ENGINEERING DEPARTMENT

A PLACE OF EXCELLENCE

CITY OF

GRAND FORKS

STANDARD CONSTRUCTION SPECIFICATIONS

CITY OF GRAND FORKS

GRAND FORKS, NORTH DAKOTA 58201

ENGINEERING DEPARTMENT

February 20, 1990

Enclosed are revised and/or added specification sheets and standard plates for the Standard Construction Specifications of Grand Forks, North Dakota, dated March 1, 1971.

These pages are to be inserted in the specification book and the old sheets removed. Contractors and suppliers may wish to retain the old sheets on file for reference to completed and/or current projects.

The following sheets are revised as of February 20, 1990:

iv, v, vi

27, 31, 32, 60, 61, 72b, 73, 73a, 74, 78, 79, 80a, 81, 91 92, 93, 97a, 98, 98a, 101a, 104a, 107, 61.01, 61.02, 61.03, 61.04, 61.05, 62.01, 62.02, 62.03, 62.04, 64.01, 64.02, 64.04, 64.07, 64.09, 65.01, 65.03, 65.04, 65.08, 66.01, 66.02, 67.03, 67.04, 69.01

The following sheets are added as of February 20, 1990:

97b, 104b, 62.03-1, 65.04-1

The following sheets are deleted as of February 20, 1990:

64.06, 64.08, 65.04-A

OFFICE OF MAYOR
MICHAEL POLOVITZ

(701) 746-2607

City of Grand Forks

402-2ND AVENUE NORTH-BOX 1518 GRAND FORKS, NORTH DAKOTA 58206-1518
Grand Forks-A Gateway to the Future

Upon City Council approval, at its regular meeting on February 20, 1990, it is hereby ordered that, effective February 20, 1990, these specifications, dated March 1, 1971, and revised to February 20, 1990, shall be the specifications for construction and material to be used on the classes of work described herein, on projects constructed in and by the City of Grand Forks, North Dakota, from and after this date, excepting work already under contract; and with the exceptions noted shall supersede all specifications previously issued for classes of work covered by these specifications.

It is further ordered that a copy of these specifications shall be filed in the Office of the City Auditor of Grand Forks, North Dakota.

2-27-90
Date

Michael Polovitz
Mayor

I hereby certify that the specifications and standard plates in the City of Grand Forks, North Dakota, Standard Construction Specifications, dated March 1, 1971, revised to February 20, 1990, were prepared by me or under my direct supervision, and that I am a duly registered professional engineer under the law of North Dakota.

2-27-90
Date

Frank Bittlemeyer
City Engineer
Reg. No. 379

GRAND FORKS
NORTH DAKOTA

ENGINEERING DEPARTMENT

STANDARD CONSTRUCTION SPECIFICATIONS

MARCH 1, 1971

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DIVISION I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 1 DEFINITION OF WORDS AND TERMS

In the interpretation and construction of these specifications and the contract, or in any documents or instruments dealing with the construction operations governed by these specifications, the following words, terms and abbreviations, or pronouns in place of them shall each be construed as defined below.

Owner

The City of Grand Forks acting through its legally constituted officials, officers, or employees.

Engineer

The City Engineer, or an engineer of the Owner, including such assistants as are authorized to represent him.

Consulting Engineer

A licensed engineer or an authorized member of a licensed consulting firm or organization retained by the Owner for design and/or supervision of its public works.

Inspector

The inspector or inspectors of the Owner who are placed in supervision of any part of the inspecting or engineering work with authority limited to the particular duties entrusted by the Engineer.

Specifications

The directions and requirements of the standard specifications as contained herein, as supplemented by such special provisions as may be provided pertaining to the manner of performing the work or the quantities and quality of materials to be furnished under the contract.

Special Provisions

The special provisions are contract requirements peculiar to the project and which are not otherwise thoroughly or satisfactorily detailed and set forth in the standard specifications.

Supplemental Specifications

Supplemental specifications are those adopted subsequent to the standard specifications and generally involve alterations and new construction items, or substantial changes in the Standard Specifications.

Plans

The official drawings, plans, profiles, typical cross sections and supplemental drawings, or reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of work to be performed. All such documents are to be considered as a part of the plans whether attached to the specifications or separate therefrom.

Bidder

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

Proposal

The written offer, or copy thereof, of the bidder to perform the work proposed, properly signed and guaranteed.

Proposal Guaranty, Bid Bond

Cash, bid bond, cashiers check or certified check accompanying the proposal submitted by the bidder as a guaranty that he will enter into contract with the Owner for performance of the work if the contract is awarded to him.

Contract

The written agreement covering the performance of the work and the furnishing of labor, materials, tools, and equipment in the construction of the work. The contract shall include the Notice to Contractors, Proposal, Plans, Specifications, Special Provisions and Contract bonds; also any and all Supplemental Agreements amending or extending the work contemplated and which may be required to complete the work in a substantial and acceptable manner. Supplemental agreements are written agreements governing alterations, amendments or extensions to the contract and include contract change orders.

The contract documents are complementary and what is called for by one shall be as binding as if called for by all.

Amount of Contract

For the purpose of awarding the contract and determining the amount of the bond, the total amount of the bid and the full amount of the contract price will be the summation of the products of the quantities shown in the proposal and the unit bid prices.

Contractor

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

Subcontractor

The individual, firm, partnership or corporation to whom the Contractor, with written consent of the Owner, sublets any part of the work covered by the contract.

Contract Bond, Performance Bond

The approved form of security furnished by the Contractor and his surety, as required in the contract. It shall be conditioned that such person or persons who enter into contract with the Owner shall faithfully perform all the provisions of the contract and complete the work in strict accordance with the plans and specifications including full payment for labor and materials used in the work.

Surety

The sureties or surety company responsible for the bidder's acts in the execution of the contract, or which is bound with and for the Contractor to insure performance of the contract, the payment of all obligations pertaining to the work, and the fulfillment of such other conditions as may be specified or required by law.

Project or Work

All the work specified, indicated, shown or contemplated in the contract to construct the improvement, including all alterations, amendments or extensions thereto made by contract change order or other written orders of the Engineer.

Days

Unless otherwise designated, days as used in the specifications will be understood to mean calendar days.

Liquidated Damages

The amount prescribed in the specifications to be paid the Owner, or to be deducted from any payments due or to become due the Contractor, for each day's delay in completing the whole or any specified portion of the work beyond the time allowed in the specifications.

"Or Equal"

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

Change Order

A written order to the Contractor by the Engineer, ordering a change that has been found necessary in the work from that originally shown in the plans and specifications but which is still within the general scope of the contract.

Intention of Terms

Whenever, in these specifications or upon the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation or prescription of the Engineer is intended; and similarly, the words, "approved," "acceptable," "satisfactory," or words of like import shall mean approved by, or acceptable to or satisfactory to the Engineer, subject to the final determination of the Owner.

Work Order

A written order, signed by the Engineer, of a contractual status requiring performance by the Contractor without negotiation of any sort.

Supplemental Agreement

A written agreement between the Owner and Contractor covering work necessary or incidental to the project but not included in the original contract.

Abbreviations

A.S.T.M.	(ASTM)	American Society for Testing Materials
A.W.W.A.	(AWWA)	American Water Works Association
A.S.A.	(ASA)	American Standards Association
A.N.S.I.	(ANSI)	American National Standard Institute
A.A.S.H.O.	(AASHO)	American Association of State Highway Officials
A.G.C.	(AGC)	Associated General Contractors of America
A.P.W.A.	(APWA)	American Public Works Association
N.D.S.H.D.	(NDSHD)	North Dakota State Highway Department
A.C.P.	(ACP)	Asbestos Cement Pipe
C.I.P.	(CIP)	Cast Iron Pipe
C.P.	(CP)	Concrete Pipe
R.C.P.	(RCP)	Reinforced Concrete Pipe
P.V.C.	(PVC)	Polyvinyl Chloride Pipe
V.C.P.	(VCP)	Vitrified Clay Pipe
C/L		Center Line
P/L		Property Line
B to B		Back to Back
F to F		Face to Face
D/W		Driveway
S/W		Sidewalk
R/W		Right of Way Line
Proj.		Project
Dist.		District
L.		Lot
Blk.		Block
Sec.		Section

St.	Street
Ave.	Avenue
Dr.	Drive
Hwy.	Highway
I.	Interstate
Hyd.	Hydrant
GV	Gate Valve
CB	Catch Basin
MH	Manhole
MB	Monument Box

Street or Alley

The whole area within the right of way which is reserved for public use.

Arterial Street

A general term denoting a street primarily for through traffic, usually on a continuous route.

Right of Way, Easement

The land provided by the Owner upon which to construct the roadway or other work and appurtenances specified in the contract.

Roadway

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

Subgrade

That portion of the roadbed surface which has been prepared, as specified, and upon which a layer of specified roadbed material or base, or surfacing, or pavement is to be placed.

Surfacing

The uppermost layer of material placed on the traveled way. This term is used interchangeably with pavement.

Traveled Way

That portion of the roadway intended for movement of vehicles.

Pavement

The uppermost layer of material placed on the traveled way or auxiliary lanes for a riding surface, generally rigid or flexible in composition. This term is used interchangeably with surfacing.

Bridge

A structure, other than a culvert, which carries traffic over a water course, highway, or railroad, or railroad traffic over a highway or street.

Culvert

A drainage structure which may or may not directly support traffic, extending across and beneath a highway, street, driveway, or alley.

SECTION II PROPOSAL REQUIREMENTS AND CONDITIONS

12.01 Contents of Proposal Forms

The Owner will furnish bidders with proposal forms which will state the location and description of the contemplated construction, the place, date, and time of opening of the proposal, and which will show the approximate quantities of the various items of work to be performed and materials to be furnished, for which unit bid prices are asked. The proposal form will state the time in which the work must be completed, the amount of the proposal guarantee which must accompany the proposal, and will contain special provisions or requirements which vary from or are not contained in these specifications. All papers bound with or attached to the proposal forms are necessary parts thereof and must not be detached.

12.02 Interpretation of Proposal Estimates

The quantities as shown in the proposal shall be used as a basis of calculation upon which the award of contract will be made, but these quantities are not guaranteed to be accurate and are furnished without any liability on the part of the Owner.

12.03 Examination of Plans, Specifications, Special Provisions, and Site of Work

The bidder is required to examine carefully the site of the proposed work, the proposal, plans and specifications and contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of these specifications, special provisions and contract. The submission of a proposal shall be prima facie evidence that the bidder has made such an examination.

Any information shown on the plans as to the soil or material borings or tests of existing materials is for the convenience of the Contractor. The information is not guaranteed, and no claims for extra work or damages will be considered if it is found during construction that the actual soil or material conditions vary from those indicated by the borings.

12.04 Preparation of Proposal

The bidder must submit his proposal on the forms furnished by the Owner. All blank spaces in the proposal forms must be correctly filled in when indicated for each and every item for which a quantity is given, and the bidder must state the price (written in ink) for which he proposes to do each item of the work contemplated or furnish each item of the materials required.

The bidder must sign his proposal correctly and in ink. If the proposal is made by a partnership, it shall contain the names of each partner and shall be signed in the firm name, followed by the signature of the person authorized to sign. If the proposal is made by a corporation, it shall be signed in the name of the corporation by the officer or officers having authority to sign contracts. The address of the bidder shall be typed or printed on the proposal.

12.05 Permissable Reservations in Proposals

Proposals containing reservations other than those permitted by the following regulations may not be considered.

1. A bidder may provide for the reduction in bid prices if he is awarded a certain combination of projects. In comparing bids, the Owner reserves the right to consider each proposal containing this stipulation individually without the specified reduction in prices or to consider all such proposals collectively with the specified reduction prices, as may appear to be in its best interest.

2. A bidder may limit the maximum amount of work he will accept at one time. In this case, if a bidder has submitted low bids on work having a value in excess of the amount specified, the projects on which awards will be made to him will be determined by the Owner.

3. Any bidder may specify that he will accept an award on a certain combination of projects only or an "all or none" basis. In such cases, only the grand total of the combination so submitted will be considered by the Owner in comparison with other bids.

12.06 Non-Collusion Affidavit

Each bid shall be accompanied by a properly executed non-collusive affidavit on the form furnished thereof by the Owner.

12.07 Proposal Guaranty

Each bid shall be accompanied by a bidder's bond in the amount of five percent of the amount of the bid. The bid security which must accompany each bid is required as a guarantee that the bidder will enter into a contract with the Owner for the work described in the proposal and furnish a performance bond as specified. All bonds shall be issued in compliance with statutes governing this class of work.

Each bidder shall verify from the proposal and special provisions that the above amount and type of bid security is applicable to the particular project on which he contemplates submitting a bid.

12.08 Delivery of Proposals

Each separate proposal, with any addenda, shall be placed in a bidding envelope and securely sealed. The proposal guaranty and a copy of the contractor's license or a copy of the certificate of renewal of license shall be sealed in a separate envelope and attached thereto. The envelopes must be addressed to the City Auditor and shall be plainly marked to indicate its contents and shall show at least the following:

1. Project Title and District Number
2. Contractor's name and address
3. Contractor's license number, class designation, and date of expiration

Proposals will be received at the time and place stated in the notice to contractors. It is the sole responsibility of the bidder to see that his bid is received in time. Any bid received after the scheduled closing time for receipt of bids will be returned to the bidder unopened.

12.09 Withdrawal and Modification of Proposals by Bidders

A bidder may, without prejudice to himself, withdraw, modify, or correct a proposal after it has been deposited with the Owner, provided the request for same is received by the Owner, in writing or by telegram, before the scheduled closing time.

12.10 Modification of Proposals by City

The City reserves the right to modify plans, specifications, special provisions or proposals for any project at any time prior to the date set for receipt of bids for the project. Notice of any such modification will be issued to all prospective bidders in the form of an addendum to the proposal forms.

12.11 Public Opening of Proposals

At the time and place set for opening and reading of the proposals as indicated in the notice to contractors, each and every proposal (except any which may have been withdrawn in accordance with Section 12.09) received prior to the scheduled closing time for receipt of proposals, will be publicly opened and read aloud.

12.12 Rejection of Proposals

Proposals containing any omission, alteration of form, additions or conditions not called for, conditional or alternate bids unless called for, incomplete bids, or proposals otherwise regular which are not accompanied by a proposal guarantee will be considered irregular and may be rejected. The Owner reserves the right to waive technicalities as to changes, alterations, or reservations, and make the award to its best interest.

12.13 Competency of Bidders

Each bidder shall furnish to the Owner, upon its request, a statement in writing showing the experience, the amount of capital and equipment the bidder has available for the performance of the proposed work. The Owner shall have the right to take such action as he may deem necessary in determining the ability of the bidder to perform the work satisfactorily. The right is reserved to the Owner to reject any bid.

12.14 Disqualification of Bidders

Any one or more of the following causes may be considered as sufficient for the disqualification of a bidder and the rejection of his bid or bids:

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

2. Evidence of collusion among bidders. Participants in such collusion may receive no recognition as bidders for any future work.

3. Unbalanced proposals in which the prices for some items are out of proportion to the prices for other items.

4. Failure to submit a unit price for each item of work for which a bid price is required by the proposal.

5. Lack of competency as revealed by the financial statement, experience, plant and equipment statements submitted.

6. Lack of responsibility as shown by past work judged from the standpoint of workmanship and progress.

7. Uncompleted work which, in the judgement of the Owner, might hinder or prevent the prompt completion of additional work if awarded.

8. For being in arrears on existing contracts, in litigation with the Owner, or having defaulted on a previous contract.

12.15 Familiarity with Laws and Ordinances

The bidder is assumed to be familiar with all federal, state, and local laws, ordinances, and regulations, which in any manner affect those engaged or employed in the work or the materials or equipment used in the proposed construction, or which in any way affect the conduct of the work, and no plea of misunderstanding will be considered on account of ignorance thereof. If the bidder or Contractor, shall discover any provision in the plans, specifications, special provisions or contract which is contrary to or inconsistant with any law, ordinance, or regulation, he shall forthwith report it to the Owner in writing.

SECTION III AWARD AND EXECUTION OF CONTRACT

13.01 Consideration of Proposals

After the proposals are opened and read, the quantities will be extended and totaled in accordance with the bid prices of the accepted proposals, and the results of the prices will be made public. Until the final award of the contract, the Owner reserves the right to reject any or all proposals, to waive technicalities and to advertise for new proposals, or proceed to do the work otherwise when the best interests of the Owner will be promoted.

13.02 Award of Contract

The award of contract, if made, will be made to the lowest responsible bidder. No award will be made until necessary investigations are made by the Owner as to the responsibility of the bidder. The Owner shall be the sole judge as to the responsibility of the bidder to satisfactorily perform the work as specified and within the time set. As provided by the North Dakota statutes, no contract will be awarded to any Contractor unless he is the holder of a current license in the class within which the value of the work falls.

In case the Federal or State government, or any agency thereof, a county or other participating party is paying any or all of the costs of construction of the project, any award made by the Owner shall be deemed only tentative until concurrance has been received from the participating parties.

13.03 Return of Proposal Guaranty

After the bids have been tabulated and compared, the Owner will return the guaranty deposits to all bidders except the deposits accompanying the two lowest bids, both of which will be held pending execution of the contract and bond therefor. Upon the execution of a contract with the successful bidder, the Owner will return the guaranty deposits to the unsuccessful bidder.

13.04 Requirements of Performance Bond

The successful bidder shall, within the time fixed by the Owner for execution of the contract, file a performance bond with the City Auditor. The performance bond shall be executed by the bidder or Contractor, as principal, and a surety company authorized to do business in the State of North Dakota. Said performance bond shall be made payable to the City of Grand Forks and shall be in a sum equal to the full amount of the contract.

The performance bond shall include and be conditional upon the premise that the Contractor shall:

1. in all things perform all terms, conditions, and provisions of the contract;
2. pay all bills or claims on account of labor or material, including supplies used for machinery and motor power equipment, performed, furnished and used in and about the performance of the contract, including all demands of subcontractors;

3. save the City of Grand Forks harmless of and from all costs, damages, loss liability, judgments, and executions that may be brought against it by such work or the prosecution thereof by the said Contractor, or its acts or omissions or those of its agents, servants, and employees in the premises;
4. have made or will make prior to the commencement of any work by himself or any subcontractor under such contract, full and true report to the Workmens Compensation Bureau of the payroll expenditures for the employees to be engaged in such work and shall pay the premium thereon prior to the commencement of such work;
5. repair and replace all defective work or unsatisfactory filling of trenches which may appear within the period of two years from the date of the final acceptance of the work.

Such bond shall be approved by the Owner and shall thereafter be and remain in full force and effect until the period of two years following the final acceptance of the work by the Owner shall have expired. Upon the execution of the contract and of the contract bond, the bidding bond shall be returned to the bidder.

13.05 Execution of Contract

Within ten (10) days after notification of award of contract as evidenced by receipt from the Owner of properly prepared contract documents, the bidder to whom award is made shall execute and return the contract in the required number of copies, and shall furnish a performance bond and other required bonds and insurances satisfactory to the Owner.

13.06 Approval of Contract

No contract is binding upon the Owner until it has been executed by the Owner and delivered to the Contractor.

13.07 Failure to Execute the Contract

Failure on the part of the successful bidder to execute a contract and/or file a satisfactory performance bond, as provided herein, may be considered cause for annulment of the award and the forfeiture of the proposal guaranty to the Owner, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next responsible bidder or the work may be readvertised and constructed under contract or otherwise as the Owner may decide.

13.08 Contractor's Insurance

The Contractor shall not commence work under this contract until he has obtained all insurance required herein and such insurance has been approved by the Owner as to amounts, form, and insurers. Said insurance shall protect both the Contractor and the Owner against all hazards enumerated herein, and should any part of this contract be sub-let the Contractor shall have the option of either naming any or all sub-contractors as being insured under his policies or requiring that each sub-contractor secure insurance protecting himself against all hazards enumerated herein. The following policies are required:

1. Public Liability and Property Damage

The Contractor shall maintain such insurance as will protect him and the Owner against any and all claims and demands arising from injury to person or persons not in the employ of the Contractor, and against any and all claims and demands resulting from damage to any property due to any act or omission of the Contractor, his agents, or employees, or the Owner, in the operation of the work or the execution of this contract. The Owner shall be named as an insured in the policy. Such insurance shall remain in effect on portions of the work which have been completed and which may or may not be occupied or utilized by the Owner prior to the completion and acceptance of all of the work included in these specifications. The minimum amount of public liability insurance shall be $250,000.00 for injury to one person and $500,000.00 for any one incident, and property damage insurance shall be $100,000.00 for any one incident and $200,000.00 cumulative.

2. Employers Liability and Workmens Compensation

The Contractor shall secure and maintain employers and Workmens Compensation insurance as it will protect him and the Owner against any and all claims resulting from injuries to and death of workmen engaged in work under this contract.

3. Purchaser's Contingent Protective Liability and Property Damage

The Contractor shall purchase and maintain purchaser's protective liability and property damage insurance issued in the name of the Owner as will protect the Owner against any and all claims that might arise as a result of the operations of the Contractor or his subcontractors in fulfilling this contract. The minimum amounts of such insurance shall be the same as required for the public liability and property damage insurance.

4. Contractors Contingent or Protective Liability and Property Damage

In case part of this contract is sub-let, the Contractor shall secure contingent or protective liability and property damage insurance to protect him from any and all claims arising from the operations of subcontractors in the execution of work included in this contract.

5. Builders Risk Fire Insurance with Extended Coverage (or Supplemental Contract)

Where required by the special provisions the Contractor shall secure insurance fully to protect himself and the Owner against damage to equipment, structures, or material from fire and hazards included in extended coverage endorsement or supplemental contract.

6. Automobile Public Liability and Property Damage

The Contractor shall maintain automobile public liability insurance in the amount of not less than $250,000.00 for injury to one person and $500,000.00 for one accident, and automobile property damage insurance in the amount of not less than $100,000.00 for one accident to protect him from any and all claims arising from the use of any and all automobiles and trucks owned by the Contractor, hired or rented by the Contractor, or used by the Contractor on the project although neither owned by him nor hired by him, such insurance to cover the use of said automobiles and trucks both on and off the actual site of the project.

7. Special Insurance

When the contract requires work to be done or materials or equipment to be stored or transported on or across railroad property the required Railroad Protective Liability and Property Damage and Public Liability and Property Damage insurances (see Art. 16.16) in the form and amounts as required by the railroad shall be furnished at no additional cost to the Owner.

If the owner of any other premises on which the contract requires work to be done demands indemnification in addition to that required in the contract documents, the Contractor shall furnish insurance of such kinds and in such amounts as the Engineer directs. The Owner will reimburse the Contractor for the premium on such additional insurance in the exact amount thereof upon presentation of receipted bills therefore.

8. "X", "C" and "U" Exclusions

Where required by the special provisions, the Contractor shall furnish X,C, and U coverage.

13.09 Evidence of Insurance

The Contractor shall be required to furnish a Certificate of Insurance or copies of the required policies to the City Auditor as evidence of sufficient and satisfactory coverage.

If a Certificate of Insurance is furnished it shall be furnished on Form 50.06 of this specification.

SECTION IV SCOPE OF WORK

14.01 Intent of Plans and Specifications

It is the intent of the plans and specifications to prescribe a complete work or improvement which the Contractor undertakes to do, in full compliance with the provisions and requirements of the contract. Unless otherwise provided, the Contractor shall furnish all labor, materials, equipment, tools transportation, supplies and incidentals which may be necessary to construct and complete the improvement in accordance with the contract. All work shall be done, and all materials shall be furnished, in accordance with the plans, specifications, and special provisions unless deviations are authorized or ordered by the Owner.

The Owner expressly reserves the right to make alterations in the construction details or limits contained in the plans, specifications, or special provisions.

14.02 Special Provisions

Should any construction items or requirements which are not covered by these specifications be anticipated on any proposed work, special provisions covering such items will be included with the proposal form, and these special provisions shall be considered as a part of the contract.

14.03 Increased or Decreased Quantities of Work

The Owner reserves the right to make such alterations in the plans, or in the quantities of work as may be considered necessary. Such alterations shall be in writing by the Engineer and shall not be considered as a waiver of any conditions of the contract nor to invalidate any of the provisions thereof; provided, however, that the execution of a supplemental agreement acceptable to both parties of the contract will be necessary before any alteration is made which involves (1) an extension or shortening of the length of the project by more than 25%; (2) an increase or decrease of more than 25% of the total cost of the project calculated from the original proposal quantities and the unit contract prices, or (3) an increase or decrease of more than 25% in the quantity of any one major contract item.

For condition (3) above, a major item is defined as any item, unless otherwise indicated on the plans or designated in the special provision, the contract price for which amounts to 10% or more of the total contract price as determined by the original quantities and the unit contract prices.

When an alteration requires the execution of a supplemental agreement, the agreement shall be fully executed before any work on the alteration is started. Alterations involving an increase of more than 25% in the net of any one minor contract item will not require a supplemental agreement.

14.04 Extra Work

When work is necessary to the proper completion of the project for which no quantities or prices were given in the proposal or contract, the same shall be called extra work and shall be performed by the Contractor when so directed in writing by the Engineer. Extra work shall be performed by the Contractor in accordance with these specifications in a proper and workmanlike manner and as may be directed by the Engineer.

Prices for extra work shall be itemized and covered by a change order or by a supplemental agreement submitted by the Contractor and approved by the Owner prior to the starting of such work. Should the parties be unable to agree on unit prices for the extra work or if this method is impractical, the Engineer may instruct the Contractor to proceed with work by force account.

CLAIMS FOR EXTRA WORK NOT AUTHORIZED IN WRITING BY THE CITY ENGINEER PRIOR TO THE EXTRA WORK BEING STARTED WILL BE REJECTED.

14.05 Disputed Claims

In any case where the Contractor believes extra compensation is due him for work or material which he deems is not clearly covered in the contract, or is not ordered by the Engineer as extra work, he shall notify the Engineer in writing of his intention to make claim for such extra compensation before he begins the work on which he bases his claim. If such notification is not given, or if the Engineer is not afforded the proper facilities for keeping strict account of actual cost, no claim for such extra compensation will be considered. Such notice by the Contractor, and the fact that the Engineer has kept account of the cost as aforesaid, shall not in any way be construed as proving the validity of the claim. The claim must be passed upon by the Owner. In case the claim is found to be just, it shall be allowed and paid for as extra work.

14.06 Prosecution of Work Near Public Utility Properties

Public utility companies will be notified to move those of their properties which run over, through, or under any part of the right of way and which, in the opinion of the Enigneer, must be moved in order to complete the project. However, no warranty is made or implied that such properties will be moved prior to the construction operations.

The Contractor shall preserve and protect all such properties which are above the ground surface, and also those below the ground surface whose approximate locations are shown in the plans or whose existance is indicated in the special provisions, or of whose existance he is notified before such properties are damaged by his operations; and he shall assume full responsibility for reimbursing the owners thereof for any damage or injury to such properties which may be caused by his operations. He shall at no time hinder or interfere with any persons engaged in protecting or moving utility properties or in the operation of the utility.

The Contractor shall give notice to the owners of all known utilities at least forty-eight (48) hours before starting any construction operations which will affect such properties. If, during the course of his operations, he discovers utility properties the existance of which was not known, he shall immediately notify the owner thereof and the Engineer.

Nothing in these specifications shall be deemed to impose liability on a Contractor for damage to property located below the surface of the ground, in the absence of negligence, if the owner of such property after a reasonable notice from the Contractor, fails to advise the Contractor of the location of such property and the depth at which it is located.

It is understood and agreed that, in preparing his proposal, the bidder has considered all public utility properties which are above the ground surface and those below the ground surface whose approximate locations are shown in the plans, or whose existance are indicated in the special provisions, together with their effect on the cost of performing the work. It is further understood and agreed that no compensation in addition to the contract prices will be made by the Owner to the Contractor for any delays, inconvenience or damages sustained by him because of such utility properties or the operations of moving them (either by the owners or by the Contractor) or because of any special construction methods required in the prosecution of the work made necessary by the existance of such utility properties, whether or not they have been moved.

14.07 Disposal of Material and Debris

When the contract requires or permits the Contractor to dispose of materials or debris outside the right of way, he may do so in any manner he elects, providing that before dumping material and debris on public or private lands, he obtains written permission from the owner of such land and a waiver of all claims against the City for any damage to such land which may result therefrom, together with all permits required by law for such dumping.

14.08 Use of Materials Found on Work

Materials, including black dirt, found on the right of way or other land acquired for the project shall not be used by the Contractor for any other purposes than those specified in the contract, nor shall any materials be destroyed or removed from the site by him unless specifically permitted by the contract.

14.09 Final Cleanup

Upon completion of the project and before acceptance and final payment is made, the Contractor shall remove from the right of way all surplus and discarded materials, equipment, rubbish and temporary structures, and shall leave the right of way in a neat and presentable condition.

SECTION V CONTROL OF WORK AND MATERIALS

15.01 Authority of the Engineer

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

The Engineer will have the authority to suspend the work wholly or in part due to the failure of the Contractor to correct conditions unsafe for the workmen or the general public; for failure to carry out provisions of the contract; for failure to carry out orders; for such periods as he may deem necessary due to unsuitable weather; for conditions considered unsuitable for the prosecution of work; for any other condition or reason deemed to be in the public interest; or for other reasons that may be mutually agreed on by the parties to the contract.

15.02 Conformity With Plans and Allowable Deviations

Finished surfaces in all cases shall conform to the lines, grades, cross sections, and dimensions shown on the approved plans and working drawings. Any deviation from the approved plans and working drawings which may be required by the exigencies of construction will be determined by the Engineer and authorized by him in writing.

15.03 Coordination of Plans, Specifications and Special Provisions

These specifications, the plans, special provisions, and all supplementary plans and documents are essential parts of the contract, and a requirement occurring in one is just as binding as if occurring in all. They are intended to be cooperative to describe and provide for a complete work. In case of discrepancy, figured dimensions, unless obviously incorrect, shall govern over scaled dimensions. Plans shall govern over specifications and special provisions shall govern over both plans and specifications.

The Contractor shall not take advantage of any apparent error or omission in the plans and specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately call upon the Engineer for his interpretation and decision, and such decision shall be final.

15.04 Cooperation of Contractor

The Contractor shall have a set of plans and specifications available on the project at all times during its progress. He shall cooperate with the Engineer in preserving stakes and marks established by the Engineer. He shall have a competent and reliable representative on the project at all times, who is authorized to act for him in every capacity under the terms of the contract. The Contractor shall employ careful and competent superintendents, foremen, and workmen.

When the Contractor begins work on a project which he did not work on the previous day, he shall immediately notify the Engineer before proceeding with construction. Any work done without notice may be treated as unauthorized work as defined in 15.08.

When different types of construction work on the same section of street are let under separate contracts, the several contractors shall cooperate to the fullest extent with each other so that the prosecution of the work under each contract will be carried out to the best advantage of the Owner. The Owner assumes no liability for any delay caused to any Contractor by another.

The Contractor shall give to the work the constant attention necessary to facilitate the progress thereof and he shall cooperate with the Engineer and his inspectors and with others in every way possible. The Engineer shall allocate the work and designate the sequence of construction in case of controversy between Contractors.

15.05 Construction Stakes

The Contractor shall give at least two (2) working days notice to the Engineer prior to the time that he begins work on any portion of the project which requires construction stakes. The Engineer will then furnish and set said construction stakes and marks establishing lines and grades and will furnish the Contractor with all necessary information relating to them. The Contractor shall satisfy himself as to the accuracy of all measurements before constructing any permanent structure and shall not take advantage of any errors which may have been made in laying out the work. Such stakes and markings as the Engineer may set for either his own or the Contractor's guidance shall be scrupulously preserved by the Contractor. In the case of negligence on the part of the Contractor or his employees resulting in the destruction of such stakes or markings, an amount equal to the cost of replacing the same may be deducted from subsequent estimates due the Contractor, at the discretion of the Engineer.

15.06 Authority and Duties of Inspectors

Inspectors, empowered by the Owner, shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. The inspector is not authorized to revoke, alter, or waive any requirements of the specifications. He is authorized to call the attention of the Contractor to any failure of the work or materials to conform to the specifications and contract, but failure on the part of the inspector to call such infringements upon the plans and specifications to the attention of the Contractor shall not constitute acceptance of said work. He shall have the authority to reject materials or suspend the work until any questions at issue can be referred to and decided by the Engineer.

The inspector shall in no case act as foreman or perform other duties for the Contractor, nor interfere with the management of the work by the latter. Any advice which the inspector may give the Contractor shall in no way be construed as binding on the Engineer in any way, or releasing the Contractor from fulfilling all of the terms of the contract.

If the Contractor refuses to suspend operations on verbal order, the inspector shall issue a written order giving the reason for shutting down the work. After placing the order in the hands of the man in charge, the inspector shall immediately leave the job. Work done in the absence of the inspector will not be accepted or paid for.

The inspector will exercise such additional authority as may, from time to time, be especially delegated to him by the Engineer.

15.07 Inspection

The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the work, as performed, is in accordance with the requirements and intent of the specifications and contract. If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the unfinished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed, will be paid for as extra work, but should the work so exposed or examined prove unacceptable, the uncovering or removing, and the replacing of the covering or making good of the parts removed, shall be at the Contractor's expense. Any work done or materials used without suitable supervision or inspection by the Engineer or his authorized representative may be ordered removed and replaced at the Contractor's expense.

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

15.08 Unauthorized Work

Except as otherwise provided in the contract, work done without lines or elevations being given or with materials which have not been given the required inspection may be considered as unauthorized work and as having been done at the expense of the Contractor. Compensation for such work will be made only in the event that the Engineer determines it to be acceptable to the Owner.

Any work done which is not specified in the contract and which is not ordered by the Engineer to be done, and any work done by the Contractor contrary to the terms of any "Suspension of Work Order" issued by the Engineer, will be considered as unauthorized work and will not be measured or paid for by the Owner.

Any unauthorized work may be ordered removed and replaced at the Contractor's expense.

15.09 Defective Work

All work and materials which do not conform to the requirements of the contract shall be considered as defective. When so ordered by the Engineer, all defective work shall be remedied, repaired, or removed and replaced in an acceptable manner by the Contractor.

If the Contractor fails or refuses to remedy or repair any defective work or materials or to remove and replace such work or materials, the Owner shall have the right at its option: (1) to take over and use such defective work by payment to the Contractor of an amount equal to the reasonable value of such work as determined by the Owner; or (2) to cause such defective work to be remedied or repaired, or removed and replaced, and deduct the cost thereof from any moneys due or which may become due the Contractor or require reimbursement therefor from the surety of the performance bond.

When such defective work has been remedied or repaired, or removed and replaced, either by the Contractor or by the Owner, the Contractor will be credited with an amount equal to the value of the completed work based on the contract price or prices therefor, subject to deduction of any costs incurred for work performed by others under the provisions of option (2) above.

If the Contractor continues to perform defective work, the Owner may declare him in default as provided in 17.07 (Annulment of Contract).

15.10 Equipment and Methods

When the equipment and methods to be used by the Contractor are not prescribed in the specifications, the Contractor may use any equipment and methods that he demonstrates to the satisfaction of the Engineer will accomplish the contract work in reasonable conformity with the plans and specifications. When the specifications require that the construction be performed by the use of certain equipment and methods, such equipment and methods shall be used unless otherwise authorized by the Engineer.

15.11 Night Work

No work shall be permitted at night without the prior written approval of the Engineer and unless the Contractor furnishes flood lights in sufficient number and of sufficient intensity to insure the same degree of accuracy of workmanship as would be obtained by daylight.

15.12 Verbal Agreements

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

15.13 Quality of Materials

All materials furnished by the Contractor shall meet the requirements of these specifications.

15.14 Sources of Material

Promptly after the approval of the contract, the Contractor shall notify the Engineer of the proposed sources of supply of all materials to be furnished by him. At the option of the Engineer the source of supply of each of the materials shall be approved by the Engineer before the delivery is started. Representative preliminary samples of the character and quality prescribed shall be submitted by the Contractor or producer for examination and tests by the Engineer.

15.15 Shop Drawings

After checking and verifying all field measurements, the Contractor shall submit five copies of all shop drawings to the Engineer for review and approval, said drawings having been checked by and stamped with the approval or signature of the Contractor. The data shown on the shop drawings shall be complete with respect to dimensions, design criteria, materials of construction, and like information to enable the Engineer to review the information as required. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the shop drawings may have from the requirements of the contract documents.

The Engineer's review and approval of the shop drawings shall be only for conformance with the design concept of the project and for compliance with the information given in the contract documents and shall not extend to means, methods, sequences, techniques, or procedures of construction or to safety precautions or programs incidental thereto. The review and approval of a separate item, as such, will not indicate approval of the assembly in which the item functions. The Contractor shall make any corrections required by the Engineer and shall return the required number of corrected copies of the shop drawings for review and approval. The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on previous submittals. The Contractor's stamp or signature of approval on any shop drawing shall constitute a representation to the Owner and the Engineer that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or assumes full responsibility for doing so, and that the Contractor has reviewed or coordinated each shop drawing with the requirements of the work and the contract documents.

Where a shop drawing is required by the specifications, no related work shall be commenced until the submittal has been reviewed and approved by the Engineer.

The Engineer's review and approval of shop drawings shall not relieve the Contractor from responsibility for any deviations from the contract documents unless the Contractor has in writing called the Engineer's attention to such deviation at the time of submission and the Engineer has given written concurrence and approval to the specific deviation, nor shall any concurrence or approval by the Engineer relieve the Contractor from responsibility for errors or omissions in the shop drawings.

15.16 Inspection and Acceptance of Materials

Final inspection and acceptance of materials will be made only at the site of the work. The Owner reserves the right to sample, inspect, and test materials throughout the duration of the work, and to reject any materials which are found to be unsatisfactory at any time. No material which, after approval, has in any way become unfit for use shall be used in the work.

15.17 Samples and Tests

All tests of materials furnished by the Contractor shall be made by the Engineer in accordance with commonly recognized standards of national organizations, and such special methods and tests as are set forth elsewhere in these specifications or in the special provisions.

The Contractor shall furnish without charge such samples of all materials as may be requested by the Engineer. Materials shall not be used until they have been approved by the Engineer. Samples will be secured and tested whenever necessary to determine the quality of the material.

15.18 Storage of Materials

Materials shall be stored so as to ensure the preservation of their quality and fitness for the work, and such materials, even though approved before storage, shall be subject to re-test and must meet the requirements of these specifications at the time they are used in the work.

15.19 Defective Materials

All materials not conforming to the requirements of these specifications will be rejected by the Engineer, and all such materials, whether in place or not, shall be immediately removed from the site of the work by the Contractor. Any portion of the work in which any defective material may have been used shall be considered as defective work, as provided in 15.09.

SECTION VI LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

16.01 Laws to Be Observed

The bidder is assumed to be familiar with all federal, state, and local laws, codes, ordinances, and regulations which, in any manner, affect those engaged or employed in the work or the material or equipment used in or upon the site, or in any way affects the conduct of the work. No pleas in misunderstanding or ignorance on the part of the Contractor will, in any way, serve to modify the provisions of the contract.

The Contractor at all times, shall observe and comply with all federal, state, and local laws, codes, ordinances, and regulations in any manner affecting the conduct of the work, and the Contractor and his surety shall indemnify and save harmless the Owner and all of his agents, officers, and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees.

If the Contractor shall discover any provision in the contract which is contrary to or inconsistent with any such laws, or regulations, he shall immediately report it to the Engineer in writing.

16.02 Permits and Licenses

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

16.03 Use of City Hydrants

The Contractor shall secure the permission and abide by the rules and regulations of the City Water Department before any use of City hydrants will be permitted. The Contractor shall furnish sufficient proof of this permission to the Engineer.

16.04 Patented Processes, Materials, and Devices

If the Contractor is required or desires to use any device, design, material, or processes covered by letters patent or copyright, he shall provide for such use by suitable legal arrangement with the patentee or patent owner. The Contractor and his surety shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of any such patented device, design, material, or process, or any trademark or copyright in connection with the work agreed to be performed under this contract, and shall indemnify the Owner for any costs, expense, and damages which it may be obliged to pay for reason of any such infringement at any time during the prosecution, or after the completion of the work.

The contract prices shall, without exception, include compensation for all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work.

16.05 Taxes on Materials

The prices quoted herein by the bidder shall be deemed exclusively to include all direct and/or indirect federal, state, or local taxes which apply, including the North Dakota use taxes and sales taxes, even though the bidder at the time of submitting his bid is not required or authorized to collect such taxes.

16.06 Federal Participation

When the United States Government pays all or any portion of the cost of the project, the federal laws and rules and regulations made persuant to such laws must be observed by the Contractor, and the work shall be subject to the inspection of the appropriate federal agency. Such inspections shall in no sense make the Federal Government a party to this contract and will in no way interfere with the rights of either party hereunder.

16.07 Sanitary Provisions

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements of the state and local board of health, or of other bodies or tribunals having such jurisdiction.

16.08 Public Convenience and Safety

The Contractor shall at all times conduct his operation and perform the work in such a manner as to insure the least obstruction and interference to traffic. The Contractor shall take adequate precautions to insure the safety of the general public and those who require access to the abutting property. Temporary bridges for pedestrians shall be provided over new pavements and sidewalks at street intersections, as required by the Engineer.

The Contractor shall give the Chief of the fire department at least 24 hours notice, in writing, before it becomes necessary to blockade any street. Fire hydrants shall be accessible at all times to the fire department. No material or other obstruction shall be placed closer to the fire hydrant than permitted by ordinances, rules or regulations, or within five (5) feet of a fire hydrant in the absence of such ordinances, rules or regulations. If, in the opinion of the Engineer, dust caused by the Contractor's operations on the street or on any haul road to the street becomes a hazard to traffic or a nuisance to the public, the Contractor shall sprinkle the street with water in such amounts as the Engineer directs. The water so used shall be considered incidental to construction.

The Contractor shall provide all safeguards, safety devices and protective equipment and take any other action reasonably necessary to protect the life and health of the employees on the project.

16.09 Provisions for Traffic

The Contractor shall be responsible for maintenance, control, barricades, warning signs, and the safeguarding of traffic within and immediately abutting the project as further outlined herein. All barricades, warning signs, lights, temporary signals, and other protective devices must conform with the latest edition of the Manual on Uniform Traffic Control Devices for Street and Highways published by U.S. Department of Transportation, Federal Highway Administration. The Owner will be responsible for maintenance on all detours which do not lie within the project limits, unless otherwise required in the special provisions.

Streets may be closed to through traffic unless otherwise provided for in the special provisions. Streets shall not be closed to traffic until such closure has been approved by the Engineer. Street closures shall be made in such a manner as to provide for maximum public safety and public convenience. They shall be open to through traffic at such time as the work has been completed, or as the Engineer may direct.

Local traffic shall be provided access to private properties at all times, except during critical stages of construction when it is impractical to carry on the construction and maintain traffic simultaneously.

No private driveway may be closed without the approval of the Engineer unless written permission has been given the Contractor by the owner of the property affected.

Emergency traffic such as police, fire, and disaster units shall be provided reasonable access at all times. The Contractor shall be liable for any damages which result from his failure to provide such reasonable access.

The Contractor shall furnish at his own expense all flagmen who may be needed.

The Contractor shall take every precaution to protect pedestrian and vehicular traffic.

16.10 Use of Explosives

Blasting will not be permitted in any case without specific authority from the Owner, and then only with such restrictions as may be required by the proper authorities. When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care so as not to endanger life or property, cause slides or disturb the materials outside the neat lines of the cross-section.

The Contractor shall notify each public utility company, having structures in proximity to the site of the work, of his intentions to use explosives and such notice shall be given sufficiently in advance to enable the companies to take such steps as may be necessary to protect their property from injury.

The Contractor shall be responsible for any and all damages resulting from the use of explosives.

16.11 Protection and Restoration of Property

The Contractor shall be responsible for the preservation of all public and private property and shall protect carefully from disturbance or damage all land monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed. The Contractor shall be responsible for all damage or injury to property of any character during the prosecution of the work, resulting from any act, omission, neglect or misconduct in his manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, he shall restore, at his own expense, such property to the condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring as may be directed, or he shall make good such damage or injury in an acceptable manner.

16.12 Responsibility for Damage Claims

The Contractor and his sureties will indemnify and save harmless the Owner and all of its officers, agents, and employees from all suits, actions, or claims of any character, name and description brought for or on account of any injuries or damages received or sustained by any person, persons, or property, by or from the said Contractor or his employees or by or in consequence of any neglect in safeguarding the work, or through the use of unacceptable materials in constructing the work or by or on account of any act or omission, neglect, or misconduct of the said Contractor or by or on account of any claims or amounts recovered by an infringement of patents, trademark, or copyright, or from any claims or amounts arising or recovered under the "Workman's Compensation Law," or any other law, ordinance, order or decree, and so much of the money due the said Contractor under and by virtue of this contract, as shall be considered necessary by the Owner, may be retained or, in case no money is due, his surety shall be held until such suit or suits, action or actions, claim or claims, for injuries or damages as aforesaid shall have been settled and satisfactory evidence to that effect furnished to the Owner.

16.13 Contractor's Responsibility for Work

Until acceptance by the Engineer of any part or all of the construction, as provided for in the specifications, it shall be under the charge and care of the Contractor, and he shall take every necessary precaution against injury or damage to any part of the work by the action of the elements or from any other cause whatsoever, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good, at his own expense, all injuries or damages to any portion of the work occasioned by any of the above causes before its completion and acceptance.

16.14 Personal Liability of Public Officials

In carrying out any of the above provisions or in exercising any power or authority granted to him by this contract, there shall be no liability upon the Engineer or his authorized assistants nor any other officer of the Owner, either personally or as an official of the Owner, it being understood that in such manners he acts as an agent and representative of the Owner.

16.15 No Waver of Legal Rights

Should an error be discovered in or payment of unauthorized work be made by the final estimate or should dishonesty on the part of the Contractor be discovered in the work, the Owner reserves the right, after the final payment has been made, to claim and recover by process of law such sums as may be sufficient to correct the error, to recover the overpayment, or to make good the defects in the work resulting from the Contractor's dishonesty.

16.16 Work on Railroad Right of Way

The term "railroad" shall be understood to mean the railroad upon whose right of way the contract requires that work be done or across whose tracks materials will be hauled over a private crossing. No compensation in addition to the contract unit prices will be made to the Contractor by the Owner because of any cost incurred by him (including the cost of the bond required herein) or because of any delays to his forces or equipment which may result from his fulfillment of the requirements specified. Insurances with higher limits of liability are required for work on railroad property as follows:

The Permitee (or Owner) shall require in any contract it shall let for the work permitted to be performed on the property of the Railroad that its contractor shall:

A. Furnish to Railroad a Railroad Protective Liability Insurance policy in the form prescribed by the Federal Highway Administration's Policy and Procedure Memorandum No. 20-12. Said policy shall protect the Railroad and any other railroad company including National Railroad Passenger Corporation (AMTRAK) occupying or using the Railroad's right of way or line of railroad against all loss and damage arising from activities of the Permittee or its contractors, their forces, or any of their subcontractors or agents. The limits of said policy shall not be less than Five Hundred Thousand ($500,000.00) for all damages arising out of bodily injury to or death of any one person and subject to that limit for each person a total of not less than One Million Dollars ($1,000,000.00) for all damages arising out of bodily injury to or death of two or more persons in any one accident; and not less than Five Hundred Thousand Dollars ($500,000.00) for all damages arising out of injury to or destruction of property in any one accident and subject to that limit for any one accident a total limit of not less than One Million Dollars ($1,000,000.00) for all damages arising out of injury to or destruction of property during the policy period. Said insurance policy executed by a corporation qualified to write the same in the State in which the work is to be performed shall be in form and substance satisfactory to the Railroad, and shall be delivered to and approved by the Railroad prior to the entry upon or use of its property by the Permittee or its contractor.

B. Carry regular Contractor's Public Liability and Property Insurance as specified in the Federal Highway Administration's Policy and Procedure Memorandum No. 20-12 providing for a limit of not less than Five Hundred Thousand Dollars ($500,000.00) for all damages arising out of bodily injuries to or death of one person, and, subject to that limit for each person, a total limit of not less than One Million Dollars ($1,000,000.00) for all damages arising out of bodily injuries to or death of two or more persons in any one accident, and providing for a limit of not less than Five Hundred Thousand Dollars ($500,000.00) for all damages to or destruction of property in any one accident and subject to that limit a total (or aggregate) limit of not less than One Million Dollars ($1,000,000.00) for all damages to or destruction of property during the policy period. A certified copy of the policy providing said Contractor's Public Liability and Property Damage Insurance, executed by a corporation qualified to write the same in the State in which the work is to be performed, in form and substance satisfactory to the Railroad, shall be delivered to and approved by the Railroad prior to the entry upon or use of the Railroad's property by the Contractor.

All requirements as to safety, hours of operation, limits of access to the site, submittal of plans, specifications or detail drawings for work to be done on railroad property or other similar requirements of the railroad shall be investigated by the bidder and the cost of such work or any limitations on the work to be done or any compensation due the railroad because of method of construction or temporary easements required by the contractor shall be included in the contract bid price.

17.01 Subletting or Assigning of Contract

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

Requests for permission to sublet, assign, or otherwise dispose of any portion of this contract shall be in writing and accompanied by the consent of the surety. In the event consent is given, it shall in no way release the Contractor from any responsibility, but he shall be held in all respects accountable for the same as if no consent has been given. The Contractor shall be required to give his personal attention to the work that is sub-let.

17.02 Prosecution of Work

The Contractor shall begin the work to be performed under the contract within ten (10) days after he is notified in writing by the Owner to proceed with construction of the project. At least five (5) days prior to the contract starting date, the Contractor shall submit to the Engineer a bar chart showing the dates on which he proposes to start and complete each of the major operations and the percentage of each which he proposes to have completed at the end of each month. This schedule shall be subject to review and revision when and if conditions beyond the control of the Contractor delay his operations. The Contractor will be required to adhere to his proposed schedule and he shall prosecute the work in such a manner as to ensure its completion within the time set forth in the contract. Any failure to adhere to the proposed schedule will be considered prima facie evidence that the Contractor has failed to provide sufficient workmen, equipment or materials to insure completion of the work within the specified time. The Engineer may thereupon give notice of such failure to the Contractor and his surety as provided in 17.07 (Annulment of Contract).

17.03 Suspension and Resumption of Work

The Engineer shall have the authority to suspend the work wholly, or in part, for such period or periods as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as is necessary, due to the failure on the part of the Contractor to carry out orders given or perform any and all provisions of the contract. If it should become necessary to stop work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction, nor become damaged in any way, and he shall take every precaution to prevent damage or deterioration of the work performed; provide suitable drainage by opening ditches, shoulder drains, storm sewers, etc., and erect temporary structures where necessary.

The Contractor shall not suspend the work without written authority from the Engineer, and shall proceed with the work promptly when notified by the Engineer to resume operations.

17.04 Time for Completion

The improvement contemplated by the contract shall be completed in its entirety within the number of working days, or by definite completion dates specified in the contract.

Working days shall be counted from the date specified below:

1. Ten (10) days from date of notice to proceed or May 15, whichever is later.

or

2. As specifically set forth as part of the special provisions or a duly issued addendum prior to date of bid opening.

or

3. As specifically agreed upon by the Contractor and the Engineer and set forth in writing and signed by both parties.

Working days shall be calendar days, exclusive of Saturdays, Sundays, or Owner recognized legal holidays on which weather and other conditions, not under the control of the Contractor will permit construction operations to proceed on the controlling item or items of work which would be in progress at that time.

The Engineer will furnish the Contractor with a statement of the number of working days charged to the contract at least monthly. The Contractor will be allowed one week in which to file a written protest setting forth in what respects said statement is incorrect, otherwise the statement shall be deemed to have been accepted by the Contractor as correct. All working days elapsing between the effective dates of any orders of the Engineer to suspend and resume work for suspensions not the fault of the Contractor shall be excluded.

17.05 Extension of Contract Completion Time

The Contractor expressly covenants and agrees that in undertaking to complete the work within the time herein fixed, he has taken into consideration and made allowances for all of the ordinary delays and hinderances incident to such work whether growing out of delays in securing materials or workmen, or otherwise. Should the Contractor, however, be delayed in the prosecution and completion of the work by any cause beyond his control, including delayed shipment orders, or by any changes, additions, or omissions therein ordered in writing by the Owner, or by the abandonment of the work by the men engaged thereon through no fault of the Contractor; or by any act taken by the U.S. Government such as the commandeering of labor and materials, embargos, etc., which would affect the fabrication or delivery of materials and or equipment to the work; or by neglect, delay or default of any other Contractor of the Owner, or delays caused by court proceedings; the Contractor shall have no claims for damages for any such cause or delay; but he shall in such cases be entitled to such extention of time specified for the completion of the work as the Owner shall award in writing on account of such delays, provided, however, that claim for such extension of time is made by the Contractor to the Owner in writing within one week from the time that such alleged cause for delay shall occur.

17.06 Liquidated Damages

It is mutually understood and agreed by and between the parties to this contract, in the execution of the same, that time is of the essence. In the event that the Contractor shall fail to complete the work to be performed under this contract by and at the completion time bid in the proposal, the Contractor shall pay unto the Owner as and for the liquidated damages, and not as a penalty, the sum equal to:

1. ten dollars per hour times the actual number of hours an inspector is required on the project;
2. twenty-five dollars per hour times the actual number of hours a survey crew is required on the project;
3. fifteen dollars per hour times the actual number of hours an engineer is required on the project;

for each and every calendar day that the Contractor shall be in default; extension of time granted by the Owner as hereinbefore stated shall not operate to the contrary, unless such extensions granted by the Owner specifically provide for the waiving of liquidated damages during and over such periods of time extension; provided however, that in no case will the liquidated damages exceed the sum of fifty dollars ($50.00) for any one day. The Owner shall have the right to deduct said liquidated damages from any moneys in his hand, otherwise due, or to become due, to said Contractor, or to sue for and recover compensation for damages for nonperformance of this contract at the time stipulated herein and provided for.

17.07 Annulment of Contract

The contract of which these specifications form a part, may be terminated by the Owner for the following reasons:

1. Failure of the Contractor to start the work on the day given in the notice to proceed.

2. Substantial evidence that the progress being made by the Contractor is insufficient to complete the work within the specified time.

3. Deliberate failure on the part of the Contractor to observe any requirements of these specifications.

4. Failure of the Contractor promptly to make good any defects in materials or work or any defects of any other nature, the correction of which has been directed in writing by the Engineer.

5. Substantial evidence of collusion for the purpose of illegally procuring the contract or perpetrating fraud on the Owner in the construction of the work under contract.

6. If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency or if he should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Engineer, or otherwise be guilty of the substantial violation of any provision of the contract.

Before the contract is terminated, the Contractor and his surety will first be notified in writing by the Owner of the conditions which make termination of the contract imminent. If, after seven (7) days from the delivery of such notice, a satisfactory effort has not been made by the Contractor or his surety to correct the conditions, the Owner may declare the contract terminated and notify the Contractor and his surety accordingly.

Upon receipt of notice from the Owner that the contract has been terminated, the Contractor shall immediately discontinue all operations. The Owner may then proceed with the work in any lawful manner that he may elect until it is finally completed.

The right is reserved to take possession of any machinery, implements, tools, or materials of any description that shall be found upon the project, to account for said equipment and materials, and to use the same to complete the project. When the work is thus finally completed, the total cost of the same will be computed. If the total cost is more than the contract price, the difference shall be made up either by the Contractor or his surety. If the total cost is less than the contract price, the difference will be paid to the Contractor or his surety. In case of termination all expenses incident to ascertaining and collecting losses under the bond, including but not limited to engineering and legal services, shall be assessed against the bond.

17.08 Service of Order or Notice

A notice or an order as specified in 17.07 shall be considered duly served when it is served, in person, or by registered mail, to any of the following: The Contractor, the Contractor's representative on the work, the person in charge of the Contractor's office, the surety, the authorized local representative of the surety, or the person in charge of the surety's office. Service of such notice or order shall be deemed complete and sufficient when it is enclosed in a registered and stamped envelope, properly addressed and is deposited in any Post Office or U. S. letter box.

17.09 Cancellation of Contract

In the event that a national emergency occurs and the work to be performed under the contract is thus rendered impossible to perform, the Contractor and the Owner may agree to cancel and terminate the contract upon equitable terms satisfactory to both parties. The Engineer shall be the sole judge as to the existance of any event, time or condition justifying or permitting the cancellation of the contract, and his decision shall be final, binding and conclusive on the parties hereto.

If the contract or any portion thereof is cancelled persuant hereto and the Contractor is released before all items of work included in the contract have been performed, payment will be made at the contract unit prices for the actual work performed and completed in accordance with the contract and to the satisfaction of the Engineer. For all partially performed or partially completed work which has been performed or partially completed in accordance with the contract and to the satisfaction of the Engineer and for all materials furnished but not incorporated in the work, payment will be made in direct proportion to the value of the work or materials to the Owner, based upon the unit prices or actual material cost.

If the terms and conditions of cancellation of all or any part of the contract cannot be agreed upon pursuant hereto, then the contract shall be and remain in full force and effect.

SECTION VIII MEASUREMENT AND PAYMENT

18.01 Measurement of Quantities

The determination of quantities of work acceptably completed under the terms of the contract, or as directed by the Engineer in writing, will be made by the Engineer based upon the lines, grades, and cross-section given, or measurements made by him or his assistants. All items will be computed to the nearest whole number unless otherwise specified, and shall be in the units set forth in the proposal.

18.02 Scope of Payment

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

Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material. Payment will be made only for materials actually incorporated in the work. For payment of materials on site, see Section 1807, Partial Payments.

The unit contract prices for the various bid items of the contract shall be full compensation for all labor, materials, supplies, equipment, tools and all things of whatsoever nature required for the complete incorporation of the item into the work the same as though the item were to read "In Place," unless the plans and special provisions shall provide otherwise.

18.03 Payment for Increased or Decreased Quantities

When alterations in the plans or quantities of work not requiring supplemental agreements, as hereinbefore provided, are ordered and performed, the Contractor shall accept payment in full at the contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

18.04 Payment for Omitted Items

The Engineer shall have the right to cancel or alter the portions of the contract relating to the construction of any item or items therein by the payment to the Contractor of a fair and equitable amount covering all items of costs incurred prior to the date of cancellation, alteration, of suspension of the work by order of the Engineer. No allowance will be made for anticipated profits in reimbursements to the Contractor for omitted items of work.

18.05 Payment for Extra Work

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

1. By an acceptable lump-sum proposal from the Contractor.
2. By unit contract prices contained in the contract proposal, or by unit prices mutually agreed upon by the Contractor and the Owner.
3. By force account.

It shall be the responsibility of the Contractor before proceeding with any change to satisfy himself that the change has been properly authorized on behalf of the Owner. No compensation for extra work or any other change in the contract will be allowed unless the extra work or change has been authorized in writing by the Owner, and the compensation or method of determining such compensation is stated in such written authority.

18.06 Force Account

All extra work done on a force account basis will be paid for in the manner hereinafter described, and the compensation thus provided shall be accepted by the Contractor as payment in full for the use of small tools, superintendent's services, timekeeper's service, premium on bond, and all other overhead expenses incurred in the prosecution of all extra work done on a force account basis. Payment will be made as follows:

1. For all materials purchased by the Contractor and used in this specific work, he will receive the actual cost of such materials including freight charges, as shown by the original receipted bills for materials and freight, to which will be added an amount equal to fifteen per cent (15%) of the sum thereof.

2. For all labor and foremen, engaged in the specific operation, the Contractor will receive the wage prevailing and paid on the project for each and every hour that said labor and foremen are actually engaged in such work, to which will be added an amount equal to fifteen per cent (15%) of the sum thereof. In addition, the Contractor shall be paid a sum equal to the workmen's compensation insurance premium and the actual cost of Social Security taxes, computed on the base rate for the class of work involved, for the actual amount of the payroll. Health and welfare benefits, travel time, and other fringe benefits will be considered as wages.

3. For any machine, power, and equipment which it may be deemed necessary or desirable to use, the Contractor will be allowed a reasonable rental price, which will be agreed upon in writing before such work is begun, for each and every hour that said machinery or equipment is in use on such work, to which sum no percentage will be added. No allowance for travel time or moving cost of such machinery or equipment will be allowed, it being included in the rental price agreed upon.

The Contractor's timekeeper and the inspector shall compare records of extra work on a force account basis at the end of each day. Copies of these records shall be made in duplicate by the inspector and shall be signed by both the inspector and the Contractor's timekeeper, one copy being forwarded respectively to the Engineer and the Contractor.

No force account work will be paid for unless unit prices or wages have been agreed upon in writing before such work is started.

Bills for force account work must be sworn to and submitted to the Engineer with the current monthly estimate.

18.07 Partial Payments

Estimates of the value of the work done under the Contract will be made by the Engineer at least once each month and will be known as partial estimates. Partial estimates may include the following items of accomplishment:

1. The work performed and the materials complete in place;
2. The invoice cost of materials delivered to the job site (this must be verified by copies of the invoices for such materials).

Unless otherwise provided in the Contract, payments based on these partial estimates will be made as the work progresses once each month. The partial estimates will be prepared as of the Friday prior to the last Monday of each month. All invoices for material or other documents required of the Contractor must be submitted on or before that date.

The Owner will retain ten per cent (10%) of the amount of each partial estimate until 50% of the entire project has been satisfactorily completed. After 50% of the project has been satisfactorily completed, the Owner will retain an amount equal to five per cent (5%) of the total project cost until final completion and acceptance of all the work covered in the contract.

18.08 Acceptance of the Work

Acceptance of the work shall be defined as final approval of the project only in that it has been constructed, cleaned up, and completed in accordance with the plans and specifications.

It is mutually agreed between the parties to the contract that approval of the final estimate shall constitute acceptance. It is provided further that such approval shall not constitute an acceptance of any unauthorized work, that no payment made under the contract except the final payment shall be evidence of the performance of the contract, either wholly or in part, and that no payment shall constitute an acceptance of unauthorized or defective work or improper material.

Projects will generally be accepted in respect to construction at such times as they are entirely completed; however, on projects consisting of several disconnected streets, sewer lines, or water lines, the Engineer may accept any of these separate sections if he so elects.

18.09 Final Payment

After the work has been completed the Engineer will prepare a final statement showing the quantities of each and every item of work performed by the Contractor. All estimates upon which previous payments may have been based are partial estimates and are subject to correction in the final statement. The final statement showing the entire quantity and value of each and every item of work performed will be submitted to the Contractor for his approval before being submitted to the Owner for payment.

If the final statement shows that the total of all partial payments made exceeds the total amount due to the Contractor, the Contractor shall promptly refund to the Owner the amount of such overpayment. If such refund is not made, the Owner shall have the right to deduct the amount thereof from any moneys due or coming due to the same Contractor under any other contract, either present or future.

The Owner shall withhold final payment until the Contractor has filed with the Owner an affidavit showing evidence that all claims against him by reason of the contract have been paid or satisfactorily secured.

18.10 Assignment of Payments

No assignment or order executed by the Contractor directing payment of any portion or all of the money due him under the contract will be recognized by the Owner unless such assignment or order has attached thereto, by endorsement or otherwise, the consent of the surety. The Owner reserves the right in all cases to exercise its discretion as to the acceptance or rejection of such an order or assignment.

DIVISION II

DIVISION II

CONSTRUCTION DETAILS

SECTION I EARTH WORK

21.01 CLEARING AND GRUBBING

A DESCRIPTION

This work shall consist of cutting brush, trees, loose stumps and windfalls, removing roots, stumps and corduroy from the ground, and disposing of the resultant debris.

B MATERIALS

C CONSTRUCTION REQUIREMENTS

Clearing operations shall be confined to the right-of-way unless otherwise shown in the plans or directed by the Engineer.

All desirable trees and shrubs which are designated by the Engineer to be preserved shall be protected from injury or defacement during the construction operations.

The Contractor shall dispose of the debris by any lawful manner, shall secure any necessary permits, and shall comply with all regulations prescribed by the governing agency.

D METHOD OF MEASUREMENT

Clearing and grubbing will be measured by the number of trees or stumps, as indicated in the contract. When the tree is the unit, the quantity of clearing and grubbing will be determined by counting the number of trees and stumps cleared and grubbed, which measure 4 inches or more in average diameter at a point approximately 2 feet above the ground surface. Trees and stumps will be designated and measured in accordance with the following schedule of sizes:

Size of Diamcter at Height of 2 Feet	Pay Item Designation
4 inches to 8 inches	6-inch size each
over 8 inches to 12 inches	10-inch size each
over 12 inches to 24 inches	18-inch size each
over 24 inches	30-inch size each

When the lump sum is the unit, no measurement will be made of the quantity of clearing and grubbing.

E BASIS OF PAYMENT

When the proposal contains a lump sum bid item for clearing and grubbing, the lump sum price so bid shall be compensation in full for all clearing and grubbing required for construction of the project, and shall be confined to the right of way limits.

When the proposal does not contain an estimated quantity for a lump sum item for clearing and grubbing, any clearing and grubbing required for construction of the project shall be considered as incidental work and no direct compensation will be made therefor.

Payment for clearing and grubbing will be made on the basis of the following schedule:

Item No.	Item	Unit
21.01 E1	Clearing and Grubbing	Lump Sum
21.01 E2	Clear and Grubb Tree	Each
21.01 E3	Clear and Grubb Stump	Each

21.02 REMOVING MISCELLANEOUS STRUCTURES

A DESCRIPTION

This work shall consist of clearing the right-of-way of all abandoned structures which are not to be incorporated in the new construction. It shall include the removal of all structures and materials designated to be salvaged and all structures the existence of which would interfere with, endanger or detract from the new constnıction in any way.

B MATERIALS

C CONSTRUCTION REQUIREMENTS

Those structures or portions of structures which are to be removed will be designated in the plans; however, if a particular structure is not shown on the plans, the Engineer will determine whether or not its removal is necessary. In general, a structure having no salvage value will not be required to be removed from underground areas outside the limits of the street if its existence does not interfere with, endanger or detract from the new construction in any way.

All materials which have a salvage value shall be removed in such a manner as not to cause any damage thereto.

Where a portion of an existing structure is to be retained for use, that portion shall not be damaged during the removal operations. In removing concrete pavements, asphalt pavements, sidewalks and similar structures, where the cut will be exposed in the finished work, the structure shall, unless the removal is made to an existing joint, be sawed along the removal lines to a depth of not less than 1/3 the thickness of the concrete (to a maximum depth of 2 inches) before breaking off the concrete. In cases where no removal lines are shown on the plans, the Contractor shall not remove any structure without the prior approval of the Engineer and shall remove only that portion or portions of the structure that is staked for removal.

All timber structures and all underground tanks shall be completely removed.

When removing manholes, catch basins and drop inlets all live sewers shall be rebuilt and properly reconnected. Satisfactory by-pass service shall be maintained during construction. Sewer lines and catch basin leads which are abandoned shall be plugged at both ends. When an abandoned underground pipeline is cut during construction operations, both exposed ends shall be plugged with concrete or masonry.

The upgrade ends of all drainage or sewer pipes leading from abandoned basements, manholes, or similar structures shall be plugged with concrete or masonry. Before filling abandoned basements, manholes, cesspools, or similar structures which are not completely removed, the Contractor shall make holes in the bottom to prevent the entrapment of water.

All materials which have a salvage value shall be transported and piled in the Owner's storage yard as directed by the Engineer. All earth and debris shall be removed from salvaged pipes before they are piled. Debris and materials having no salvage value shall be disposed of in a manner satisfactory to the Engineer.

D METHOD OF MEASUREMENT

When the proposal contains an appropriate pay item for removing structures of a particular kind, all structures, or portions thereof, of that kind which are required to be removed will be measured in accordance with the following methods:

1. "Remove Culverts" will be measured by length between the extreme limits of the culvert, including any prefabricated aprons. Culverts shall include all pipe and timber culverts, and all size and types will be included in the same item.

2. "Remove Pavement" will be measured by area. "Pavement" will be construed to mean the entire concrete pavement, or the concrete base plus any surface and cushion courses which comprise a part of the pavement, including any integral curb. Bituminous concrete, and asphaltic concrete and sidewalk shall not be considered as pavement.

3. "Remove Curb and Gutter," "Remove Curb," or "Remove Gutter" will be measured by length.

4. "Remove Driveway" will be measured by area.

5. "Remove Sidewalk" will be measured by area, except for "concrete sidewalk blocks" (12"x 12", 18"x18", or 20"x20") which removal shall be considered incidental to the new construction.

6. "Remove Manholes," "Remove Catch Basins," and "Remove Drop Inlets" will be measured as units, including all attached parts, and making the required connections of any live sewer affected.

7. "Remove Underground Conduit" will be measured by length, regardless of size or type. The measurement will be made of actual conduit removed.

8. "Concrete Saw Cutting" will be measured by the linear foot.

9. "Remove Structures" of miscellaneous kinds will be measured separately, either by lineal foot or the number of structures of each kind removed.

E BASIS OF PAYMENT

Payment will be made only for removing those structures which are specifically included under the removal item listed in the proposal. The removal of any other structures, not required to be removed by others, which are to be salvaged or which interfere with, endanger or detract from the new construction in any way will be considered to be incidental work and no direct compensation will be made therefor.

If, due to negligence by the Contractor, materials considered salvageable by the Engineer are damaged, the Owner may deduct from any moneys due or coming due to the Contractor an amount equal to 60 per cent of the current delivered price for a quantity of new material, of the same type and size as that damaged, equal to the quantity of the material so damaged, and the damaged material shall thereupon become the property of the Contractor.

Backfilling depressions resulting from the removal of structures will be considered to be embankment construction and no extra compensation will be paid therefor.

Payment for removing miscellaneous structures will be made on the basis of the following schedule:

Item No.	Item	Unit
21.02 E1	Remove Culverts	Linear Foot
21.02 E2	Remove Pavement	Square Yard
21.02 E3	Remove Curb and Gutter	Linear Foot
21.02 E4	Remove Curb	Linear Foot
21.02 E5	Remove Gutter	Linear Foot
21.02 E6	Remove Driveway	Square Foot
21.02 E7	Remove Sidewalk	Square Foot
21.02 E8	Remove Manhole	Each
21.02 E9	Remove Catch Basin	Each
21.02 E10	Remove Drop Inlet	Each
21.02 E11	Remove Underground Conduit	Linear Foot
21.02 E12	Concrete Saw Cutting	Linear Foot
21.02 E13	Remove (Specify definite structure)	Each
21.02 E14	Remove (Specify definite structure)	Linear Foot

21.03 COMMON EXCAVATION

A. DESCRIPTION

This work shall consist of the removal and disposal of all materials from the right-of-way provided by the City, necessary for the construction of the earth grade, including but not limited to the grading of the roadway, intersections and entrances; salvaging and stockpiling topsoil; construction of embankments; excavating and disposing of foreign materials; disposing of surplus and unsuitable materials; and maintaining the work in a finished condition until acceptance.

B. MATERIALS

C. CONSTRUCTION REQUIREMENTS

No excavation shall be done on any area before the Engineer has taken the required cross-sections.

Excavation shall in all cases be made to the specified cross-section, alignment and grade.

If, in the prosecution of the work, it is necessary to interrupt existing surface drainage, sewers or underdrainage, the Contractor shall provide and maintain temporary drainage facilities until permanent drainage facilities are completed.

To prevent accidental flooding of the sanitary sewer system and any properties connected thereto, the Contractor shall furnish and install watertight covers, temporary extensions for the tops of manholes or other approved means of preventing the entrance of storm water and/or dirt into the sanitary sewer during any construction which interrupts adequate storm drainage or disturbs the watertightness of existing sanitary sewers. Loose covers, plates, or castings which are not sealed and backfilled shall not be considered adequate.

When the roadbed surface is in a cut and no subcut is required, the upper six inches of the finished roadbed shall be compacted as provided in 21.06 for compacting the upper six inches of embankments.

Excavated materials for which no other disposition is specified shall be used in the construction of embankments so far as they are needed; provided that such materials are suitable for embankment construction. Unless otherwise specified, all surplus or unsuitable material shall become the property of the Contractor and shall be removed from the project site at the Contractor's expense. Removal shall take place in a timely manner approved by the Engineer. When specified in the special provisions or shown on the plans, surplus or unsuitable material shall remain the property of the City. The material shall either remain on site or be hauled to a site specified by the Engineer.

Unstable materials shall be removed as provided in the contract. All materials which the Engineer considers unsuitable to be left in the upper portion of the roadbed shall be excavated to the extent indicated in the plans or directed by the Engineer and the excavated materials disposed of as provided above. The subcuts shall be backfilled with material consisting of selected soil and shall be placed in accordance with the methods prescribed in 21.06 (Embankment Construction).

D. METHOD OF MEASUREMENT

Except as otherwise provided, common excavation will be measured in its original position by the cross-section method and the volume computed by the method of average end areas.

If the proposal contains the item "Borrow Excavation", the Contractor shall provide a suitable source of material and provide the Engineer with ample time to cross-section the borrow pit. Such material shall conform to the requirements of this section. Measurement of "Borrow Excavation" will be as provided for "Common Excavation".

Surplus or unsuitable material which remains the property of the City and is to be hauled off site shall be measured on the basis of loose truck volume.

E. BASIS OF PAYMENT

All subcuts shown on the plans or specified in the special provisions are included in the plan quantity for "Common Excavation" and no additional payment will be made therefor. All subcuts which are ordered by the Engineer during the course of construction will be paid for at the rate of 1.5 times the unit bid price for "Common Excavation" and shall be construed to be compensation in full for the excavation and the backfill of such subcuts.

Payment for excavation and for surplus or unsuitable material that remains the property of the City and is hauled off site shall be paid on the basis of the following schedule:

ITEM NO.	ITEM	UNIT
21.03 E1	Common Excavation	CY
21.03 E2	Borrow Excavation	CY
21.03 E03	Haul	CY/Mile

Unless otherwise provided in the special provisions, payment for Common Excavation will be made on the basis of plan quantities, without any measurement being made of the actual quantity of excavation performed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to substantially change the planned quantities of excavation.

2. Either the Owner or the Contractor may request the measurement of excavation quantities. Such request shall be made not later than seven calendar days after the excavation has been completed. In such cases, the party making the request shall notify the other in writing before the measurement is made, and payment will be made for the measured quantity of excavation instead of the planned quantity.

   In all cases where such measurement is made, the computation of the volume of excavation will be based on the latest "original" cross-sections and the actual "final" cross-sections.

21.04 CHANNEL EXCAVATION

A. DESCRIPTION

This work shall consist of the excavation of channel changes outside the limits of the normal street excavation and the construction of ditches to or from culverts or storm sewers.

B. MATERIALS

C. CONSTRUCTION REQUIREMENTS

The excavation shall be made to the alignment, grade, and cross-section shown in the plans or special provisions.

Excavated material shall be used in the construction of the project so far as is practical; however, if sufficient disposal areas are not available on the project, the Contractor shall remove and dispose of the surplus material in a manner satisfactory to the Engineer. The Engineer may, at his option, designate the disposal point for surplus material provided that the haul distance does not exceed one mile.

D METHOD OF MEASUREMENT

Channel excavation will be measured separately by volume according to the cross-section measure.

E BASIS OF PAYMENT

Payment for channel excavation will be made on the basis of the following schedule:

Item No.	Item	Unit
21.04 E1	Channel Excavation	Cubic Yard

Unless otherwise provided in the special provisions, payment for Channel Excavation will be made on the basis of planned quantities, without any measurement being made of the quantity of excavation actually performed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to substantially change the planned quantities of excavation.

2. Either the Owner or the Contractor may request the measurement of excavation quantities. Such request shall be made not later than 7 calendar days after the excavation has been completed. In such cases, the party making the request shall notify the other in writing before the measurement is made, and payment will be made for the measured quantity. In all cases where such measurement is made, the computation of the volume of excavation will be based on the latest "original" cross-sections and the actual "final" cross-sections.

21.05 EXCAVATION FOR CONDUITS AND MINOR STRUCTURES

A DESCRIPTION

This work shall consist of the excavation required for the installation of pipe culverts, storm drains, sanitary sewers, watermains, and other related facilities as well as other minor structures in accordance with these specifications and in reasonably close conformity with the lines, grades, and typical cross-sections shown on the plans or established by the Engineer.

All excavation for structures below the original ground elevation or designed section, whichever is lower, shall be included under this item.

Unless otherwise specified, this excavation shall include all pumping, bailing, draining, sheeting, bracing and incidentals for proper execution of the work. Removal of existing structures shall be in accordance with Art. 21.02.

B MATERIALS

Aggregates 33.01

21.05 C CONSTRUCTION REQUIREMENTS

Prior to trench excavation, all available topsoil shall be removed and stockpiles for replacement as the upper layer of backfill. Where the surface is to be graded and graveled, paved following completion of the underground conduit or structure, or at the direction of the Engineer, the topsoil shall be stockpiled for future use. Stockpiles shall be located on berms and boulevards as shown on the plans or at other locations as directed by the Engineer. Stockpiles shall be left in a workmanlike manner, rounded and mounded so it can be mowed and maintained.

To prevent accidental flooding of the sanitary sewer system and any properties connected thereto, the Contractor shall furnish and install watertight covers, temporary extensions for the tops of manholes or other approved means of preventing the entrance of storm water into the sanitary sewer during any construction which interrupts adequate storm drainage or disturbs the watertightness of existing sanitary sewers. Loose covers, plates or castings which are not sealed and backfilled shall not be considered adequate.

The trench shall be dug to the alignment and depth required and only so far in advance of pipe laying as the Engineer shall permit. The trench shall be so braced and drained that workmen may work therein safely and efficiently. Discharge from any pumps required shall be led to natural drainage channels or storm sewers.

The trench width may vary with and depend upon the depth of the trench and the nature of the excavated material encountered; but in any case shall be an ample width to permit the conduit to be laid and backfilled properly. If approved by the Engineer, the trench walls may be backsloped from a point level with the top of the conduit. The trench shall be excavated to a depth approximately four (4) inches below the required grade and backfilled with four (4) inches of select granular backfill conforming to the requirements of 33.01 Class 6.

Where the bottom of the trench uncovered at subgrade is soft, and in the opinion of the Engineer cannot support the pipe, further depth shall be excavated and refilled to the pipe foundation grade with thoroughly compacted rock conforming to the requirements of 33.01 Size 2 for which the Contractor will receive additional compensation. Extra compensation shall not be allowed for additional excavation and/or gravel used for seepage or ground water control.

Ledge rock, boulders and large stones shall be removed to provide a clearance of at least four (4) inches on all sides of the pipe. Adequate clearance for properly joining the pipe shall be provided at all bell holes. Excavation below grade in rock or boulders shall be refilled with thoroughly compacted pit run gravel for which the Contractor will receive extra compensation.

All excavated material shall be piled in a manner that will not endanger the work and will not obstruct sidewalks, driveways or drainage channels.

Excavation for conduits shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the Contractor shall provide suitable bridges.

Hydrants under pressure, valve boxes, curb stop boxes and other utility controls shall be left unobstructed and accessible during the construction period.

Trees, fences, poles, and all other property shall be protected unless their removal is authorized by the Engineer and any property damaged shall be satisfactorily restored by the Contractor.

D METHOD OF MEASUREMENT

Measurement for conduits and minor structures will be made by depth or by volume to the neat lines as shown on the plans or standard plates.

Measurement of sub-cut gravel will be by the cubic yard (vehicle measure) or by the ton.

E BASIS OF PAYMENT

When payment is made for materials actually incorporated into the project, no additional compensation will be made for excavation required to install those materials. No compensation in addition to the contract prices will be made to the Contractor because of the special requirements of this section except as may be provided elsewhere in the plans, specifications or special provisions.

Payment for sub-cut gravel shall be compensation in full for furnishing and installing the gravel and for the cost of additional excavation required. No separate payment will be made for the additional excavation.

In cases where a bid item is on the proposal, payment will be made on the following basis:

Item No.	Item	Unit
21.05 E1	Excavation (depth)	Linear Foot
21.05 E2	Excavation for (Name of Structure)	Cubic Yard
21.05 E3	Sub-cut Gravel	Cubic Yard or Ton

When no bid item under this section is shown on the proposal, all excavation required is incidental and no additional compensation for any excavation required will be allowed.

21.06 EMBANKMENT CONSTRUCTION

A DESCRIPTION

This work shall consist of the construction of embankment, or of backfilling excavation below grade in cut areas which will be considered as embankment construction except when the plans provide for such backfill to be made as "Stabilized Base".

B MATERIALS

Materials for embankment construction shall be compactable soil selected from the excavation insofar as is suitable. Any additional material that is needed shall be suitable material obtained by the Contractor. When granular material is specified, it shall conform to the requirements of 33.01 Class 4.

C CONSTRUCTION REQUIREMENTS

Before placing embankment on any area, all ice and snow and all topsoil which is considered by the Engineer to be unsuitable for use in the embankment shall be removed from the area within the limits of embankment and disposed of. Excavation of earth material shall be considered and paid for as Common Excavation.

When embankment is to be constructed in locations where unstable material that will not support the embankment is encountered, the foundation shall be prepared by removing all or part of the unsuitable material to the extent indicated in the plans or directed by the Engineer. When no provision has been made in the contract for payment for such work, it will be considered to be extra work and will be paid for as such.

The foundations for all embankments shall be compacted with a tamping roller of suitable size and pressure to assure a firm, unyielding working platform. This will be considered incidental work and no direct payment will be made therefor.

Before placing the embankment over an old road or street, the Contractor shall excavate all that part of the old road or street to the existing ditch bottom elevation, except where otherwise required by the plans. The excavated material shall be used elsewhere in the embankment or otherwise disposed of. Such excavation shall be measured and paid for as Common Excavation.

Snow and ice, frozen lumps or sod will not be permitted in embankments. No stone which has a diameter greater than 3 inches will be permitted in the top 6 inches of the embankment.

No materials shall be placed or stockpiled in such a manner as to restrict free surface drainage of the embankment areas or base and surface courses.

Prior to and during the placing of the embankment materials, the Engineer will sample the soils which are to be used and make the tests necessary to determine the Maximum Density and Optimum Moisture content of the materials.

The embankment material shall be spread in uniform layers 6 inches thick approximately parallel to the finished grade and extending over the full width of the embankment.

Each layer, for such lengths as may be under construction at any one time, will be considered as a unit for field density determinations. The Engineer will make density tests on each unit at such intervals as he deems necessary to determine the actual density and moisture content. No individual test on a unit shall show a density less than 95% of the maximum density. The moisture content shall be between 90% and 105% of optimum moisture. Maximum density and optimum moisture shall be as established by the AASHO T-99 Method A.

When granular material is specified, it shall be compacted to a density of not less than 100% of Maximum Density as established by AASHO T-99A.

If the moisture content of the materials is not within the permissible range or is such that the required density cannot be obtained, the Contractor shall dry the material or apply water as may be necessary to meet the requirements. Drying the material or applying water will be considered to be incidental work and no direct compensation will be made therefor.

D METHOD OF MEASUREMENT

No measurement will be made of any embankment material which is provided and paid for exclusively under Excavation items.

Measurement of the items "Embankment Material in Place" and "Granular Material in Place" will be made by volume (cross-section measure) of the compacted embankment.

E BASIS OF PAYMENT

When payment is made for the excavation of materials used in embankments, no additional compensation will be made for the embankment construction.

Regardless of the item under which the designated material is furnished, payment for the material at the contract price shall be compensation in full for furnishing the material from sources outside the right of way, hauling it to the point of use on the project, and constructing the embankment in accordance with the foregoing requirements.

Subject to the above limitations, payment for embankment construction will be made on the basis of the following schedule:

Item No.	Item	Unit
21.06 E1	Embankment Material in Place	Cubic Yard
21.06 E2	Granular Material in Place	Cubic Yard

21.07 BACKFILL

A DESCRIPTION

This item shall consist of backfilling all watermains, sanitary sewers, storm sewers, culverts, and other structures.

B MATERIALS

Material for Class AA and Class A backfill shall be granular in nature and meet the requirements of 33.01 Class 4. Material for other classes of backfill shall be compactable soil selected from the excavation insofar as is suitable. Any additional material needed shall be suitable material obtained by the Contractor.

C. CONSTRUCTION REQUIREMENTS

The trench shall be initially backfilled with clean friable earth, free from large rocks, stones, or deleterious materials, to a height of six (6) inches above the top of the pipe in six (6) inch layers. Each layer shall be reasonably level and uniform and shall be thoroughly compacted with mechanical tampers to a density of at least 90% of maximum dry density.

Pipe bedding requirements may conflict with initial backfill requirements in which case the bedding requirements will govern.

The remainder of the trench may be backfilled by any method or means the Contractor wishes to employ, provided that such methods shall not damage the pipe and further provided that the backfill must be compacted to the specified densities for the classes of backfill. When Class AA or Class A backfill is specified, the Contractor shall transport to another site all excess materials excavated from the trench and shall dispose of them to the satisfaction of the Engineer. Granular materials (sand and gravel) shall be compacted to the required densities in layers of 12 (twelve) inches, maximum thickness to within two feet of the bottom of the subbase. The top two feet shall consist of clay compacted in eight inch lifts to a minimum of 95% of standard proctor at two to six percent over optimum moisture. All other backfill material shall be compacted to the required densities in layers of eight (8) inches, maximum thickness. After the pipe has been inspected, the trench shall be backfilled and compacted to produce a uniform density as shown in the table below:

		BACKFILL CLASSES							
		AA*	A*	B	C	D	E	F	FF
DEPTH ZONE	X	100	100	100	95	90	85	80	NONE
	Y	100	90	90	90	85	80	80	NONE

* ALL GRANULAR MATERIAL SEE SPEC. 21.07

Maximum dry density for backfill shall be established as 100 pounds per cubic foot. Optimum moisture is approximately 23 percent.

At the time of compaction, the moisture content shall be between 90 percent and 105 percent of optimum moisture. If the moisture content of the materials is not within the permissible range, or is such that the required density cannot be obtained, the Contractor shall dry the material, or add water, as may be necessary to meet the requirements. Drying the material or applying water will be considered to be incidental work and no direct compensation will be made therefor.

The Engineer may order such tests as he deems necessary to establish the quality of the compaction. In the event that the backfilling does not meet the requirements outlined above, the Contractor will be required to correct the backfilling by any acceptable means he may select. In addition, all subsequent tests required to establish the quality of the backfill will be charged against any money due the Contractor or his surety. No additional compensation will be allowed for any work necessitated by insufficient compaction.

The class of backfill shall be as specified on the plans or in the special provisions. When no class is noted, the class specified shall be Class D.

D METHOD OF MEASUREMENT

Class AA and Class A backfill will be measured by the linear foot or by the cubic yard as determined by the neat lines shown on the plans, standard plates, or special provisions. Classes B, C, D, E, F, FF, W, and IT will not be measured, but shall be considered incidental to construction.
Water used in compacting will not be measured, but will be considered incidental to construction.

E BASIS OF PAYMENT

No direct payment will be made for Class B, C, D, E, F, FF, W&IT backfill. Class AA and Class A backfill will be paid for on the basis of the following schedule.

Item No.	Item	Unit
21.07 E1	Class AA Backfill	Cubic Yard
21.07 E2	Class AA Backfill	Linear Foot
21.07 E3	Class A Backfill	Cubic Yard
21.01 E4	Class A Backfill	Linear Foot

Unless otherwise specified, Item 21.07E1 and 21.07E3 will be paid on the basis of planned quantities.

21.08 SUBGRADE PREPARATION

A DESCRIPTION

This work shall consist of shaping and compacting the subgrade prior to constructing a sub-base, base or surface course.

B MATERIALS

C CONSTRUCTION REQUIREMENTS

This work shall be done after any unstable sections of the subgrade have been repaired.

The Contractor shall compact and shape the subgrade for its full width as may be necessary to produce at the time the sub-base, base or surface course is placed, the required density in the top 6 inches of the sub-grade and the required grade and cross-section. The Contractor will be required to scarify, dry the material or apply water as may be necessary to obtain the required density.

The "required density" shall be as specified in 21.06 "Embankment Construction" and shall mean the Maximum Density at Optimum Moisture. In addition, the grade shall be so stable as to not rut, shove, flex, or displace when any construction equipment is used thereon.

The "required grade and cross-section" shall consist of a smooth subgrade surface which conforms to the prescribed elevations for the particular subgrade being prepared, prior to constructing an additional course thereon. The prescribed elevation for any point on the subgrade surface shall be as determined from the grades staked by the Engineer and the cross-section shown in the plans or standard plates and shall not vary by more than 0.05 foot from the prescribed elevation for that point.

D METHOD OF MEASUREMENT

Subgrade Preparation will be measured by length in 100 foot stations on the center line of the street.

E BASIS OF PAYMENT

When the subgrade is constructed under the same contract that includes a base or surface course, Subgrade Preparation will be considered to be incidental work and no direct compensation will be made therefor.

When the subgrade is not constructed under the same contract as the course being constructed, then and only then, will Subgrade Preparation be paid for on the basis of the following schedule:

Item No.	Item	Unit
21.08 E1	Subgrade Preparation	Station

21.09 STABILIZED SUBGRADE

A DESCRIPTION

This work shall consist of treating to a specified depth, the material in the upper portion of the subgrade, by the addition of a small amount of Hydrated Lime.

B MATERIALS

Hydrated Lime shall conform to the requirements of 31.01 B.

C CONSTRUCTION REQUIREMENTS

The minimum quantity of lime will be as shown on the plans or special provisions but not less than 5% by volume.

The lime shall be spread by any approved method that produces the required rate of application as shown on the plans or as directed by the Engineer, and shall be spread uniformly and in a manner that will reduce the scattering of lime by the wind to a minimum. Lime shall not be applied when wind conditions are such that blowing lime becomes objectionable. This determination shall be left solely to the discretion of the Engineer.

The lime shall be thoroughly mixed with the material to be processed and water shall be added to the mixture in a quantity that will maintain the moisture content at not less than optimum. The material shall be handled at all times in a manner to preserve the moisture content of the mixture and additional water shall be added at any time the moisture content in the mixture falls below optimum.

The mixture shall be spread to section before any compaction equipment is used. Compaction shall be obtained by any method or means that the Contractor might elect, but in no case shall more than 24 hours elapse between mixing and compacting. Compaction shall continue until a uniform density of not less than 95% of maximum dry density is obtained, as determined by AASHO T-99A.

During compaction and finishing operations, the Contractor shall take care to eliminate compaction planes. Should compaction planes develop, the Contractor shall scarify and recompact the mixture insofar as is necessary to eliminate the compaction planes.

The surface shall be shaped to the required line, grade and cross-section. No steel-wheeled or tracked equipment shall be used after the material has been placed.

When required, the surface shall be lightly scarified to loosen any imprints left by the compacting or shaping equipment. The resulting surface shall then be re-compacted at the specified moisture content.

No mixing shall be started after October 15th without the written permission of the Engineer.

No curing will be required when the Contractor places the course on top of the subgrade immediately after completion of the subgrade. Should there be an appreciable delay, the Contractor shall place a liquid asphalt cure coat that conforms to the requirements of 22.03 C3a.

D METHOD OF MEASUREMENT

Stabilized Subgrade will be measured by the square yard as determined by the paving quantities.

Lime, water, liquid asphalt and any other materials shall be considered incidental and will not be measured for payment.

E BASIS FOR PAYMENT

Payment will be made at the contract unit price according to the following schedule:

Item No.	Item	Unit
21.09 E1	Stabilized Subgrade	Square Yard

and shall be payment in full for furnishing all labor, tools, equipment supplies, and materials of whatever nature, and in doing all work involved in accordance with the specifications.

21.10 BERMS AND BOULEVARDS

A DESCRIPTION

This work shall consist of excavation or filling of the berm area as shown on the plans, cross-sections or typical drawing No. 69.01.

B MATERIALS

C CONSTRUCTION REQUIREMENTS

The berms and boulevards shall be construed to be that portion between the back of curb or edge of the street proper and the nearest edge of the sidewalk or sidewalk line in cases where there is no sidewalk.

It is the policy of the Owner to provide that the berms drain onto the street; therefore, the slope of the berm will generally be between 3 and 9 percent.

The Contractor shall either excavate or fill this area to within 1/2 inch of the finished grade as shown on the plans or directed by the Engineer.

When required by the plans or specifications seeding of the berms and boulevards will be done in accordance with 25.09.

When required by the plans or specifications sodding of the berms and boulevards will be done in accordane with 25.10.

D METHOD OF MEASUREMENT

Berms and boulevards will not be measured as a separate item when included with paving or curb and gutter construction projects but shall be considered incidental to the cost of common excavation or surfacing work.

When included as a separate pay item berms and boulevards shall be measured by the square yard. Only the area shown on the plans or designated in the specifications for separate payment and actually installed and accepted will be measured.

E BASIS OF PAYMENT

Payment of the contract unit price shall constitute payment in full for furnishing all labor, tools, equipment, supplies and materials and in doing all work involved in accordance with the specifications. Payment will be based on the following schedule:

Item No.	Item	Unit
21.10 E1	Berms and Boulevards.	Square Yard

21.11 BUILDING REMOVAL

A DESCRIPTION

This work shall consist of demolishing and removing from the right-of-way, buildings which have previously been vacated by the former owners and are not considered to have a salvage value as buildings.

It shall include the removal of all sidewalks, driveways, steps, patios, outbuildings or similar structures that are on the premises, unless indicated to the contrary.

B MATERIALS

C CONSTRUCTION REQUIREMENTS

All work shall be done in accordance with the applicable ordinances and the Contractor shall obtain and pay for the required permits.

The buildings to be removed will be listed in the plans or special provisions, which will show the approximate location of each building (by the street address or by reference to a survey station) and a general description of the building.

All buildings (including all fixtures except those owned by public or private utilities) may be demolished prior to removal from the right-of-way or removed from the right-of-way without being demolished.

If the Contractor elects to move any building to another location, the moving shall be done in accordance with all applicable laws and ordinances and the Contractor shall obtain all necessary permits including those required by the City of Grand Forks.

The City assumes no responsibility for the condition of any building at any time and no guarantee is made or implied that any building will remain in the condition the bidder finds it at the time he examines it prior to preparing his proposal.

The Contractor shall remove all buildings, including steps and basement walls, at least down to one foot below the existing ground surface. Where there is no basement, he shall also remove the building floor.

During removal operations, the Contractor shall maintain the premises in a condition that will not allow dust, debris or other harmful substances to be deposited outside the property limits. When removal operations are conducted within ten feet of any street, sidewalk or adjoining property that pedestrians or vehicles may use, the Contractor shall construct barricades of sufficient height and strength to completely shield the public from any adversity.

The Contractor shall not unduly block streets, sidewalks or access to adjoining property without the written consent of the Engineer or property owner.

The Contractor shall plug all sewers leading from the buildings with a watertight plug at the curb line and shall shut off city water service lines at the main. Water shut off work shall be done by a plumber. Telephone, electric power and other wire services and gas service pipes will be disconnected by the utility owners outside the buildings and all fixtures belonging to such utility companies not less than 10 days prior to the date on which he intends to do any work which will affect their properties.

All materials removed and all debris resulting from the removals shall become the property of the Contractor and shall be disposed of by him outside the right-of-way in any manner he elects subject to the provisions of 14.07, except that, if the building removal is included in the same contract as the grading, noncombustible debris may be disposed of within the right-of-way in a manner satisfactory to the Engineer.

Before filling any basement, the Contractor shall remove all debris therefrom and break the floor to permit drainage of water therefrom.

If the building removal is not included in the same contract as the grading, the Contractor shall fill all basements of buildings removed (and any excavation he may make), together with any other basements specified in the plans or special provisions to be filled, to a level of the existing ground surface, using sand, gravel, clay, loam, or other inorganic soil furnished by him from sources outside the right-of-way. Compaction of basement fill will be as specified in the special provisions.

If the building removal is included in the same contract as the grading, the foundations shall be removed and basements backfilled in accordance with other requirements of the contract.

D METHOD OF MEASUREMENT

No measurement will be made of any building removal, but all buildings removed will be considered to be included in the single lump sum for which payment is made.

E BASIS OF PAYMENT

Payment for the item "Building Removal" at the contract lump sum shall be compensation for all costs of the work described above.

Payment for building removal will be made on the basis of the following schedule:

Item No.	Item	Unit
21.11 E1	Building Removal........................	Lump sum

21.12 EQUIPMENT RENTAL

A DESCRIPTION

This work shall consist of furnishing men and of furnishing and operating equipment, in cases where the contract provides that the work be done as directed by the Engineer and at the Owner's expense.

B MATERIALS

All materials shall be as ordered by the Engineer and shall conform to the requirements of these specifications so far as practicable.

C CONSTRUCTION REQUIREMENTS

All equipment shall be in such a mechanical condition that it will operate in a manner satisfactory to the Engineer.

All equipment which operates on bituminous or concrete surfaces shall be equipped with rubber tires or smooth street plates.

In bidding under this item, the Contractor shall show the capacity of each specific item by make and model number for tractor type equipment, or by capacity for backhoes, drag lines, water pumps, trucks and the like.

D METHOD OF MEASUREMENT

The Contractor's timekeeper and the inspector shall compare records of the work at the end of each day. Copies of these records shall be made in duplicate by the inspector and signed by both inspector and time keeper. Both parties will receive one copy each which shall be considered the final record upon which payment will be made.

Rental of each unit of equipment will be measured in hours of actual working time and necessary traveling time within the project limits.

Labor will be measured in hours of actual working time and necessary traveling time within the project limits, based on an 8-hour day.

E BASIS OF PAYMENT

Payment for the use of any equipment at the contract price per hour shall be compensation in full for the use and operation of such equipment, including the operator or operators and any tractive equipment and other accessories required in connection with such use, subject only to the provisions made hereinafter for additional compensation in cases where the Contractor is obligated to pay overtime wages for work performed by order of the Engineer on Sundays, Holidays or during overtime periods.

Payment for labor at the contract price per hour shall include compensation for the use of any hand tools used by such laborers subject only to the provisions made hereinafter for additional compensation in cases where the Contractor is obligated to pay overtime wages for work performed by order of the Engineer on Sundays, Holidays or during overtime periods.

No compensation in addition to the contract price per hour for equipment rental or labor will be made because of any overtime or work performed on Sundays or Holidays except when such work is ordered by the Engineer to be performed at such time. If the Engineer orders the use of equipment or labor during overtime periods or on Sundays or Holidays, compensation will be made in addition to the contract price per hour for equipment rental or labor only for the increased wages for which the Contractor is obligated under the terms of wage agreements. Such additional compensation will be made by increasing the contract price per hour for the equipment or labor used by an amount equal to the difference between the normal hourly wage for straight time work and the overtime hourly wage actually paid the workmen employed in operating the equipment or performing the labor, as determined from the Contractor's payroll.

Payment for all materials purchased by the Contractor and used in this specific work will be by the actual cost of such materials including freight charges, as shown by the original receipted bills for materials and freight, to which will be added an amount equal to fifteen per cent (15%) of the sum thereof.

The provisions of 14.03 shall not apply to any item of equipment rental or labor.

Payment for equipment rental and labor will be made on the basis of the following schedule:

Item No.	Item	Unit
21.12 E1	Foreman (pickup included)	Hour
21.12 E2	Skilled labor	Hour
21.12 E3	Unskilled labor	Hour
21.12 E4	Truck	Hour
21.12 E5	Scraper	Hour
21.12 E6	Front end loader	Hour
21.12 E7	Dragline	Hour
21.12 E8	Backhoe	Hour
21.12 E9	Tractor backhoe	Hour
21.12 E10	Tractor	Hour
21.12 E11	Motor grader	Hour
21.12 E12	Dozer	Hour
21.12 E13	Miscellaneous equipment	Hour

22.01 STABILIZED BASE

A DESCRIPTION

This work shall consist of the construction of a base course composed of gravel and/or sand, including the addition of binder soil, if required.

For the purposes of this specification, the term "gravel" shall be construed to mean gravel or sand (including binder soil if required) or combinations thereof.

B MATERIALS

Materials for this specification shall conform to the requirements of 33.01. The class of gravel shall be Class 4 unless otherwise shown in the plans.

C CONSTRUCTION REQUIREMENTS

The subgrade shall be prepared in accordance with the provisions of 21.08 or 21.09 whichever is applicable, and at the time the base is placed thereon, the subgrade shall conform to the required density and to the required grade and cross-section, as specified therein.

The Contractor shall construct the base by any acceptable method or means providing, however, that he does not in any way damage or injure the prepared subgrade during his construction operations.

Gravel will be accepted on the basis of gradation samples taken after the materials have been deposited on the street and are ready to be laid and compacted.

Any material that becomes contaminated after placement, so that it fails to meet the specification requirements, shall be removed and replaced, or corrected and re-tested.

The Contractor shall uniformly compact the full thickness of each layer to at least 100 per cent of Maximum Density. No individual test shall show less than that density. At the time of compaction, the moisture content shall be not less than 75 per cent of Optimum Moisture. Maximum density and optimum moisture shall be as determined by AASHO T-99A.

When construction of the base has been completed, the elevation of the finished surface of the base at any point shall not vary more than 0.05 foot from the elevation prescribed for that point.

The Contractor shall, at his expense, maintain each section of the base in a smooth and compacted condition until completion of the project.

When the Owner provides the source of gravel, the gradation requirements will be waived to the extent that the Contractor is unable to meet them by ordinary production operations.

When the proposal calls for "Gravel Material," the density requirements will be waived and the Contractor shall stockpile the gravel material in the location or locations as shown in the proposal or on the plans.

D METHOD OF MEASUREMENT

All gravel produced under this specification will be measured, as indicated in the proposal, by weight or by the volume (vehicular measure) of the material.

Water used in conjunction with this specification will not be measured for payment.

E BASIS OF PAYMENT

Payment for "Stabilized Base" at the contract price per unit of material placed will be considered to be compensation in full for all costs incidental to its construction.

Payment for "Gravel Material" at the contract price per unit of material placed will be considered to be compensation in full for all costs incidental to placing the material in the stockpile.

Payment for Stabilized Base will be made on the basis of the following schedule:

Item No.	Item	Unit
22.01 E1	Gravel (Class __)	Ton or Cubic Yard
22.01 E2	Stabilized Base (Class__)	Ton or Cubic Yard

22.02 PORTLAND CEMENT TREATED BASE

A DESCRIPTION

This work shall consist of the construction of a base course consisting of a misture of gravel, portland cement and water.

B MATERIALS

Gravel shall conform to the requirements of 33.01, Class 13 & shall be accepted immediately prior to mixing with the cement. Other materials shall conform to the requirements specified in the following subsections:

Portland Cement	31.01
Water	31.03
Asphalt MC-70	32.01

C CONSTRUCTION REQUIREMENTS

C1 Equipment

Portland Cement Treated Base may be constructed with any machine, combination of machines or equipment that will produce the results specified herein.

C2 Subgrade Preparation

The subgrade shall be shaped to the required cross-section and shall meet the requirements of section 21.08 or 21.09, whichever is applicable, before any base material is placed.

C3 Cement Application, Mixing, and Spreading

Mixing of the gravel, cement and water shall be accomplished either by the mix-in-place or central-plant-mixed method.

No cement or cement treated base mixtures shall be spread when the soil or subgrade is frozen or when the air temperature is less than 40 degrees F. in the shade.

The percentage of moisture in the gravel, at the time of cement application, shall not exceed the quantity that will permit a uniform and intimate mixture of gravel and cement during mixing operations; and it shall not exceed the specified optimum moisture content for the base mixture.

Mixing, compacting, and finishing operations shall be continuous and completed during daylight hours and within 6 hours after the introduction of cement to the mixture.

Any gravel and cement mixture that has not been compacted and finished shall not remain undisturbed for more than 30 minutes.

a. Mixed in Place

The specified quantity of cement shall be spread uniformly on the gravel. Spread cement that has been displaced shall be replaced before mixing is started.

After the cement has been applied, it shall be mixed with the gravel. Mixing shall continue until the cement has been sufficiently blended with the soil to prevent the formation of cement balls when water is applied.

Immediately after the gravel and cement have been mixed, water shall be incorporated into the mixture. Excessive concentrations of water on or near the surface shall be avoided. A water supply and pressure distributing equipment shall be provided that will assure the application within 3 hours of all mixing water required on the section being processed. After all mixing water has been applied, mixing shall continue until a uniform and intimate mixture of gravel, cement, and water has been obtained.

b. Central Plant Mixed

The gravel, cement and water shall be mixed in a pugmill either of the batch or continuous-flow type. The plant shall be equipped with feeding and metering devices which will add the the gravel, cement and water into the mixer in the specified quantities. Gravel and cement shall be mixed sufficiently to prevent cement balls from forming when water is added. Mixing shall continue until a uniform and intimate mixture of gravel, cement and water is obtained.

The mixture shall be hauled to the roadway in trucks equipped with protective covers. The mixture shall be placed on the moistened subgrade in a uniform layer by an approved spreader or spreaders. Not more than 30 minutes shall elapse between the placement of soil-cement in adjacent lanes at any location except at longitudinal construction joints. The layer of cement treated base shall be uniform in thickness and surface contour, and in such quantity that the completed base will conform to the required grade and cross-section. Dumping of the mixture in piles or windrows upon the subgrade will not be permitted.

Not more than 60 minutes shall elapse between the start of moist mixing and the start of compaction of soil-cement.

C4 Compaction

At the start of compaction, the percentage of moisture in the mixture based on oven-dry weights, shall not be below or more than two percentage points above the specified optimum moisture content, and shall be less than that quantity which will cause the mixture to become unstable during compaction and finishing.

The specified optimum moisture content and density shall be determined in the field by a moisture-density test, AASHO T134 or ASTM D558 on representative samples of cement treated base mixture obtained from the area being processed at the time compaction begins.

Prior to the beginning of compaction, the mixture shall be in a loose condition for its full depth. The loose mixture then shall be uniformly compacted to at least 95% of maximum density within 2 hours. During compaction operations, shaping may be required to obtain uniform compaction and required grade and cross-section.

C5 Finishing

After compaction the surface of the base shall be shaped to the required lines, grades and cross-section. If necessary, during shaping operations, the surface of the base shall be lightly scarified to remove any tire imprints or smooth surfaces left by equipment. The resulting surface shall then be compacted to the specified density. Rolling shall be supplemented by broom-dragging if required.

The moisture content of the surface material must be maintained at not less than its specified optimum moisture content during finishing operations. Surface compaction and finishing shall be done in such a manner as to produce, in not longer than 2 hours, a smooth, dense surface free of compaction planes, cracks, ridges or loose material.

Any portion of the cement treated base that has a density of 5 lb./c.f. or more below that specified shall be corrected or replaced to meet these specifications.

C6 Curing

After the base has been finished as specified herein, it shall be protected against drying for 7 days by the application of bituminous material. The curing material shall be applied as soon as possible, but not later than 24 hours after the completion of finishing operations. The finished base shall be kept continuously moist until the curing material is placed.

The bituminous material specified shall be uniformly applied to the surface of the completed base at the rate of approximately 0.2 gal. per square yard with approved heating and distributing equipment. The exact rate and temperature of application for complete coverage without excessive runoff will be specified by the Engineer.

At the time the bituminous material is applied the cement treated base surface shall be dense, shall be free of all loose and extraneous material, and shall contain sufficient moisture to prevent penetration of the bituminous materials. Water shall be applied in sufficient quantity to fill the surface voids of the base immediately before the bituminous curing material is applied.

Should it be necessary for construction equipment or other traffic to use the bituminous-covered surface before the bituminous material has dried sufficiently to prevent pickup, sufficient granular cover shall be applied before such use.

The curing material shall be maintained by the Contractor during the 7-day protection period so that all of the cement treated base will be covered effectively during this period.

Finished portions of base that are traveled on by equipment used in constructing an adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging completed work.

Sufficient protection from freezing shall be given the base for 7 days after its construction and until it has hardened.

C7 Construction Joints

At the end of each day's construction a straight transverse construction joint shall be formed by cutting back into the completed work to form a true vertical face.

Straight longitudinal joints shall be formed at the edge of each day's construction by cutting back into the completed work to form a true vertical face free of loose or shattered material.

C8 Traffic

Completed portions of cement treated base may be opened immediately to local traffic and to construction equipment, and to all traffic after the 7-day curing period, provided the base has hardened sufficiently to prevent marring or distorting of the surface by equipment or traffic, and provided the curing, as specified in C6, is not impared.

C9 Maintenance

The Contractor shall be required, within the limits of his contract, to maintain the base in good condition until all work has been completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done by the Contractor at his own expense and repeated as often as may be necessary to keep the area continuously intact. Faulty work shall be replaced for the full depth of treatment. Any low areas shall be remedied by replacing the material for the full depth of treatment rather than by adding a thin layer of soil cement to the completed work.

D METHOD OF MEASUREMENT

Portland Cement Treated Base of each specified thickness will be measured separately by area.

Cement will be measured by the barrel incorporated into the mixture, on the basis of 376 pounds of cement per barrel when bulk cement is used, and 4 standard 94 pound sacks of cement per barrel when sack cement is used.

Bituminous curing material applied to the base will be measured by volume in gallons at 60° F.

Water used in conjunction with this specification will not be measured.

E BASIS OF PAYMENT

Payment for "Portland Cement Treated Base" at the contract price per square yard shall be compensation in full for all costs incidental to its construction except the cost of cement and bituminous curing material.

Payment for Portland Cement Treated Base will be made on the basis of the following schedule:

Item No.	Item	Unit
22.02 E1	Portland Cement Treated Base	Square Yard
22.02 E2	Portland Cement	Barrel
22.02 E3	Bituminous Curing Material	Gallon

22.03 BITUMINOUS TREATED BASE

A DESCRIPTION

This work shall consist of the construction of a plant-mixed bituminous base constructed on a prepared surface in accordance with these specifications as shown on the plans or established by the Engineer.

B MATERIALS

Aggregates .... North Dakota Highway Department Class	21
Bituminous Materials	32.01

C CONSTRUCTION REQUIREMENTS

C1 Restrictions

Bituminous materials shall not be placed on any foundation whose temperature is 40° F. or less.

Bituminous mixtures may be placed during a period of rising temperature after the air temperature, in the shade and away from artificial heat, has reached 40° F. and indications are for a continued rise in temperature. During a period of falling temperature, the placement of bituminous mixture shall be suspended when the air temperature, in the shade and away from artificial heat, reaches 40° F. Mixtures shall not be placed when, in the opinion of the Engineer, the weather or subgrade conditions are unfavorable. For single lift base courses, 4 in. or more compacted, the temperature may be reduced to 33° F. if all other criteria are met.

No work will be permitted in the spring until the frost has disappeared and the subgrade is so stable so as to support the equipment.

Each course shall be compacted and hardened to such a degree that it will not be displaced or otherwise damaged before another course may be placed thereon.

C2 Equipment

All equipment which is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet the requirements of the work and to produce a satisfactory quality of work. Any equipment that, in the opinion of the Engineer, does not meet these requirements shall be removed from the job.

The mixing plant shall be a central mix plant, either a weight-batch, rotary drum or volumetric proportioning continuous mixing type, suitable for producing finished mixtures complying with the job mix formula.

The asphalt heating system shall be capable of even, controlled heating of the asphalt to the required temperature range, without damaging or changing the characteristics of the asphalt. An accurate thermometer shall be provided to indicate the temperature of the asphalt in the unit in which heat is being applied.

Asphalt distributors shall have pneumatic tires of such width and number that the load produced on the road shall not exceed 650 pounds per inch of tire width. It shall be so designed and equipped as to distribute the asphalt material uniformly at even heat on variable widths of surface at readily determined and controlled rates from 0.05 to 2.0 gals. per square yard, with an allowable variation from any specified rate not exceeding 5 percent. Distributor equipment shall include a positive displacement asphalt pump, tachometer, pressure gauges, volume measuring devices, a thermometer for reading the temperature of tank contents, and a hose attachment suitable for applying asphalt material to spots missed by the distributor. The distributor shall be equipped for circulation and agitation of the asphalt material during the heating process.

Bituminous pavers shall be self-contained, power propelled units, provided with an activated screed, or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of bituminous plant-mix material in widths applicable to the specified typical section and thickness shown on the detailed drawings.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.

The screed or strike-off assembly shall effectively produce a finished surface of the required shape and texture without tearing, shoving or gouging the mixture.

The mechanical spreader shall be capable of depositing the designated amount of aggregate per square yard in a smooth uniform layer and in such a manner that the wheels of the equipment will not contact any asphalt which has not been covered by aggregate.

Steel-wheeled rollers shall be of the two wheel tandem type, self-propelled and shall not weigh less than 8 tons. Each wheel of the roller shall be equipped with adjustable scrapers, and a system to uniformly moisten the full width of each roller.

Rubber-tired rollers shall have 2 axles on which are mounted not less than 9 pneumatic-tired wheels spaced so that the pressure of the tires does not vary by more than 5 pounds per square inch. The axles shall be fixed to a loading platform or body suitable for being loaded with ballast. The gross weight shall be as directed by the Engineer.

Power driven brooms and blowers shall be of sufficient size and design as to thoroughly clean the surface of the area to be treated.

C3 Preparation of the Subgrade

The subgrade shall be prepared in accordance with 21.08 or 21.09, whichever is applicable.

a. Prime Coat

A prime coat shall be applied to the prepared base, the face of the curb and gutter, manholes and similar structures. The material used shall be of a type and grade as specified on the plans or proposal or by the Engineer, and it may be RC-70, MC-30, or MC-70; where not specified, use MC-70. The rate of application shall be as directed by the Engineer and shall be between 0.15 and 0.30 gallons per square yard.

Following application of the prime coat, the Contractor shall protect such sections so as to effecitvely prevent any wheels from traveling upon the prime until it has satisfactorily penetrated into the base and will not pick up on the vehicle tires.

b. Tack Coat

Unless otherwise specified or directed by the Engineer, a tack coat shall be applied to previously placed surfaces prior to any succeeding courses at a rate of 0.05 to 0.15 gallons per square yard. The material used shall be of a type and grade shown on the plans or proposal and it may be MC-70, MC-250, MC-800, RC-70, SS-1, or SS-1h; where not specified use SS-1. Where an emulsified asphalt is specified, dilute one part of water to one part of emulsion and apply the mixture at two times the specified rate of application.

When and if directed by the Engineer, sand shall be spread on the newly tacked surface at pedestrian crossings.

C4 Mixture Preparations

The bituminous material for this specification shall be AC120-150 penetration paving asphalt and shall be within the range of 4.5 to 6.5 percent by weight of the total mix. The Engineer shall specify or approve a job mix formula, submitted by the Contractor at least three days prior to start of construction. Once that formula is approved, the maximum permissible variation shall be as follows:

Aggregate passing No. 4 and larger sieves....$\pm$ 7.0%
Aggregate passing No. 8 to No. 100 sieves....$\pm$ 4.0%
Aggregate passing No. 200 sieves............$\pm$ 2.0%
Asphalt.....................................$\pm$ 0.4%
Temperature of mixture......................$\pm$ 20° F.

The asphalt mixture shall have the following test properties:

Marshall Stability.................500# or greater
Marshall Flow (units of 0.01 in.)...8 to 18
Air Voids..........................3 to 8 percent

Adjustment of the job-mix formula shall be made if and as directed by the Engineer without adjustment in the contract unit price.

C5 Plant Operation

The plant and related facilities shall be operated according to the latest recommendations for hot-mix plants as specified by The Asphalt Institute. In addition, the plant shall be so set up that spot checks of the materials may be readily made.

The aggregate shall be heated until it is surface dry. When it reaches the mixer it shall not exceed 325° F., and shall be free of unburned fuel oil.

The hot aggregate, the mineral filler (when required) and the asphalt cement shall be measured separately and accurately, and shall be introduced into the mixer in such proportions that the mixture will have a uniform composition within the specified limits.

The aggregate and mineral filler shall be mixed for not less than 15 seconds before the bituminous material is added and mixing shall be continued for a period of at least 20 seconds or longer if required to obtain a homogenous mixture.

The temperature shall be as directed but in no case shall the temperature of the aggregate exceed that of the asphalt by more than 25°F. The maximum temperature of the mixture shall not exceed 325°F.

C6 Placement Operations

All mixtures shall be spread without segregation to the cross-section shown in the plans. If the specified compacted thickness of any course, other than a leveling course, is more than 3 inches, that course shall be spread and compacted in uniform layers of approximately equal thickness.

The mixture, in any course, may be spread by acceptable hand methods only where, in the opinion of the Engineer, the placement conditions are such that it would be impracticable to spread the mixture by a motor grader, bituminous paver or other mechanical spreading device.

Leveling course mixtures shall be spread by the method which, under the conditions prevailing, will produce the best results, the objective being to secure a smooth base of uniform grade, compaction and cross-section so that subsequent courses will be of uniform thickness. The method of spreading for such mixtures shall be as directed by the Engineer, depending on the amount of mixture to be placed, the extent and type of leveling required, the air temperature and other restrictions. Under normal placement conditions, the leveling course mixture will be required to be spread by a motor grader equipped with a leveling device or other positive means for controlling the surface elevation of the leveling course. The Engineer may permit or require such mixtures to be spread by a properly equipped paver if: (1) the primary purpose of the leveling course is to correct for crown and the leveling or feathering required is such that satisfactory results can be obtained with a paver of the type to be used; or (2) if the mixture cannot be spread satisfactorily by a motor grader, at the prevailing temperature, due to excessive loss of heat in the mixture. When a paver is used for spreading leveling course mixtures, it shall be so equipped that it will produce a surface conforming to the required grade and cross-section.

All base course, binder course and wearing course mixtures shall be spread, to the fullest extent practicable, by means of a bituminous paver. Such mixtures may be spread by a motor grader only on areas which are inaccessible to a paver.

Where a motor grader is used, the mixture shall be spread as soon as practicable after being deposited and, in all cases, before suspending work for the day. When hand methods are used, the mixture shall be dumped outside the area which it is to be spread after which it shall be immediately distributed to the proper cross-section.

Pavers shall operate, when laying mixtures, at a speed of not more than 30 feet per minute, except that higher speeds of operation may be permitted by the Engineer for approved types of pavers. The speed shall be adjusted at the discretion of the Engineer to that speed which, in his opinion, gives the best results for the type of paver being used and which coordinates satisfactorily with the rate of delivery of the mixture to the paver so as to provide a uniform rate of placement without intermittent operation of the paver.

The placement of each course shall be completed over the full width of the section under construction on each day's run.

The contact surfaces of curbs, concrete pavements and other fixed structures, and the edge of the in place mixture in all courses at transverse joints and in the wearing course at longitudinal joints, shall be given a uniform coating of RC, RT, RS, or MC bituminous material before placing the adjoining mixture. The bituminous material shall be applied by methods which will ensure a uniform coating and in no case shall the application be excessive.

Compaction shall be obtained by the Specified Density method.

Each course shall be uniformly compacted to a density not less than 95 per cent of the density obtained when a sample of the mixture from that course is compacted by the Marshall compaction method, which method shall consist of compacting the sample in a cylindrical mold and determining its weight in pounds per cubic foot in accordance with ASTM D-1559.

After being spread as above provided, each course shall be compacted to the required density with self-propelled pneumatic-tired rollers, except that: (1) the initial rolling on any course placed with a bituminous paver may be performed with a steel-wheeled roller; (2) the final rolling on the last course constructed under the contract shall be performed with a tandem steel-wheeled roller; and (3) areas which are inaccessible to the conventional type rolling equipment shall be compacted to the required density by using trench rollers or mechanical tampers.

The rolling shall follow as close behind the spreading operations as practicable without causing undue displacement of the mixture. In general, the rolling shall begin at the lower edge of the strip and progress toward the upper edge; however, when a longitudinal joint is formed by adjoining strips, the first pass of the roller shall be over that joint. Each pass of the roller shall terminate at least 3 feet in advance of or to the rear of the termination of the preceding pass. The speed of the roller shall not exceed 3 miles per hour. The final rolling on the last course constructed under the contract shall be continued until all roller marks are eliminated.

When mixtures are spread by a motor grader, the use of a steel-wheeled roller for the initial rolling will not be permitted, and the pneumatic-tired rolling shall be done simultaneously with the spreading operations.

The rollers shall, so far as practicable, be operated continuously in such a manner that all areas are thoroughly compacted to the required density. When not operating, the rollers will not be permitted to stand on the uncompacted mixture. Rolling with steel-wheeled rollers shall be discontinued whenever such rolling produces excessive crushing or pulverizing of the aggregate or displacement of the mixture.

To prevent adhesion of the mixture to the rollers, the wheels shall be properly moistened, using water or soap-water solution, but an excess will not be permitted.

To secure a true surface, variations such as depressions or high areas which may develop during rolling operations shall be corrected by removing the material in the defective area, replacing with new mixture and re-rolling. Lean, fat or segregated areas shall be entirely removed and replaced with new material. All such corrections shall be accomplished as directed by the Engineer, and at the expense of the Contractor.

C7 Thickness and Surface Requirements

After compaction, the finished surface of each course shall be free from open and torn sections and shall be smooth and true to the planned grade and cross-section within the following tolerances:

1. Where a leveling course is specified, it shall be constructed to within plus or minus 0.05 foot of the elevations and grades established by the Engineer.

2. The surface of the binder course and wearing course shall show no variation greater than 1/4 inch from the edge of a 10 foot straightedge laid thereon parallel to or perpendicular to the center line.

3. The transverse slope of the surface of each course shall not vary from the slope shown in the plans by more than plus or minus 1/4 inch in 12 feet.

C8 Construction Joints

Joints shall be carefully made in such a manner as to ensure a neat junction, thorough compaction and continuous bond throughout.

A transverse joint (extending over the full width of the strip being laid and at right angles to its center line) shall be constructed at the end of each day's work and at any other times when the operations of placing the mixture are suspended for a period of time which will permit the mixture to chill. The forward end of the freshly laid strip shall be thoroughly compacted, by rolling before the mixture has become chilled. When work is resumed, the end shall be cut vertically for the full depth of the layer with an asphalt spade or a concrete saw.

Longitudinal joints between strips shall be parallel to the center line of the roadbed.

In cases of multiple course (or layer) construction, the longitudinal joints between strips in each course (or layer) shall be not less than 6 inches distant transversely from like joints in any previously placed course (or layer).

At longitudinal joints formed by placing multiple strips, the adjoining surface being laid shall, after final compaction, be slightly higher (but not to exceed 1/8 inch) than the previously placed strip.

When constructing a strip adjoining a previously placed strip or a concrete pavement, any fresh mixture which may lap over such previously placed strip or pavement shall be removed (to the longitudinal joint line) before any rolling is done.

After final compaction, all bituminous surfaces adjacent to gutters, manholes, pavement headers, or other fixed structures shall be slightly higher (but not to exceed 1/4 inch) than the surface of such structures.

D METHOD OF MEASUREMENT

The bituminous mixture for the base course will be measured by the square yard, based on the quantity of base that is actually placed, or by weight, based on the weights of loads hauled from the mixing plant.

Bituminous materials which are used for prime coat, tack coat, fog coat and the bituminous mixture will be measured separately by volume or by weight at a temperature of 60° F. when separate payment for bituminous material is indicated in the proposal.

No measurement of sand or other protective covering will be made.

E BASIS OF PAYMENT

The estimated quantities of bituminous materials will be based on normal construction usage.

Payment for bituminous treated base at the contract unit price shall be compensation in full for all costs of constructing the base including the cost of bituminous materials.

Payment for bituminous materials will be considered payment in full for all costs incidental thereto.

Furnishing and installing sand on newly tackled surfaces and other protective devices furnished will be considered to be incidental work and no direct compensation will be made therefor.

Payment for the bituminous treated base will be made on the basis of the following schedule:

Item No.	Item	Unit
22.03 E1	Bituminous Material for Prime	Gallon
22.03 E2	Bituminous Material for Tack	Gallon
22.03 E3	Bituminous Material for Fog	Gallon
22.03 E4	Bituminous Material for Mixture	Gallon or Ton
22.03 E5	___" Bituminous Treated Base	Square Yard
22.03 E6	Bituminous Treated Base	Ton

Unless otherwise provided in the special provisions, payment for 22.03 E5 "Bituminous Treated Base" will be made on the basis of planned quantities, without any measure being made of the quantity of base actually installed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to increase or decrease the planned quantities.

2. If either the Owner or the Contractor request in writing that an actual measurement be made. Such a request shall be made not later than 7 days after the base has been installed.

In such cases, payment will be made for the actual measured quantity of base installed.

SECTION III SURFACE COURSES

23.01 PORTLAND CEMENT CONCRETE PAVEMENT

A DESCRIPTION

This work shall consist of the construction of portland cement concrete pavements, with or without reinforcement, upon a prepared base or subgrade in accordance with the lines, grades, thickness and typical cross-sections, including any appurtenances as shown on the plans and as called for in the specifications.

B MATERIALS

Concrete	25.01
Reinforcing Steel	36.01
Dowel Bars	36.02
Preformed Expansion Joint Filler for Concrete	35.01
Concrete Joint Sealer	35.02
Concrete Curing Materials	38.01
Concrete Treating Oil	38.03
Form Coating Material	38.02

C CONSTRUCTION REQUIREMENTS

C1 General

Construction operations shall not be started on any part of the work without authorization from the Engineer.

The Contractor shall have in his working organization a separate foreman, sub-foreman, or a designated workman in charge of each phase of the work requiring direct supervision, who is authorized to receive instructions and orders in the absence of the general foreman or superintendent. Major phases of the work requiring this direct supervision are:

a. Concrete batching plant
b. Preparation of the subgrade and fine grading
c. Form setting
d. Placing concrete
e. Finishing and curing
f. Sealing joints and final clean up

Power equipment shall not operate on a pavement slab until it has attained an age of 7 days or a flexural strength of 550 psi, and then only when authorized in writing by the Engineer. In the event that the equipment or operation thereof damages the concrete, operation shall be suspended until the damage has been corrected. In general, before any equipment will be allowed on an existing street surface, the Contractor must furnish to the Engineer, sufficient details of his scheme for prevention of damage. The Engineer's authorization will in no way relieve the Contractor for any damage caused by his operations.

Concrete placement shall not be carried on when atmospheric conditions are such as to cause an abnormal amount of shrinking and checking of the pavement.

Concrete shall not be placed on any foundation whose temperature is 32°F or less. Concrete may be placed during a period of rising temperature after the air temperature, in the shade and away from artificial heat, has reached 35° F. Concrete placement shall stop when the falling temperature has reached 40° F.in the shade and away from artificial heat. Prior to any concrete placement during cold weather, the Contractor shall submit to the Engineer for approval, the Contractor's means of frost protection for newly-deposited concrete.

In addition to the required cure covering, the Contractor shall protect the concrete after placement to prevent the temperature of the deposited concrete from falling below 50°F until the required curing period has elapsed. The minimum curing period during cold weather for protected concrete shall be 72 hours, and shall be subject to such extension as deemed necessary by the Engineer.

New pavement shall not be opened to use by any traffic until the joints have been sealed.

New pavement may be opened to use by light vehicles (axle loads of 6000 pounds or less) 72 hours after the concrete has been placed.

New pavement may be opened to use by the general public 12 days after the concrete has been placed or when the concrete has reached a flexural strength of 550 psi, whichever is shorter; providing, however, that the pavement is in condition for safe use.

During periods of low temperature, the above specified limitations will be extended by the Engineer as required by the then existing conditions.

C2 Subgrade Preparation and Maintenance

The subgrade shall be prepared in accordance with 21.08 of 21.09, whichever is applicable. When the pavement is placed on a subgrade constructed under the same contract, the subgrade shall be prepared and maintained at the Contractor's expense, and the final shaping and compacting of the subgrade shall be done just prior to constructing the pavement.

Fine grading shall be done just prior to placement and shall be so done that, at the time the concrete is placed, the subgrade will conform approximately to the grade and cross-section of the bottom of the pavement slab.

C3 Forms

Regardless of the type or design, forms shall have a strength and rigidity such that, when set in place and braced, they will withstand the weight and action of passing equipment without springing, settlement or lateral displacement.

Approved flexible forms shall be used on all curves where the radius is less than 20 times the length of form.

The forms shall be set to the proper alignment and grade for a distance equal to at least 3 hours paving time.

Prior to placing the forms, the foundation shall be prepared as provided for in 23.01 C2. The forms shall have a firm and uniform bearing over their whole base, shall be tightly joined, fully and securely staked, clean and free of accumulations of hardened concrete and, before the concrete is placed, they shall be well oiled on the contact faces.

In the event of rain, the forms shall be removed and reset as may be necessary to comply with the requirements stated above.

Forms for pavement and back forms for integral curb shall be removed after the concrete has been placed as directed by the Engineer. Forms shall be removed during daylight hours only, and in such a manner as to avoid damage to the pavement and curb.

C4 Placing Steel Reinforcement

All steel reinforcement shall be clean when used and, unless otherwise provided, shall be of the type, style and dimensions shown, and shall be placed at the locations specified.

All bar reinforcement (whether used in fabricated steel bar mats or as individual bars), except dowel bars but including steel bars used for tie joints, will be classified as Reinforcement Bars.

Steel bar reinforcement of greater cross-section area than that specified may be used at the Contractor's option, but the spacing between the individual members shall not exceed the spacing shown for the type of reinforcement and bar size specified.

The final location of all steel bar reinforcement placed in the pavement shall be within plus or minus one inch of the vertical location shown.

C5 Batching and Mixing

The batching and mixing of concrete and all operations incidental thereto shall be in accordance with 25.01 "Portland Cement Concrete."

C6 Placing and Distributing Concrete

The Contractor shall sprinkle the subgrade as may be necessary to provide a moisture content in the top 3 inches of the subgrade (at the time the concrete is placed) such that there will not be undue absorption of water from the concrete into the subgrade.

The concrete shall be deposited in such a manner as to form a continuous mass requiring a minimum of rehandling or redistribution and to a sufficient depth to provide a proper excess for subsequent finishing operations.

Concrete shall not be dumped or discharged directly upon or against a joint assembly in any manner that will cause displacement to any part of the assembly.

If placement of concrete is suspended for a period of 30 minutes or less, the unfinished forward face of the concrete already placed shall be covered with wet burlap or similar material during the suspension period, and when operations are resumed, it shall be broken down and thoroughly merged with the fresh concrete. During such suspension periods, the consolidating and finishing operations shall be continued until concrete in place has been properly finished. If the suspension period exceeds 30 minutes, a standard header joint shall be constructed; provided, however, that no header joint will be permitted within a distance of 10 feet from any adjacent transverse joint.

C7 Consolidating Concrete

Concrete shall be thoroughly vibrated by means of an approved mechanical vibrator. The vibrator impulses shall be delivered directly to the concrete and the intensity of vibration shall be sufficient to consolidate the concrete mass thoroughly and uniformly throughout its entire depth and width. The concrete shall be vibrated only once and as soon as possible after it has been placed on the subgrade. The rate of progress of vibrating equipment and the duration of the application shall be uniform and so regulated that the concrete is fully but not excessively vibrated. Excessive vibration, as indicated by segregation or undesireable water gain in the upper zone of the pavement, will not be permitted. The operation of the vibrating equipment shall be suspended whenever the forward progress of the machine is interrupted. The use of hand-held vibratory equipment shall be approved only where adequate manpower is available and used for regulating this equipment. Hand held vibrators may be required along the edge of existing pavement and curb, at the discretion of the Engineer.

The vibratory equipment shall be operated in such a manner as not to damage or displace any joint assemblies or reinforcing bars.

In the event of temporary failure of the vibratory equipment, concrete paving shall be suspended until (a) the vibratory equipment is again working or (b) the concrete mixture has been redesigned to allow concrete construction without vibration. Any increase in concrete cost resulting from the redesign of the concrete mixture due to the failure of the equipment shall be borne by the Contractor.

C8 Strike-off and Screeding

The pavement shall be struck off and consolidated with a mechanical finishing machine. Hand finishing methods may be used only with special permission of the Engineer. When a mechanical finishing machine is used, the concrete shall be struck off at such a height that after consolidation and final finishing it shall be at the exact elevation as shown in the plans. A depth of at least 2 inches of concrete shall be carried in front of the strike-off screed for the full width of the slab whenever the screed is being used to strike off the pavement. The finishing machine shall be provided with a screed which will consolidate the concrete by pressure. The concrete shall, through the use of this machine, be brought to a true and even surface, free from rock pockets, with the fewest possible number of passages of the machine. Hand finishing tools shall be kept available.

When hand finishing is permitted, the concrete shall be struck off and consolidated by a vibrating screed to the exact elevation as shown on the plans. When the forward motion of the vibrating screed is stopped, the vibrator shall be shut off; it shall not be allowed to idle.

C9 Longitudinal Floating

After the concrete has been struck off and consolidated, it shall be further smoothed by means of a mechanical longitudinal float of a suitable design approved by the Engineer. In order to allow enough time for consolidation of the concrete it may be necessary for the float to lag the finishing operation operating by as much as one hour. The float machine shall be of such design that the float is operated transversly across the pavement with its longitudinal axis approximately parallel to the center line and successive passes lapped with at least one-half the length of the float.

When hand finishing is permitted, the manually operated longitudinal floats shall be metal shod and at least 10 feet long and 10 inches wide. The float shall be operated in a manner similar to a machine float and shall be in full contact with the concrete surface. Surplus water and laitance shall be wasted over the forms after each transverse movement of the float.

C10 Scraping and Straightedging

After the passage of the longitudinal float, the pavement shall be scraped with a straightedge from 6 to 10 feet long, equipped with a handle to permit it to be operated from the edge of the pavement. The straightedge shall be operated so that any excess water, laitance and inert material are removed from the surface of the pavement.

After the longitudinal floating has been completed and any excess water removed, but while the concrete is still plastic, the slab surface shall be tested for trueness with a 10 foot straightedge swung from handles 3 feet longer than one-half the width of the slab. The straightedge shall be placed on the surface of the pavement parallel to the centerline and at not more than 5 foot intervals transversly. After each test the straightedge shall be moved forward one-half its length and the operation repeated. When irregularities are discovered, they shall be corrected by adding or removing concrete. All disturbed places shall be floated with a wood or metal float not less than 3 feet long and not less than 6 inches wide, and again straightedged. The pavement surface shall have no depression in which water will stand.

C11 Final Surface Finishing

The final surface of the concrete pavement shall have a uniform gritty texture free from excessive harshness and true to the grades and cross-section shown on the plans.

In general brooming will be required to produce the final finish. Brooming shall follow closely the straightedging operation. The broom, which shall be an approved steel or fiber broom not less than 24 inches wide, shall be pulled gently over the surface of the pavement. Adjacent strokes shall be slightly overlapped. Brooming shall be perpendicular to the centerline of the pavement and so executed that the corrugations thus produced will be uniform in character and width and not more than 1/8 inch nor less than 1/16 inch deep.

Upon permission of the Engineer the final finish may be constructed with a burlap drag. The drag shall have at least 3 feet in contact with the pavement and be 4 feet longer than the width of the slab under construction. It shall be laid on the surface of the pavement and dragged forward in the direction in which the pavement is being laid.

Before brooming or burlap dragging is completed, and before the concrete has taken its initial set, the edges of the slab shall be carefully finished with an edger having a radius of not larger than 1/8 inch.

C12 Joints

All joints shall be straight and shall be constructed at right angles to the pavement surface, and unless otherwise indicated in the plans, longitudinal joints shall be parallel to and transverse joints at right angles to the centerline of the pavement.

Joints shall be dried and sand cleaned prior to installation of the joint material.

Joints for concrete pavement are classified as follows: contraction, isolation, and construction joints. These joints are to be constructed as shown in the standard plates.

a. Transverse joints shall be contraction or construction joints. Contraction joints shall be sawed except in cases where pre-molded strips are used to control cracking from adjacent working joints.

   When transverse contraction joints are to be formed by sawing, care must be taken to saw the grooves soon after placing to prevent the formation of cracks due to contraction of the slab.

All transverse joints shall be sawed to at least one-fourth (1/4) of the slab depth. Any procedure for sawing joints that results in premature and uncontrolled cracking shall be revised immediately by adjusting the time interval between placement of the concrete and the cutting of the joints.

Transverse pre-molded strip joints shall be of the dimensions shown. The pre-molded filler is placed in a vertical groove formed to receive it. The top of the filler shall be flush with the pavement surface.

Transverse construction joints shall be of the type shown and shall be placed wherever the placing of concrete is suspended for more than 30 minutes. No construction joint will be allowed between the normal contraction joint locations. It will be the responsibility of the Contractor to lay out his location of joints in advance of the work so that construction joints do not occur where prohibited.

b. Longitudinal joints shall be placed as shown on the plans or standard plates. They shall be either contraction or construction joints.

In general, all contraction joints shall be sawed in a manner the same as specified for transverse sawed contraction joints. Should the Contractor desire to use any other type of contraction joint, he shall first obtain the written permission of the Engineer.

Longitudinal construction joints shall be as shown in the plans or standard plates. The key shall be constructed by placing a deformed metal plate against the form when the first lane adjacent to the joint is placed. This metal plate shall be removed with the form. When placing the second slab, no concrete shall be left to overhang the lip formed on the first slab by the edging tool. Before placing the second slab, the entire edge shall be sprayed with concrete form oil so as to completely break the bond between adjacent slabs.

c. Isolation joints shall be used to separate all fixed objects, such as buildings, poles, pipes, catch basins, manholes, inlet castings, etc., within or abutting the pavement, and at all street intersections. The isolation joint shall be for the full depth of the slab and of the dimensions shown in the standard plates.

In general, isolation joints will be only the normal depth of the slab; however, whenever an isolation joint extends the entire length or width of a slab, the depth will be increased 2 inches over a 5 foot length, as shown in Type 6.

When tie bars are shown, they shall be of deformed steel and of the dimensions and at the spacing specified. Tie bars shall be firmly supported by subgrade chairs or so installed as not to be displaced during construction operations.

After the curing period all joints in the pavement shall be cleaned and sealed with material meeting the requirements of 35.02. All foreign material, joint sawing residue and dirt shall be removed. Joints shall be slightly underfilled (about 1/8 inch) to prevent extrusion of the sealer. Any excess material shall be removed immediately.

When separate curb and gutter is used, the longitudinal joint between the pavement and the gutter shall be a type 3 joint as shown in the standard plates. Transverse joint locations in the curb and gutter shall match the locations of transverse joints in the pavement.

C13 Curing

The pavement shall be cured by being covered with curing paper or plastic curing blankets or by the application of a liquid membrane curing compound meeting the requirements of 38.01, and shall cover all exposed surfaces of the pavement. The paper or plastic shall be applied as soon as possible (without marring the pavement) after the final finishing operations have been completed, and shall remain on the pavement not less than 72 hours.

The curing blankets shall be in such a condition and shall be so placed as to provide an airtight and moisture proof covering in order to prevent the loss of water vapor from the underlying pavement during the curing period.

When the liquid membrane curing compound is used, the material must be applied to cover the surface completely and uniformly at the rate of not less than one gallon per 150 square feet of pavement. The curing compound shall be white pigmented and shall be placed in two equal applications. The second application shall be made within 30 minutes of the first application. Joints which are to be sealed shall be protected against entry of the curing compound, When side forms are removed before the expiration of the curing period, the exposed sides shall be sprayed with curing compound within 30 minutes after removal of the forms. If the curing membrane is damaged from any cause within the curing period, the damaged areas shall be recoated without delay.

C14 Workmanship

Only that pavement which meets the minimum requirements for workmanship and quality as specified will be measured and paid for at the contract unit bid price. Pavement which fails to meet the specified requirements when tested will be considered to be defective work and shall be subject to the provisions made herein for correction and for measurement or payment on an adjusted basis. The limits of each individual defective pavement area will be determined by the Engineer and will be computed to the nearest square yard.

When defective areas are corrected by removing and replacing the pavement, the pavement shall be removed to the full width of a lane for the entire length of deficiency but in no case less than 5 feet. When such removal limits fall within 5 feet of a joint, the pavement shall be removed to the joint.

If any pavement area is deficient in more than one requirement, it will be paid for at the adjusted unit price specified for that deficiency which produces the least compensation to the Contractor.

a. <u>Surface Requirements</u>

After completion of the curing period, the Engineer will check the pavement surface, both transversly and longitudinally, with a 10 foot straightedge. If the pavement shows a variation from the testing edge of more than 1/4 inch, the contract unit bid price will be reduced to 90 per cent of the original bid price. If the deviation is over 1/2 inch from the testing edge, the Engineer may, at his discretion, order the pavement removed and replaced, or pay for the defective pavement at the rate of 50 per cent of the contract unit bid price. For areas ordered to be removed and replaced and are not so done by the Contractor, the Engineer shall deduct a sum equal to 2 times the contract unit bid price. This sum is to cover the expense of the work by another contractor.

Light surface grinding or rubbing will be allowed on defective areas to bring them within the above limits. The grinding or rubbing shall be so done so as to not appreciably affect the gritty texture of the concrete, and must stop when the course aggregate is exposed.

b. <u>Thickness Requirements</u>

It is intended that the finished pavement thickness conform substantially to the thickness as shown in the plans or standard plates.

Prior to acceptance of the project, the Owner may take random cores of the pavement to determine the thickness. The core locations shall be decided by the Engineer at his discretion.

Whenever a random core shows a depth deficiency from the plan thickness, additional cores shall be taken. If no adjacent cores measure less than the planned thickness, the original core will be disregarded. If additional cores show that an area of the pavement is less than the planned thickness, that area shall be reasonably determined by the Engineer to the nearest square yard. There shall then be deducted from any money due the Contractor an amount equal to 50 per cent of the contract unit bid price of the pavement for each and every square yard determined to be defective as to thickness. Should the deficiency be equal to 1/2 inch or more, the entire pavement within the deficient area will be removed and replaced at the Contractor's expense or an amount equal to 2 times the contract unit bid price for the pavement will be deducted from any money due the Contractor. Any pavement that is removed and replaced, shall be an area enclosed by in-place longitudinal and transverse joints.

D METHOD OF MEASUREMENT

Concrete pavement, including reinforced panels and headers, will be measured by area, based on the dimensions as staked by the Engineer except that, in accordance with the provisions of 23.01 C14, all areas subject to price adjustment will be measured separately.

No reinforcement, tie bars, dowel bars, curb, treating oil, curing compound or any other materials will be measured, and will be considered to be incidental items required to construct the concrete pavement.

E BASIS OF PAYMENT

Payment for Concrete Pavement of each type and strength at the contract price per square yard, or at any adjusted unit price provided in 23.01 C14, shall be compensation in full for all costs of its construction included under this specification. No direct payment will be made for any items considered incidental to the construction of concrete pavement.

In accordance with the provisions of 23.01 C14, pavement which is defective in workmanship or quality will be subject to unit price adjustment or to final payment adjustment, based on the type and extent of deficiency.

If the contract does not contain a bid price for Concrete Pavement (High Early Strength), any high early strength concrete pavement constructed by order of the Engineer will be paid for at the contract unit price bid for Concrete Pavement plus 15 per cent thereof.

Payment for concrete pavement construction will be made on the basis of the following schedule:

Item No.	Item	Unit
23.01 E1	___" Concrete Pavement..	Square Yard
23.01 E2	___" Concrete Pavement (High Early Strength)............................	Square Yard

Unless otherwise provided in the special provisions, payment for "Concrete Pavement" will be made on the basis of planned quantities, without any measure being made of the actual quantity of pavement installed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to increase or decrease the planned quantities.

2. If either the Owner or Contractor request in writing that an actual measurement be made. Such request shall be made not later than 7 days after the pavement has been installed. In such cases, payment will be made for the actual measured quantity of pavement installed.

23.02 ASPHALTIC CONCRETE PAVEMENT

A DESCRIPTION

This work shall consist of the construction of an asphaltic concrete pavement including a plant mixed base and surface course of the thickness and dimensions shown on the plans, typical sections, special provisions and described in the proposal. A single surface treatment aggregate seal coat shall be required and included as part of the pavement unless otherwise specified in the bidding documents.

B MATERIALS

The materials shall be the same as specified in 22.03.

C CONSTRUCTION REQUIREMENTS

Construction requirements are the same as those specified in 22.03 except that the percentage of asphalt cement in the surface course shall be within the range of 5.0 to 7.0 percent by weight of the total mix.

D METHOD OF MEASUREMENT

Asphaltic concrete pavement will be measured by the square yard, based on the quantity of pavement that is actually placed, or by weight, based on the weights of loads hauled from the mixing plant.

When separate payment for bituminous material is indicated in the proposal the bituminous materials which are used for prime coat, tack coats, fog seal and bituminous mixture will be measured separately by volume, or by weight, at a temperature of 60° F.

No measurement of sand or other protective covering will be made.

E BASIS OF PAYMENT

The estimated quantities of bituminous materials will be based on normal construction usage.

Payment for asphaltic concrete pavement at the contract unit price shall be compensation in full for all costs of construction included under this specification. No separate payment will be made for sand, or newly tacked surfaces, protective devices furnished or other materials or work required to complete the pavement.

Payment for bituminous materials will be considered payment in full for all costs incidental thereto.

Payment for Asphaltic Concrete Pavement or bituminous material will be made on the basis of the following schedule:

Item No.

23.02 E1	Bituminous Material for Prime.	Gallon
23.02 E2	Btiuminous Material for Tack.	Gallon
23.02 E3	Bituminous Material for Fog	Gallon
23.02 E4	Bituminous Material for Mixture	Gallon or Ton
23.02 E5	Asphaltic Concrete Pavement	Square Yard
23.02 E6	Asphaltic Conrete Pavement	Ton

Unless otherwise provided in the special provisions, payment for 23.02 E5 "Asphaltic Concrete Pavement" will be made on the basis of planned quantities, without any measure being made of the quantity of pavement actually installed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to increase or decrease the planned quantities.

2. If either the Owner or the Contractor requests in writing that an actual measurement be made. Such a request shall be made not later than 7 days after the surface has been installed.

In such cases, payment will be made for the actual measured quantity of surface constructed.

23.03 SEAL COAT

A. DESCRIPTION

This work shall consist of constructing a bituminous seal coat with cover aggregate.

B. MATERIALS

Mineral aggregates shall conform to the requirements of 33.01. Unless otherwise specified, aggregate shall be Class 43.

The bituminous material used shall be of a type, grade, and rate of application as specified and it may be an MC, RC, or RS. Where not specified, use an RS-2.

An anti-stripping addition shall be used, and it shall be added to the bituminous material at the refinery or blending plant unless prior approval of the Engineer is secured.

C. CONSTRUCTION REQUIREMENTS

C1. Restrictions

Seal coat operations shall be conducted only during hours of daylight, when the pavement and air temperature are 60 degrees F. or higher, the relative humidity is less than 75 percent, and the road surface is dry. Application of the bituminous material shall be suspended when, if in the opinion of the Engineer, the weather or the road surface conditions are unfavorable.

Seal coat operations shall not be conducted before June 1 or after September 1 except upon written permission of the Engineer.

C2. Equipment

All equipment which is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet the requirements of the work and to produce a satisfactory quality of work. Any equipment that, in the opinion of the Engineer, does not meet these requirements shall be removed from the job.

The distributor shall be capable of applying the bitumen uniformly on the designated area at the specified rate; and shall be equipped with a system to permit even, controlled heating of the bitumen to the temperature required for spraying, and with means for circulating the bitumen being heated. The distributor shall be mounted on a pneumatic-tired vehicle.

The aggregate spreader shall be capable of depositing the designated amount of aggregate per square yard in a smooth uniform layer on the freshly deposited bitumen, and in such a matter that the wheels of the equipment will not contact any bitumen which has not been covered by the aggregate.

Pneumatic-tired rollers shall be self-propelled and shall exert a pressure on the street of not less than 200 pounds per inch of rolling width.

Steel-wheeled rollers shall be of the two-wheel tandem type, self-propelled and shall weigh not less than 5 tons. The maximum weight of the roller shall be controlled to prevent crushing of the aggregate particles.

C3 Preparation of the Surface

Immediately prior to the application of any bituminous material, the street surface shall be cleaned, for the full width to be treated, of all dirt, dust and other objectionable matter. All debris removed shall be disposed of by the Contractor, outside the right of way, in any manner he elects subject to the provisions of 14.07.

To prevent entrance of bituminous material or aggregate into sewers or other underground structures, all inlets and vented manhole covers shall be covered with building paper or other suitable material prior to the application of the seal coat. Any material allowed to enter such structures shall be removed immediately.

C4 Application of the Bituminous Seal Material

The bituminous material shall be applied only when the street surface is clean and dry. The progress of the application of the bituminous material shall be governed by the rate at which the aggregate is applied and rolled. No traffic will be permitted on the uncovered bituminous material. Bituminous material shall not be applied until sufficient aggregate is at hand ready to cover the area of anticipated application of bituminous material.

The rate of application shall be 0.15 to 0.25 gal./s.y. as directed by the Engineer.

In order to prevent overlapping at the end junction of two successive applications, building paper shall be spread on the road surface at both ends, and the application shall begin and end on the building paper. The building paper shall be removed and destroyed after application of the bituminous material.

The bituminous material shall be applied in a uniform film at the rate specified without ridges or missed areas.

C5 Application of the Aggregate

The application of the aggregate shall begin immediately after the start of application of the bituminous material and nowhere shall the aggregate application follow more than one minute after application of the bituminous material.

The aggregate, at the time it is applied, shall contain not more than 2 per cent (by weight) of free surface moisture.

The aggregate shall be spread uniformly over the full width of the bituminous application by means of an aggregate spreader. The rate of application shall be 15 to 25 lbs./s.y. as directed by the Engineer.

Prior to rolling the aggregate, any non-uniformity in the distribution of the aggregate shall be corrected by removing any excess or by spreading additional aggregate over such area of the street surface as the Engineer may direct.

C6 Rolling

Three complete passes of the rollers will be required. The initial rolling shall be completed not later than one (1) minute after the aggregate has been spread, and all of the rolling shall be completed not later than five (5) minutes after the aggregate has been spread. Initial rolling shall be done with pneumatic-tired rollers. Pneumatic-tired rollers shall be operated at speeds less than five (5) miles per hour, and steel-wheeled rollers shall operate at less than four (4) miles per hours. The aggregate shall not be crushed, shoved, or displaced by the rolling.

A complete pass is defined as one complete full width coverage.

The completed surface shall present a uniform appearance.

C7 Protection of the Surface

No traffic shall be permitted on the sealed street surface until after all of the rolling has been completed and the bituminous material has set to a degree satisfactory to the Engineer and will not pick up on vehicle tires.

C8 Clean Up

The Contractor shall sweep off the surplus aggregate from the seal coat construction when directed by the Engineer and when the road surface is cool. Care shall be exercised to not disturb aggregate which has set.

If excessive dust (air pollution) is caused by the clean up operation, in the judgment of the City Engineer, he may require the Contractor to use water for dust control, vacuum sweeping equipment, or other means to control air pollution for protection of health, property, and traffic safety.

Following removal of surplus aggregate, all manholes and drainage structures shall be inspected. Any seal coat aggregate, bituminous material, or other debris resulting from the seal coat operation found in the underground structures shall be removed immediately.

Surplus aggregate shall remain the property of the City. The Contractor shall dispose of the aggregate that is swept up as directed by the Engineer. When required to dispose of surplus aggregate outside the right-of-way the provisions of 14.07 shall apply.

D METHOD OF MEASUREMENT

Bituminous material applied on the street will be measured by weight or by volume in gallons at 60^{o} F.

Seal coat aggregate will be measured by weight of the material deposited on the street.

When the contract provides an item for seal coat, the seal coat will be measured by the area in square yeards and no measurement will be made of the bituminous material or seal coat aggregate required.

E BASIS OF PAYMENT

The estimated quantities will be based on normal construction usage. The provisions of 14.03 will not apply to items of bituminous material and aggregate.

Payment for the bituminous material (including any required additive), seal coat aggregate, or the seal coat at the appropriate contract prices shall be compensation in full for all costs incidental to the seal coat.

Payment for the bituminous seal coat will be made on the basis of the following schedule:

Item No.	Item	Unit
23.03 E1	Bituminous Material for Seal Coat.......	Gallon or Tons
23.03 E2	Seal Coat Aggregate.....................	Tons
23.03 E3	Seal Coat...............................	Square Yard
23.03 E4	Seal Coat Aggregate Removal (Surplus)...	Lump Sum

Unless otherwise provided in the special provisions, payment for 23.03 E3 "Seal Coat" will be made on the basis of planned quantities, without any measure being made of the quantity of seal coat actually installed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to increase or decrease the planned quantities;
2. If either the Owner or the Contractor requests in writing that an actual measurement be made. Such a request shall be made not later than 7 days after the seal coat has been installed.

In such cases, payment will be made for the actual measured quantity of seal coat.

23.04 DOUBLE SEAL COAT

A DESCRIPTION

This work shall consist of the constructing a bituminous seal coat consisting of two separate applications of bituminous material, each with cover aggregate.

B MATERIALS

The materials shall be the same as specified in 23.03.

C CONSTRUCTION REQUIREMENTS

Construction requirements shall be the same as specified in 23.03 with the following modifications:

1. Bituminous material shall be applied on the first application for Class 42 aggregate and on the second application for Class 43 aggregate.
2. The double bituminous seal coat shall be constructed in two separate operations.
3. The second application shall not be made until the first application has cured sufficiently to prevent damage by subsequent operations.

D METHOD OF MEASUREMENT

Bituminous material applied on the street will be measured by weight or by volume in gallons at 60° F. for each application.

Seal coat aggregate will be measured by weight of the material deposited on the street.

When the constract provides an item for double seal coat, the double seal coat will be measured by the area in square yards and no measurement will be made of the bituminous material or seal coat aggregate required.

E BASIS OF PAYMENT

The estimated quantities will be based on normal construction usage. The provisions of 14.03 shall not apply to items of bituminous material and aggregate.

Payment for the bituminous material (including any required additive), seal coat aggregate, or the double seal coat at the appropriate contract prices shall be compensation in full for all costs incidental to the double seal coat.

Payment for the double seal coat will be made on the basis of the following schedule:

Item No.	Item	Unit
23.04 E1	Bituminous Material for Seal Coat	Gallon or Tons
23.04 E2	Seal Coat Aggregate	Tons
23.04 E3	Double Seal Coat	Square Yard

Unless otherwise provided in the special provisions, payment for 23.04 E3 "Double Seal Coat" will be made on the basis of planned quantities, without any measure being made of the quantity of double seal coat actually installed, except under the following conditions:

1. If the Engineer orders a change in the plans so as to increase or decrease the planned quantities;
2. If either the Owner or the Contractor request in writing that an actual measurement be made. Such a request shall be made not later than 7 days after the double seal coat has been installed.

In such cases, payment will be made for the actual measured quantity of double seal coat.

23.05 SLURRY SEAL COAT

A DESCRIPTION

The slurry seal coat shall consist of a mixture of emulsified asphalt, mineral aggregate, and water, properly proportioned, mixed, and spread evenly on the surface as specified herein and as directed by the Engineer. The cured slurry seal coat shall have a homogenous appearance, fill all cracks, adhere firmly to the surface and have a skid resistent texture.

B MATERIALS

The emulsified asphalt shall conform to the requirements of 32.01 for SS-1h. The mineral aggregate shall conform to the requirements of 33.01 and the following additions. It shall consist of natural or manufactured sand, slag, crusher fines, and others, or a combination thereof. The aggregates shall conform to the following gradation requirements:

Sieve Size	Percent Passing
3/8"	100
No. 4	90-100
No. 8	65-90
No. 16	45-70
No. 30	30-50
No. 50	18-30
No. 100	10-21
No. 200	5-15

Mineral fillers such as portland cement, limestone dust, or fly ash may be added in minimum amounts as needed to improve the workability of the mix or the gradation of the aggregates. If so used, they shall be considered a part of the blended aggregate. Water shall conform to the requirements of 31.03.

C CONSTRUCTION REQUIREMENTS

C1 Restrictions

The slurry seal coat shall not be applied if either the pavement or air temperature is 55° F or below and falling, but may be applied when both the air and pavement temperature is 45° F or above and rising. The mixture shall not be applied if high relative humidity prolongs the curing beyond a reasonable time. Slurry seal coat operations shall not be conducted during the hours of darkness, nor before June 1 or after September 1 except upon written permission of the Engineer.

C2 Equipment

The slurry mixing machine shall be a continuous flow mixing unit and be capable of delivering accurately a predetermined proportion of aggregate, water and asphalt emulsion to the mixing chambers and to discharge the thoroughly mixed product on a continuous basis. The aggregate shall be pre-wetted immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients together. No violent mixing shall be permitted.

The mixing machine shall be equipped with an approved fines feeder that provides an accurate metering device or method to introduce a perdetermined proportion of mineral filler into the mixer at the same time and location that the aggregate is fed. The fines feeder shall be used whenever added mineral filler is a part of the aggregate blend.

The mixing machine shall be equipped with a water pressure system and fog type spray bar adequate for complete fogging of the surface preceding spreading equipment with a maximum application of 0.05 gal. per square yard.

Sufficient machine storage capacity to mix properly and apply a minimum of five tons of the slurry shall be provided.

Attached to the mixer machine shall be a mechanical type squeegee distributor equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor. It shall be maintained so as to prevent loss of slurry on varying grades and crown by adjustments to assure uniform spread. There shall be a steering device and a flexible strikeoff. The spreader box shall have an adjustable width. The box shall be kept clean, and build-up of asphalt and aggregate on the box shall not be permitted. The use of burlap drags or other drags shall be approved by the Engineer.

Power brooms, power blowers, air compressors, water flushing equipment, and hand brooms shall be suitable for cleaning the surface and cracks of the old surface.

Hand squeegees, shovels, and other equipment shall be provided as necessary to perform work.

C3 Preparation of the Surface

Immediately prior to applying the slurry, the surface shall be cleaned of all loose material, silt spots, vegetation, and other objectionable material. Any standard cleaning method used to clean pavements will be acceptable, except water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. The Engineer shall give final approval of the surface.

C4 Tack Coat

If the slurry is being placed over a brick or concrete surface, highly absorbent asphalt surface, or over a surface where the aggregate has become exposed and is polished and slick, a 1 part emulsion, 3 part water, tack coat of the same asphalt emulsion type and grade as specified for the slurry will be required. This can be applied with an asphalt distributor or other suitable means employed. The normal rate of application is 0.05 to 0.10 gallons of the diluted emulsion per square yard of surface. The Engineer shall determine the exact application rate at the time the tack is applied.

C5 Application

The amount of asphalt emulsion to be blended with the aggregate shall be determined by the laboratory after final adjustment in the field. A minimum amount of water shall be added as necessary to obtain a fluid and homogeneous mixture. The rate of application shall be at least 12 pounds per square yard but not greater than 15 pounds per square yard. The Engineer shall give final approval to the design and rate of application used.

The surface shall be fogged with water directly preceding the spreader. The slurry mixture shall be of the desired consistency when deposited on the surface and no additional elements shall be added. Total time of mixing shall not exceed four minutes. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is obtained. No lumping, balling or unmixed aggregate will be permitted. No segregation of the emulsion and aggregate fines from the course aggregate will be permitted. If the course aggregate settles to the bottom of the mix, the slurry will be removed from the pavement. No excessive breaking of the emulsion will be allowed in the spreader box. No streaks such as caused by oversized aggregate will be left in the finished pavement.

No excessive build-up nor unsightly appearance will be permitted on longitudinal or transverse joints or cracks.

Approved squeegees shall be used to spread slurry in non-accessible areas to the slurry spreader. Care shall be exercised in leaving no unsightly appearance from hand work.

C6 Curing

All traffic shall be kept off the slurry seal until it has cured to a firm condition that will prevent pick-up of the mixture. Where two applications of the slurry mixture are required, the initial treatment shall be cured thoroughly prior to placing the succeeding application.

C7 Rolling

Rolling is normally not required; however, rolling will be required for areas of slow turning traffic and areas where extensive scaling has occurred. When rolling is required, it shall be accomplished with a rubber-tired roller operating at a tire pressure of 50 psi. The paved area should be subjected to five complete coverages.

C8 Protection of the Surface

Suitable methods such as barricades, flagmen, etc., shall be used to protect the uncured slurry surface from all types of traffic. Any damage to the uncured slurry will be the responsibility of the Contractor.

D METHOD OF MEASUREMENT

Bituminous material applied on the street will be measured by weight or by volume in gallons at 60° F.

Slurry seal aggregate will be measured by weight of the material deposited on the street.

No measurement will be made of any water or mineral filler that is used in the mixture.

When the contract provides an item for slurry seal coat, the item will be measured by the area in square yards and no separate measurement of the bituminous material or aggregate will be made.

E BASIS OF PAYMENT

The estimated quantities will be based on normal construction usage. The provisions of 14.03 shall not apply to items under this specification.

Payment for the bituminous material, slurry coat aggregate, or the slurry seal coat at the appropriate contract prices shall be compensation in full for all costs incidental to the slurry seal coat.

Payment for slurry seal coat will be made on the basis of the following schedule:

Item No.	Item	Unit
23.05E1	Bituminous Material for Slurry Seal..........	Gallons or Tons
23.05E2	Slurry Seal Aggregate.......................	Tons
23.05E3	Slurry Seal Coat............................	Square Yards

Unless otherwise provided in the special provisions, payment for 23.05 E3, "Slurry Seal Coat", will be made on the basis of planned quantities, without any measure being made of the quantity of slurry seal coat actually installed except under the following conditions:

1. If the Engineer orders a change in the plans so as to increase or decrease the planned quantities;
2. If either the Owner or the Contractor requests in writing that an actual measurement be made, such request shall be made not later than seven days after the slurry seal coat has been installed.

In such cases, payment will be made for the actual measured quantity of slurry seal coat.

23.06 PLANT MIX SEAL COAT

A DESCRIPTION

This work shall consist of cleaning, drying, and preparing the existing pavement, crack sealing, application of the required tack coat, and the application of the plant mix seal coat. This shall include furnishing of all labor, material, equipment, and accessories necessary to complete the work according to the specifications and as shown on the plans.

B MATERIALS

All materials shall be obtained from approved sources and shall conform to the applicable ASTM or AASHO Standards.

B1 Bituminous Materials

a. Tack Coat

The tack coat shall be as specified in Section 22.03.

b. Asphalt Cement

The asphalt cement used for this mixture shall have a penetration grade of 85-100, and the percentage of asphalt used in the mix shall be within the range of 6.0%-7.0% by weight of the total mix.

B2 Aggregate

The aggregate shall be crushed stone or gravel, composed of hard durable pebbles or fragments and a filler of finely crushed stone, gravel, or sand, meeting the following aggregate requirements:

Seive Designation	Percent by Weight Passing
3/8"	100
No. 4	30-50
No. 8	13-33
No. 30	02-15
No. 200	00-05

The aggregate shall be free from vegetable matter, lumps or balls of clay, adherent films of clay, or other matter that would prevent thorough coating with bituminous material. At least 75 percent of the material by weight retained on the No. 4 sieve shall be particles having at least one fractured face, and shall have a percentage of wear of not more than 40 at 500 revolutions as determined by AASHO T96.

The Contractor shall obtain approval of the Engineer for all sources of aggregate proposed for use, at least 10 days prior to its use.

C EQUIPMENT

The equipment used shall conform to the requirements of Section 22.03, except that pneumatic tired rollers shall not be used.

D CONSTRUCTION REQUIREMENTS

Plant mix seal coat shall not be placed when water is present on the surface, when the air temperature is below 60° F., or when weather or roadbed conditions otherwise prevent the proper handling or finishing of the bituminous mixture.

A sufficient number of rollers shall be furnished to permit adequate compaction while the mixture is in a workable condition.

E METHOD OF MEASUREMENT

Plant mix seal coat will be measured by the ton, based on the weight used in the accepted plant mix seal coat.

F BASIS OF PAYMENT

Payment for plant mix seal coat at the contract unit price shall be compensation in full for all costs of constructing the seal, including the cost of bituminous materials used in the mixture and for tack.

Furnishing and installing sand on newly tacked surfaces, when required, and other protective devices furnished will be considered incidental work and no direct compensation will be made therefor.

Payment will be made under

Bid Item No.	Pay Item	Pay Unit
23.06E1	Plant Mix Seal Coat	Ton

24.01 PIPE LAYING

A. DESCRIPTION

This work covers the installation of underground conduits either by open trench methods or by boring and pushing.

B. MATERIALS

C. CONSTRUCTION REQUIREMENTS

C1. Open Trench Method

a. Bedding

All underground conduits shall be bedded in accordance with drawing 68.02 - Pipe Bedding Details. Unless otherwise noted, all underground conduits (with the exception of PVC pipe) shall be installed on Class B Bedding. All PVC pipe shall be installed on PVC Pipe Bedding according to type of pipe and depth of cover as follows:

PVC sewer pipe with less than 21 feet of cover - bedding shall be Special Class I gravel meeting the requirements of Table 33.01.

PVC water pipe with less than 21 feet of cover - bedding shall be Class 6 gravel meeting the requirements of Table 33.01.

All PVC pipe with more than 21 feet of cover - bedding shall be dry mix concrete meeting the requirements of Section 25.11.

Bedding shall be accurately shaped by means of a template to fit the lower part of the pipe exterior for a width of at least sixty (60) percent of the outside diameter of the pipe.

Class A Bedding shall consist of a continuous concrete cradle. The cradle shall have a minimum width equal to the outside diameter or span plus eight (8) inches and shall be constructed monolithically. Concrete shall conform to the requirements of Section 25.01 with the following exceptions:

Minimum Cement Content per Cubic Yard...........330 lbs.
Maximum Water-Cement Ratio......................1.0
Strength Requirement...........................None

b. Installation

Laying of underground pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the foundation and bedding has been prepared. Mud, silt, gravel and other foreign material shall be kept out of the pipe and off the jointing surface.

No attempt shall be made to make joints under water and the trench must be kept dry until the joint is completed. No work shall be done during inclement weather.

Proper implements, tools, and equipment, satisfactory to the Engineer, shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe and fittings shall be carefully lowered into the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment in such manner as to prevent damage to the pipe. Under no circumstance shall pipe be dropped or dumped into the trench.

Before lowering and while suspended, the pipe shall be inspected for defects. Any defective, damaged or unsound pipe shall be rejected. All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench and it shall be kept clean by approved means during and after laying. Care shall be taken to prevent dirt from entering the joint space. When pipe laying is not in progress, the open ends of the pipe shall be closed by approved means and no trench water shall be permitted to enter the pipe.

After the trench has been excavated to the proper grade, and all loose dirt removed, the trench shall be prepared with class 6 gravel. All pipes shall be laid to line and grade by use of three or more grade boards in a series for line and grade unless other methods are approved by the Engineer. The grade boards shall have been set a maximum interval of 25 feet. In watermain construction the line and grade shall be set at 50' intervals, unless otherwise specified.

The pipe shall be laid with the bell ends facing the direction of laying; and shall face upgrade. Wherever necessary to deflect the pipe from straight line, whether in the vertical or horizontal, the degree of deflection shall be approved by the Engineer.

In watermain construction, half-length pipes shall be used when crossing previous trench excavation, so as to provide a minimum of one extra joint (two half-lengths of pipe) through the excavation area. Half lengths of pipe shall also be used around curves to minimize the degree of deflection at each joint.

Except on curved sections (and after pipe bedding procedures have been completed) the grade and line of sewer main shall not vary by more than 1/4 inch from the edge of a 10-foot straight line.

The alignment of the pipe at the bottom of the trench shall be controlled by use of a plumb bob or other methods approved by the Engineer. The pipe shall be backfilled along the bottom and sides of the pipe by thoroughly compacting the bedding material. This compaction may be obtained by any approved method or equipment which will produce a uniform density meeting the requirements to obtain not less than 95% of maximum dry density at optimum moisture made in accordance with A.A.S.H.O. Designation T-99. Care shall be exercised to not displace the pipe or injure the pipe during the compaction operations.

The remaining trench shall be backfilled in accordance with the specifications for the class of backfill as set forth in these specifications.

No valve or other control on the existing water system shall be operated for any purpose by the Contractor without approval by the Engineer, and all consumers affected by such operation shall be notified by the Contractor at least one (1) hour before the operation and advised of the probable time when the service will be restored.

Cutting pipe for inserting valve fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe.

When any railroad is crossed all precautionary construction measures required by the railroad officials shall be followed.

The Owner reserves the right to limit the amount of trench opened in advance of pipe laying and the amount of pipe laid in advance of backfilling.

C2 Bore and Push Method

Pipe shall be installed by boring and/or pushing methods under streets, alleys, highways, railways, and other locations as shown on the plans, standard plates, or as directed by the Engineer.

Every precaution for keeping the pipe clean and for proper assembly of joints as specified for open trench methods shall be taken while installing pipe by this method. When installing pipe by the open bore method, the Contractor will be required to wrap the joints with polyethylene or a similar material. The wrapping shall be wired tight to the pipe to effectively keep out dirt and other foreign materials.

The Contractor shall have on hand at the site of the work adequate tools and equipment for the size of the pipe to be installed before the boring and pushing operation is started. It is necessary that the boring and pushing equipment be of adequate size and capacity so that the work when once started may proceed continuously until completed.

All jacking pits and intermediate connection or inspection pits shall be constructed and sheathed or braced so as to provide a safe place for workmen. When installing pipelines or casing pipe under railroads or state highways, the construction recommendations and safety requirements of the railroad or Highway Department will be followed.

When specified on the plans, proposal, or special provisions, the Contractor shall bore and push a casing pipe which shall be a Class IV reinforced concrete pipe meeting the requirements of 34.02. Should the Contractor elect to use a steel casing pipe, it shall conform to the requirements of the Burlington Northern, Inc. railroad or receive prior approval of the Engineer.

When casing pipe is required, the carrier pipe to be installed shall be supported on skids securely attached to the pipe by means of stainless steel straps at points recommended by the pipe manufacturer or as directed by the Engineer. Skids shall be placed to eliminate any horizontal or vertical movement of the carrier pipe inside the casing pipe. Carrier pipe shall have joints within one foot of the end of the casing pipe. The skids shall be of such size as to prevent the pipe joints or couplings from snagging on the inside of the casing while being pulled into the casing and to support the carrier pipe so that it will not rest on its joints or couplings in the final installed position in the casing. The skids on the bottom portion of the casing pipe may be lubricated to facilitate insertion of the carrier pipe.

After installation of the carrier pipe and before backfilling, the ends of the casing pipe shall be sealed to prevent entrance of backfill or other foreign material into the casing but shall not be sealed so tightly as to prevent the escape of liquids from the casing in the event of failure of the carrier pipe.

D METHOD OF MEASUREMENT

Class A bedding will be measured by the linear foot for each size of pipe. The length measured shall be the same length as the pipe it supports.

Class B bedding will not be measured but shall be considered incidental to construction.

When bore and push method of pipe installation is specified, it will be measured by the linear foot for each size of pipe required.

E BASIS OF PAYMENT

Payment made at the contract unit bid price for Class A bedding shall constitute payment in full for the furnishing and installing the bedding but will not include payment for the conduit that it supports. No payment will be made for Class B bedding.

Payment made at the contract unit bid price for bore and push for each size specified will constitute payment in full for all costs incidental to installing the pipe, including casing pipe when specified but will not include payment for the carrier pipe. The carrier pipe will be paid for under its appropriate schedule.

Payment will be made on the basis of the following schedule:

Item No.		
24.01E1	Class A Bedding..................................	linear foot
24.01E2	Bore and Push (size and type of carrier pipe).....	linear foot
24.01E3	Bore and Push (size and type of casing pipe)......	linear foot

24.02 WATER DISTRIBUTION

A DESCRIPTION

This work covers the furnishing and installing of the water distribution system together with all appurtenances.

B MATERIALS

Asbestos-cement pipe....................................34.05B
Cast iron pipe..34.06
Concrete cylinder pipe..................................34.08
Polyvinylchloride pipe..................................34.09
Gate valve..36.04
Tapping sleeves and valves..............................36.05
Fire hydrants...36.06
Valve boxes...36.07
Cast iron fittings......................................36.08
Butterfly valves..36.09

C CONSTRUCTION REQUIREMENTS

C1 General

The removal of any miscellaneous structures shall be completed in accordance with 21.02 and shall be as shown on the plans or as directed by the Engineer. Replacement of existing facilities shall be as shown on the plans or as directed by the Engineer and shall be completed in accordance with these specifications.

All conduit and appurtenances shall be installed according to the alignment and grade as staked by the Engineer. Wood shall not be used to align or set grade for any conduit or appurtenance.

The materials shall be handled in such a manner as will prevent damage to the materials. Accidental damage to the materials shall be repaired to the satisfaction of the Engineer or be removed from the job and methods of handling shall be corrected to prevent further damage.

Dirt of other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relaid. When pipe laying is not in progress, the open end(s) of the pipe shall be plugged. The temporary plug shall be the same size and type used to make a permanent closure to insure a watertight plug and absolute cleanliness inside the pipe.

Any watermain left open and unattended, whether in repair or new construction, and not plugged in the above manner shall be considered a violation of Section 16-0109 of the Grand Forks City Code and any person, firm, or corporation who shall have caused the same to happen shall be subject to the penalties provided in the Code and liable for any resulting damages accrued from such acts.

No valve or other control on the existing water system shall be operated for any purpose by the Contractor without approval by the Engineer, and all consumers affected by such operation shall be notified by the Contractor at least one (1) hour before the operation and advised of the probable time when the service will be restored.

C2 Trench Excavation

All trenches required for this work shall be excavated in accordance with 21.05, "Excavation for Conduits and Minor Structures".

C3 Pipe Laying

All pipe shall be laid in accordance with 24.01, "Pipe Laying".

C4 Reaction Backing

All tees and bends shall be provided with reaction backing as shown on the standard plates.

Reaction backing shall be concrete of a mix not leaner than one part cement; 2½ parts sand; 5 parts gravel by weight, and having a compressive strength of not less than 2,000 psi at twenty-eight (28) days.

Approved equivalent precast concrete backing may be used in lieu of the aforementioned.

All hydrants, valves, and fittings shall be set on cast in place or precast concrete blocks in order to prevent the weight from being transmitted to the pipe. All valves 12" and larger shall be anchored to cast in place concrete thrust blocks of sufficient size to anchor the valve against thrust when closed. Before concrete is placed around valves, hydrants, and other appurtenances, the appurtenance and pipe shall be wrapped with polyethylene to completely isolate the concrete from the watermain construction.

C5 Setting Hydrants

All hydrants stand plumb and shall have their nozzles parallel with or at right angles to the curb with the pumper nozzle pointing normal to the curb. They shall conform to the established grade, with the nozzles at least thirty-two (32) inches above the ground.

The Trench for the hydrant branch shall be excavated to a width of at least thirty (30) inches and four (4) inches below the bottom of the pipe for a distance of six (6) feet from the hydrant bowl. After the hydrant has been blocked into place, the trench space around the hydrant bowl and along the hydrant brance for a distance five (5) feet shall be backfilled with 3/4 to 1 1/2" Size 2 rock, to a level six (6) inches above the waste opening. No hydrant drainage shall be connected to a sewer.

The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench.

Hydrants shall be thoroughly cleaned inside of all dirt or foreign matter before setting.

C6 Fittings and Appurtenances

Fittings and appurtenances shall be installed in accordance with the standard plates and these specifications, at locations shown on the plans or as staked by the Engineer.

Fittings shall not include gate valves, butterfly valves, tapping sleeves and valves, fire hydrants and valve boxes.

C7 Hydrostatic Test

A hydrostatic test of the completed line shall be performed under a static head of 150 psi. The duration of this test shall be at least one (1) hour.

The test pump, pipe taps and connecting piping and all necessary apparatus shall be furnished by the Contractor. The Owner may elect to furnish the test gauge.

In order to maintain the 150 psi pressure, make up water shall be pumped into the line as follows: The Contractor shall furnish a barrel or other suitable receptacle from which all make up water can be measured. At such times during the test as the gauge drops to 140 psi water will be pumped into the line to bring the pressure up to 150 psi. At the end of the test period water will be pumped into the line to bring the pressure up to 150 psi regardless of whether the gauge has dropped to 140 or not. The total water used shall be considered as the leakage. If this leakage is greater than that permitted in the following table the Contractor shall locate the defects and repair the line at his own expense until the leakage is within the permitted allowance. All testing shall be done in the presence of the Engineer or his representative.

Testing shall be done through corporation stops installed in the line at locations suitable to the Contractor and Engineer.

ALLOWABLE LEAKAGE (GPH) PER 100 COUPLINGS AT 150 PSI TEST PRESSURE

PIPE DIAMETER INCHES	GPH	PIPE DIAMETER INCHES	GPH
6	1.84	16	4.89
8	2.45	18	5.52
10	3.07	20	6.12
12	3.68	24	7.34
14	4.28	30	9.18

All exposed pipe, fittings, valves, and joints will be carefully examined during the test. Any visible leaks shall be stopped by repair or replacement of the deficient joint or pipes.

The Contractor may, at his option, test against the existing line or plug and block the ends of the new project and test prior to connecting to the existing line.

The Contractor may backfill the entire trench before he tests the line if he so desires, but he shall open up the trench at his own expense to repair any leaks.

24.02 C8 Sterilization

After the new main and valve extensions have been tested, they shall be flushed until all foreign material has been removed. Chlorination applications shall then be made under the supervision of the Engineer.

Liquid chlorine conforming to the requirements of military specification MIL-C-12460 or hyprochlorite conforming to Federal Specification 0-C-114, Type II-B, shall be put into a water solution. The chlorine solution shall be fed into the new line in amounts to produce at least 50 ppm retained for 24 hours or 200 ppm retained for 3 hours. When repairing existing lines, the chlorine residual shall be at least 200 ppm and retained for three hours. The valves shall be sterilized by opening and closing them at least once during the holding period.

After the contact time, the system shall be flushed with clean water until the chlorine residual is lowered to approximately 1.0 ppm. No chlorination water will be permitted to be discharged into the watermain trench.

The Contractor shall furnish all tools, equipment, and material to chlorinate the system.

C9 Air Release Valve and Manhole

An air release valve and manhole shall be constructed in locations shown on the plans or as staked by the Engineer and shall be constructed as shown in the standard plates.

The manhole shall be of precast concrete sections and shall be fitted with a ring and covers equal to Neenah Foundry No. R-1758 E.

The tap required shall be furnished by the Contractor. The corporation for the tap to be made shall be Mueller No. H10003 with one inch inlet and one inch I.P. outlet. The automatic air release valve shall be one inch APCO valve F3062 No. 200-A for watermains and two inch APCO valve F3076 No. 400 for sewer forcemains.

C10 Insulation

When insulation is required by the plans or due to field conditions to prevent freezing of the water main or service line the Contractor shall furnish closed-cell, rigid insulation board suitable for underground use in single or multiple layers for the required thickness. Styrofoam HI brand insulation shall be acceptable.

The Contractor shall be responsible for the installation of the insulation in conformity with these requirements and the applicable standard plates. Once the conduit has been installed and sand/gravel Class 6 has been placed and compacted to six (6) inches over the top of the pipe, the Contractor shall level the sand/gravel and widen the trench to the required width. The insulation boards shall then be placed to form a completely integrated unit. Should two or more layers of insulation be required, the joints shall be lapped so as to not coincide with joints in the lower layers. After a board has been placed it shall be staked into place with metal or wooden screws which shall be furnished by the Contractor and be acceptable to the Engineer.

Once the insulation boards have been placed and staked, backfill material shall be placed and compacted to a depth of six (6) inches over the insulation. Care shall be taken to not displace the insulation boards. Any displacement shall be corrected at the Contractor's expense.

After this six (6) inch layer has been installed and accepted by the Engineer, the Contractor shall complete the backfill in accordance with 21.07 "Backfill".

C11 Backfill Procedure

Backfilling shall be as specified in 21.07 "Backfill". All water mains shall be backfilled to natural ground elevation unless otherwise specified.

C12 Restoration of Surface

The Contractor shall restore all shrubbery, fences, grass, sod, top soil, and other surfaces disturbed to a condition equal to that before the work began.

D METHOD OF MEASUREMENT

Pipe will be measured horizontally with no deductions for hydrants, valves, or fittings.

Fire hydrants, gate valves, tapping sleeves and valves, butterfly valves will be measured separately.

Air release valves and manholes will be measured separately for each complete unit.

Insulation will be measured by the linear foot of actual installation.

No measurement will be made of fittings unless there is a specific bid item for fittings, in which case they shall be paid for by the pound as shown on the invoice.

E BASIS OF PAYMENT

Payment will be made at the contract unit bid price for each item installed and shall constitute payment in full for furnishing and installing the pipe and appurtenances, including but not limited to trenching, bedding, jointing reaction backing, testing, sterilizing, backfilling, and all other incidentals in accordance with these specifications.

Payment for insulation shall include compensation in full for furnishing and installing the insulation.

Furnishing and installing the fittings will be considered an incidental item to the construction of the pipe, and no separate payment will be made for the required fittings unless there is a specific bid item for fittings. When PVC fittings are used and there is a bid item for fittings, they shall be paid for on the basis of equivalent cast iron fitting weight.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
24.02E01	___" Asbestos-cement pipe	Linear Foot
24.02E02	___" PVC pipe	Linear Foot
24.02E03	___" Cast iron pipe	Linear Foot
24.02E04	___" Concrete cylinder pipe	Linear Foot
24.02E05	___" Gate valves	Each
24.02E06	___" Tapping sleeve and valve	Each
24.02E07	___" Butterfly valve	Each
24.02E08	Fire hydrant	Each
24.02E09	Air release valve and manhole	Each
24.02E10	Insulation	Linear Foot
24.02E11	Copper water service	Linear Foot
24.02E12	Relocate hydrant	Each
24.02E13	Relocate valve	Each
24.02E14	Fittings	Pounds
24.02E15	___" Stainless steel wraparound with ___" tap	Each
24.02E16	___" Corporation cock and swivel bend	Each

24.03 SEWERS

A DESCRIPTION

This work covers the installation of gravity sewers and all necessary incidentals thereto.

B MATERIALS

The materials shall conform to the following requirements:

Concrete Pipe, non-reinforced	34.01
Concrete Pipe, reinforced	34.02
Vitrified Clay Pipe	34.03
Asbestos-Cement Pipe	34.05
Polyvinylchloride Pipe	34.09
Castings	36.03
Manholes and Catch Basins	37.03 or 37.02

C CONSTRUCTION REQUIREMENTS

C1 General

The sewer shall be installed according to the lines and grades established by the Engineer and no deviation shall be made without the written consent of the Engineer.

To prevent accidental flooding of the sanitary sewer system and any properties connected thereto, the Contractor shall furnish and install a watertight plug in the existing sewer prior to commencing work on any project which involves the extension of an existing sanitary sewer. The plug shall be installed at the point where new work begins, or as directed by the City Engineer, and shall be capable of withstanding a head of 50 feet of water without leakage or failure.

After completion of all new construction, including manholes and service leads, and removal of all accumulation of water in the completed sewer system extension, the plug shall be removed.

C2 Trench Excavation

Excavation shall be done as specified in 21.05 "Excavation for Conduits and Minor Structures".

C3 Pipe Laying

All pipes shall be laid in accordance with 24.01 "Pipe Laying". The maximum length of PVC pipe shall be 12 1/2 feet.

C4 Joints

Pipe joints shall be installed according to the manufacturer's recommendations. All VCP joints shall be a pre-molded, factory fabricated, gasket type that conforms to the requirements of ASTM Designation C425, except that a separate O-ring or gasket will not be permitted, or, in the case of plain-end pipe, a compression sleeve conforming to ASTM Designation C594, Type B. All concrete pipe shall have flexible rubber gasket joints conforming to AASHO M198 unless otherwise provided by special provision or permitted, in writing, by the Engineer.

C5 Cleaning and Flushing

On pipe sizes less than 24" diameter an approved ball shall be flushed through the pipe after the pipe has been laid, to remove any foreign material from the inside of the pipe.

C6 Manholes

Concrete manholes shall be installed as shown on the plans and/or standard plates and shall contain the required steps and castings.

C7 Catch Basins and Leads

Concrete catch basins shall be installed as shown on the plans and standard plates and shall contain the required appurtenances. Catch basin leads shall be a minimum 12" reinforced concrete pipe. When the Contractor is required to relocate a catch basin, he shall remove and salvage the barrel, place and reconstruct it in the location as staked by the Engineer. No additional compensation will be allowed for breakage caused by the Contractor's operations.

C8 Tie Bars

Tie bars shall be installed on all outfall lines as shown on the plans and/or standard plates. The cost shall be included in the cost of the pipe.

C9 "Go-No-Go" Test

A "Go-No-Go" test shall be performed on all new sanitary sewers. The maximum allowable limit for deflection of pipe shall be 5% and shall be tested according to ASTM D 3034 or ASTM F679 as applicable.

C8 Backfill Procedure

Backfilling shall be as specified in 21.07, "Backfill."

C9 Restoration of Surface

The Contractor shall restore all shrubbery, fences, grass, sod, topsoil, and other disturbed surfaces to a condition equal to that before the work began.

D METHOD OF MEASUREMENT

Pipe will be measured horizontally center to center of manholes and pay depths will be measured vertically from the pipe invert to the ground line at the center of the pipe. No deductions will be made for wyes or diameters of manholes.

Manholes and catch basins will be measured vertically to the nearest one tenth (0.1)foot from the base to the top of precast barrel including adjustment rings. No measurement will be made of concrete base.

Sewer service will be measured along the centerline of the lead from the sewer main to the point designated on the plans or standard plates. Sewer service wye will be measured by the unit. Catch basin leads will be measured horizontally from center of catch basin to center of the manhole or catch basin.

Casting and cleanout will be measured by the unit for the actual number installed.

E BASIS OF PAYMENT

Payment at the contract unit bid price for each item shall constitute full payment for furnishing and installing the complete sewer facility including but not limited to trenching, bedding, jointing testing, backfilling and all other incidentals in accordance with these specifications.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
24.03 E1	___" RCP Class III (__'to__')......	Linear foot
24.03 E2	___" VCP (__'to__')................	Linear foot
24.03 E3	___" PVC Pipe, SDR35...............	Linear foot
24.03 E4	___" ACP (__'to__')................	Linear foot
24.03 E5	Manhole........................	Linear foot
24.03 E6	Manhole casting...............	Each
24.03 E7	Catch basin...................	Linear foot
24.03 E8	Catch basin casting...........	Each
24.03 E9	Service lead..................	Linear foot
24.03 E10	Service Wye...................	Each
24.03 E11	Cleanout......................	Each
24.03 E12	Relay sewer lead..............	Linear foot
24.03 E13	___" Trash Guard..................	Each

24.04 FORCEMAIN

A DESCRIPTION

The work covered under this section includes the construction of forcemains for sewer service.

B MATERIALS

Materials shall conform to the requirements of 24.02B.

C CONSTRUCTION REQUIREMENTS

C1 Excavation

Excavation shall be to the line and grade as staked by the Engineer as shown in the plans and shall conform to the requirements of 21.05 "Excavation for Conduits and Minor Structures".

C2 Pipe Laying

All pipe shall be laid in accordance with 24.01 "Pipe Laying".

C3 Reaction Backing

Reaction backing shall conform to the requirements of 24.02 C4.

C4 Hydrostatic Test

A hydrostatic test of the completed line shall be performed under a static head of 100 psi. The duration of this test shall be at least one (1) hour.

The test pump, pipe taps and connecting piping and all necessary apparatus shall be furnished by the Contractor. The Owner may elect to furnish the test gauge.

In order to maintain the 100 psi pressure, make up water shall be pumped into the line as follows: The Contractor shall furnish a barrel or other suitable receptacle from which all make up water can be measured. At such times during the test as the gauge drops to 90 psi water will be pumped into the line to bring the pressure up to 100 psi. At the end of the test period water will be pumped into the line to bring the pressure up to 100 psi regardless of whether the gauge has dropped to 90 or not. The total water used shall be considered as the leakage. If this leakage is greater than that permitted in the following table the Contractor shall locate the defects and repair the line at his own expense until the leakage is within the permitted allowance. All testing shall be done in the presence of the Engineer or his representative.

Testing shall be done through corporation stops installed in the line at locations suitable to the Contractor and Engineer.

ALLOWABLE LEAKAGE (GPH) PER 100 COUPLINGS AT 100 PSI TEST PRESSURE

PIPE DIAMETER INCHES	GPH
6	1.51
8	2.00
10	2.50
12	3.00
14	3.50

PIPE DIAMETER INCHES	GPH
16	4.01
18	4.52
20	5.00
24	6.00
30	7.50

All exposed pipe, fittings, valves, and joints will be carefully examined during the test. Any visible leaks shall be stopped by repair or replacement of the deficient joint or pipes.

The Contractor may, at his option, test against the existing line or plug and block the ends of the new project and test prior to connecting to the existing line.

The Contractor may backfill the entire trench before he tests the line if he so desires, but he shall open up the trench at his own expense to repair any leaks.

C5 Backfill

Backfilling shall be as specified in 21.07, "Backfill".

C6 Restoration of Surface

The Contractor shall restore all shrubbery, fences, grass, sod, topsoil, and other features disturbed to a condition equal to that before the work began.

C7 Air Release Valve and Manhole

Air release valve and manhole shall be constructed in accordance with 21.02 C9.

C8 Fittings and Appurtenances

Fittings and appurtenances shall be installed in accordance with 24.02 C6.

Valve boxes shall conform to the requirements of 36.10

D METHOD OF MEASUREMENT

Pipe will be measured horizontally along the centerline of the pipe. No deductions will be made for valves or fittings.

Valves will be measured separately according to the actual number installed.

Air release valves and manholes will be measured separately for each complete unit. No measurement will be made of fittings.

E BASIS OF PAYMENT

Payment at the contract unit bid price for each item shall constitute payment in full for furnishing and installing the complete facility, including but not limited to, trenching, bedding, jointing, testing, backfilling and all other incidentals in accordance with these specifications.

Payment for air-release valve and manhole will constitute payment in full for furnishing and installing the air-release valve and furnishing and installing the completed manhole. Fittings are considered incidental to the installation of the pipe, therefore no separate payment will be made for these.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
24.04 E1	___"Asbestos-Cement pipe	Linear foot
24.04 E2	___"Cast iron pipe	Linear foot
24.04 E3	___"Concrete cylinder pipe	Linear foot
24.04 E4	___"Gate valve	Each
24.04 E5	___"Tapping sleeve and valve	Each
24.04 E6	___"Butterfly valve	Each
24.04 E7	___"Air release valve and manhole	Each

25.01 PORTLAND CEMENT CONCRETE

A DESCRIPTION

This item shall consist of a mixture of cement, fine and coarse aggregate, and water, plus admixtures when required or permitted; proportioned and mixed in accordance with the requirements of this specification.

All requirements of this specification shall apply to the production of concrete for any purpose, except as modified in the special provisions for a particular item of work.

B MATERIALS

Unless otherwise provided in the contract, the cement to be used in the work shall be standard Portland Cement (Type I).

Portland Cement	31.01
Aggregates	33.02
Water	31.03
Admixtures	31.02

No substances other than cement, aggregate, water and air-entraining admixture shall be used in the concrete except by written permission of the Engineer.

C CONSTRUCTION REQUIREMENTS

C1 Proportions

The weights of fine and coarse aggregate, amount of cement, air content, and the quantity of water per sack of cement shall be determined by the Engineer to produce a mixture of correct plasticity and suitable workability. The Engineer reserves the right to adjust the mixing proportions during the course of the work to obtain the required results as specified hereinafter.

Modulus of Rupture @7 days	AASHO T-97	500 psi
Modulus of Rupture @28 days	AASHO T-97	600 psi
Minimum Cement Content per Cubic Yard		564 lbs.
Maximum Water-Cement Ratio		0.50
Slump	AASHOT-119	1 to 4 inches
Coarse Aggregate		Minimum 40%
Air Content	AASHOT-152	5% to 7%

It is the intent of this specification to allow the Contractor to propose any job mix that will meet the above requirements; therefore the Contractor will be allowed to submit the proportions of the fine and coarse aggregate, water and cement required to produce a mixture that will work readily, with the placement method used, into corners and angles of forms and around any reinforcement used. Segregation of materials in the mixture will not be permitted nor will collection of excess free water on the surface be permitted.

When High-Early Strength Concrete is specified in the plans or proposal, it shall be produced in the same manner as the above specified concrete except that the minimum cement content shall be 564 pounds of Type III Portland Cement or 752 pounds of Type I Portland Cement.

C2 Equipment

Equipment and tools necessary for handling materials and performing all parts of the work shall be approved by the Engineer as to design, capacity and mechanical condition. The equipment shall be at the job site sufficiently before the start of construction operations to be examined thoroughly and approved.

a. Batching Plant and Equipment

The batch plant shall include bins, weighing hoppers, and scales for the fine aggregate and for each size of coarse aggregate. If cement is used in bulk, a bin, hopper, and separate scale for cement shall be included. The weighing hoppers shall be properly scaled and vented to preclude dusting during operations.

The scales for weighing aggregates and cement shall be either the beam type or the springless-dial type. When beam-type scales are used, provision such as "tell-tale" dial, shall be made for indicating to the operator that the required load in the weighing hopper is being approached. A device on weighing beams shall indicate the critical position clearly. Poises shall be designed to be locked in any position and to prevent unauthorized change. The weigh beam and "tell-tale" device shall be in full view of the operator while charging the hopper, and he shall have convenient access to all controls.

Scales shall be inspected and scaled as often as the Engineer may deem necessary to assure their continued accuracy. The Contractor shall have on hand not less than ten (10) fifty-pound (50 lb.) weights for frequent testing of all scales.

Water measuring equipment shall consist of a supply tank and a measuring tank. The supply tank shall be open to the air and shall receive water from the supply main. The valves on the supply and discharge lines to and from the measuring tank shall be so arranged that it will be impossible for both to be open at the same time or for the water to pass directly from the supply line to the mixer. The measuring tank shall be equipped with an easily read device, at all times exposed to view, that will accurately indicate within one (1) quart the volume of water delivered to the mixer.

b. Mixers

Concrete may be mixed at the site of construction or at a central point or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer['s plate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

Mixers at the site of construction shall be rated not less than one cubic yard and be capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass. Mixing time shall be a minimum of 50 seconds or as the Engineer directs. The mixer shall be capable of discharging and distributing the mixture without segregation. The mixer shall be equipped with an approved timing device which will automatically lock the discharge lever when the drum has been charged and release it at the end of the mixing period. The device shall be equipped with a bell or other suitable warning device adjusted to give a clearly audible signal each time the lock is released.

Truck mixers used for mixing and hauling concrete, and truck agitators used for hauling central mixed concrete shall conform to the requirements of ASTM C 94.

C3 Ready Mixed Concrete

Ready mixed concrete may be used if the concrete delivered to the job site will meet the requirements of these specifications and the special provisions.

Ready mixed concrete may be produced by either a stationary mixer or a truck mixer. After the mixing, the concrete may be agitated by agitator truck or mixer truck. Agitators and mixers shall be identified as to uses, capacity in volume of concrete, and speed of rotation of mixing drums or blades. Stationary mixers shall be equipped with timing devices which will prevent the premature discharge of the concrete batch. Truck mixers shall have counters which will record the revolutions of the drum or blades unless otherwise authorized by the Engineer.

Mixers and agitators must be capable of producing concrete, when delivered to the job site, that is thoroughly mixed with a satisfactory degree of uniformity and with the specified slump. Slump tests made at the one-quarter or three-quarter points of the load, if differing by more than two (2) inches, shall be cause to discontinue use of the equipment until the condition is corrected.

Ready mixed concrete shall be mixed and delivered by one of the following operations:

1. <u>Central-mixed Concrete:</u> Concrete mixed at central location and transported to job site in agitator truck or truck mixer operated at the agitator speed specified by the equipment manufacturer. Mixing time shall be sixty (60) seconds.

2. <u>Shrink-mixed Concrete:</u> Concrete is partially mixed by stationary mixer and mixing is completed by truck mixer. Stationary mixing time shall be thirty (30) seconds and the truck mixer shall make not less than fifty (50) nor more than 100 revolutions of the drum or blades at the equipment manufacturer's designated speed, further mixing at agitator speed.

3. <u>Transit-mixed Concrete</u>: Concrete is completely mixed by truck mixer, with mixing as specified above for truck mixer under "Shrink-mixed Concrete." Truck mixers shall be equipped with accurate revolution counters.

Concrete transported by agitator or truck mixer shall be completely discharged at the job site within one hour after water is added to the cement and aggregates, or after the addition of cement to the aggregates, or when the concrete has been subjected to a maximum of 250 revolutions of the drum or blades, whichever comes first. A lesser time will be required whenever the weather accelerates the stiffening of the concrete. When a truck mixer is used to mix the concrete, the mixing shall begin within thirty (30) minutes after the cement is intermixed with the aggregates.

All equipment used in producing ready-mixed concrete shall be maintained in first class condition. Equipment, deemed by the Engineer to be inadequate to produce the quality of concrete required under these specifications, shall be removed from service until restored to proper operation conditions or be replaced by acceptable equipment.

Mixing and transportation equipment shall be adequate in quantity to deliver the required amount of concrete to the job site. The rate of delivery shall be such that the concrete can be properly handled, placed and finished. The interval between batches shall not be more than thirty (30) minutes. Delivery shall be made in a manner that will minimize rehandling and prevent damage to concrete previously placed.

C4 Retempering

Concrete shall be mixed only in such quantities as are required for immediate use and shall be used while fresh before initial set has taken place. Any concrete having inital set before placing and finishing shall be wasted and not used for the work. No retempering of concrete (remixing with water or other materials) will be allowed.

C5 Remixing Concrete

Concrete which has stiffened but not yet set may be used after remixing provided it is plastic enough to be compacted. No water or other materials shall be added in remixing.

D METHOD OF MEASUREMENT

Cement will be considered as an integral part of the concrete and no separate compensation will be made therefor.

Concrete will not be measured separately for payment.

E BASIS OF PAYMENT

Concrete will be paid for in the manner prescribed in the detailed specification for each item of work in which it is used.

25.02 CULVERTS

A DESCRIPTION

This work shall consist of the construction of pipe culverts using plant-fabricated corrugated metal pipe or precast sectional concrete pipe.

For the purposes of this specification, the term "pipe culvert" shall be construed to mean either or both circular or non-circular pipe.

Pipes whose primary function is to drain surface water transversely through one or more streets (except when they are a part of a sewer system) shall be considered to be pipe culverts, even though they may have catch basins at the inlets or at intermediate points.

B MATERIALS

Materials shall meet the requirements specified in the following subsections:

Reinforced Concrete Pipe and Pipe-Arch..34.02
Corrugated Metal Pipe..34.04

C CONSTRUCTION REQUIREMENTS

C1 General

For purposes of these Construction Requirements, the term "Diameter" shall be construed to mean, in the case of circular culverts, the nominal inside diameter of the pipe and, in the case of pipe-arch culverts, the nominal inside span when it refers to a horizontal distance and the nominal inside diameter of a circular pipe with the same periphery when it refers to a vertical distance.

All reference herein to "corrugated metal pipe" shall mean either galvanized steel or aluminum pipe and the requirements therefor shall apply to both.

C2 Excavation

The excavating of the foundation shall be in accordance with section 21.05 "Excavation for Conduits and Minor Structures."

C3 Bedding

No special shaping of the foundation will be required other than shaping to the required grade.

C4 Laying Pipe

Each culvert shall be laid true to the established line and grade and shall have a firm bearing throughout its entire length.

Two or more culverts laid adjacent to each other shall be separated by a distance of at least one Diameter to a maximum of three feet. If aprons are required for parallel culverts, the culverts shall be separated so that the ends of the apron wings will touch each other.

Generally, the pipe laying shall begin at the downstream end of the pipe line. Corrugated metal pipes shall be laid with the outside laps of the circumferential joints pointing up grade and with the longitudinal joints on the sides. Sections of pipe shall be connected with corrugated metal bands centered over the joint, the ends of the sections being as close together as possible.

Concrete pipes shall be laid with the groove end of each section up grade and the tongue shall be firmly inserted into the groove.

When so indicated in the plans, culverts shall be connected into catch basins. In such cases, an appropriate size T-section or a separate catch basin may be used. When a standard catch basin is used, the end of the pipe shall be cut off flush with the inside of the catch basin.

When the plans or proposal calls for culverts to be laid by the "Bore and Push" method, the provisions of 24.01 C2 shall apply.

When specifically required by the contract, the joints in sectional concrete pipe shall be tied together by a fastener as recommended by the manufacturer and approved by the Engineer.

C5 Backfilling

Backfilling shall conform to the requirements of 21.07, "Backfill."

C6 Aprons

Aprons shall be of the same design and quality as the manufacturer of the pipe supplies.

D METHOD OF MEASUREMENT

Pipe culverts of each type, diameter or span, and strength class furnished and installed by the Contractor will be measured separately by length along the bottom of the pipe on the longitudinal axis. Lengths of reducer or increaser sections will be measured as part of the larger size pipe.

Metal and concrete culvert aprons furnished and installed by the Contractor for each type and diameter, or span, of culvert will be measured separately as individual units.

E BASIS OF PAYMENT

The accepted quantities of pipe will be paid for at the Contract unit bid price per linear foot for pipe of the types and sizes specified complete in place.

End sections will be paid for at the contract unit bid price for each type and size specified complete in place.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
25.02 E1	___" RCP (Class __)	Linear Foot
25.02 E2	___" x ___" RCPA (Class__)	Linear Foot
25.02 E3	___" CMP (___ga.)	Linear Foot
25.02 E4	___" x ___" CMPA (___ga.)	Linear Foot
25.02 E5	___" RCP Apron	Each
25.02 E6	___" x ___" RCPA Apron	Each
25.02 E7	___" CMP Apron	Each
25.02 E8	___" x ___" CMPA Apron	Each

25.03 RIPRAP

A DESCRIPTION

This work shall consist of a protective covering of approved stone or broken concrete.

B MATERIALS

Stone and filter blanket shall conform to the requirements of 37.01.

Pieces of broken concrete may be substituted for stones, if they are sound and meet the size requirements for stone. If the concrete contains metal reinforcement, the reinforcement shall be cut or burned off flush with the concrete.

C CONSTRUCTION REQUIREMENTS

Rip rap shall, if so indicated in the plans, be laid on a filter blanket of gravel or crushed rock, the thickness of which will be shown in the plans, but in no case will be less than 6 inches.

The filter blanket shall be spread to the required thickness over a uniform subgrade conforming to lines and grades required by the plans.

Riprap shall be dumped or rolled into place in such a manner that the smaller stones will be uniformly distributed throughout the mass. Sufficient hand work shall be done to procure a neat and uniform mass, and the depth shown in the plans.

D METHOD OF MEASUREMENT

Riprap will be measured by volume, based on the surface dimensions staked by the Engineer and the specified thickness, or by weight.

Filter blankets will be measured by volume, based on the area covered and the specified thickness, or by weight.

E BASIS OF PAYMENT

Payment for riprap will be made on the basis of the following schedule:

Item No.	Item	Unit
25.03 E1	Riprap Class	Cubic Yard or Ton
25.03 E2	Filter Blanket	Cubic Yard or Ton

25.04 CONCRETE SIDEWALK

A DESCRIPTION

This work shall consist of the construction of concrete walks, except those which are parts of bridges.

B MATERIALS

Concrete	25.01
Joint fillers	35.01
Curing materials....................	38.01
Form coating materials	38.02
Treating oil	38.03

C CONSTRUCTION REQUIREMENTS

All grass, sod, sticks, roots, topsoil and other vegetable matter must be removed. The subgrade shall then be leveled to the required elevation and compacted to the satisfaction of the Engineer.

When fill of over two (2) inches is required beneath the sidewalk, the Contractor shall provide such fill consisting of natural clays or silt from adjacent excavations. This fill shall be compacted to 95% of maximum density at optimum moisture as determined by AASHO T-99A. If fill of less than two (2) inches is required, the Contractor may use sand or gravel which shall be compacted to a stable condition.

Valve boxes and curb stops shall be adjusted to grade and shall be considered incidental work for which no additional compensation will be made. In the event that a manhole has to be adjusted and there is no bid item provided, the Contractor will be paid for this work on a force account basis.

Forms shall have a height equal to the edge thickness of the walk and shall be sufficiently rigid to withstand the operations of placing and finishing the concrete. All forms shall be set to alignment and grade, and shall be substantially staked and braced.

Where practicable, all joints shall align with like joints in adjoining work. Joints shall be used to outline all panels in the walk, which so far as possible shall be square. The lengths of the panels will be determined by the width of the walk. In general, no panel shall have a surface area exceeding 36 square feet.

All joints shall be edged with a tool having a radius of not more than 1/8 inch.

Transverse joints shall be straight and shall be perpendicular to the center line and to the surface of the walk. Longitudinal joints shall be parallel to the centerline and perpendicular to the surface of the walk.

Isolation joints shall be 5/8 inch wide, shall be formed to the full thickness of the walk and may be of preformed or poured materials. Should the isolation joint be constructed with a preformed material, no hot poured seal, as shown in the standard plates, will be required. The concrete shall be the full thickness as is specified in the proposal.

Transverse isolation joints shall be placed at uniform intervals of not more than 60 feet or as shown in the plans; and where the walk abutts against or around another permanent fixed object.

Contraction joints shall be not more than 1/8 inch in width and shall be cut to a depth of not less than 1/3 of the thickness of the walk.

No concrete shall be placed before the Engineer has approved the foundation and forms. Immediately before placing the concrete, the insides of the forms shall be wetted and the foundation moistened.

Concrete shall in no case be placed on a frozen foundation. Unless cold weather protection and curing are furnished, concrete shall not be placed when the air temperature in the shade is less than 35 degrees F. nor shall it be placed where the air temperature is less than 40 degrees F. and falling.

The concrete shall be deposited in excess of the required depth, vibrated to fill all voids, struck off to the required grades and floated smooth. The surface shall not vary more than 1/8 inch from a 10-foot straight edge.

Immediately after the water sheen has disappeared, the surface shall be broomed lightly at right angles to the centerline. The broom shall be approximately 24 inches long and shall have not less than three rows of bass, bassine or coire fibers. Brooms shall be clean and free of dry or hardened mortar before being used.

The Contractor shall mark in the walks at each end of every one hundred and fifty (150) feet of work or fraction thereof, either by stamping or by inlaying an approved metal plate, his name and year in which the walk is constructed. The stamped letters shall be one (1) inch high and one-fourth (1/4) inch deep. If a metal plate is used, the top of the plate shall be flush with the top of the walk.

The forms shall remain in place for a period of not less than 12 hours.

The concrete shall be cured for a period of not less than 72 hours by covering it with curing paper or plastic curing blankets or a membrane curing compound.

During cold weather, the Contractor shall protect the concrete from frost for at least 72 hours after placing. The restoration of the disturbed area adjacent to the sidewalk shall then be completed in accordance with 21.10 "berms and boulevards."

D METHOD OF MEASUREMENT

Concrete walk of each thickness will be measured by area.

E BASIS OF PAYMENT

Payment for concrete walk at the contract price per square foot shall be considered to be compensation in full for all costs incidental to construction thereof, including but not limited to excavation, fill, isolation or poured joint fillers, curing and restoration of disturbed area.

Constructing concrete walk will be paid for on the basis of the following schedule:

Item No.	Item	Unit
25.04 E1	___" Concrete Sidewalk	Square foot

25.05 CONCRETE DRIVEWAY

A DESCRIPTION

This work shall consist of constructing driveway and alley returns according to the applicable standard plates or as shown on the plans.

B MATERIALS

Materials shall conform to the requirements of 23.01B.

C CONSTRUCTION REQUIREMENTS

Construction requirements shall conform to 23.01C with the following deletions and additions:

1. When the driveway or alley return is constructed adjacent to an existing pavement that was not constructed under the same contract, the density requirement for the subgrade is waived; however, the subgrade shall be compacted by suitable equipment so as to provide a firm, uniform and stable subgrade that will support the required construction equipment.

2. The driveway or alley return shall be isolated from any permanent existing structure by the use of an isolation joint as shown in the standard plates.

3. Driveway and alley returns shall be constructed according to the details as shown on the plans or standard plates.

4. The joints in the driveways and alley returns shall be aligned with the joints in the street and sidewalk so far as practicable.

5. When concrete curb has to be removed to allow access to the newly constructed driveway or alley return, that concrete shall be cut to a depth of at least three (3) inches so as to provide a neat joint.

D METHOD OF MEASUREMENT

Driveways and alley returns will be measured by area with no allowance for any curb required.

E METHOD OF PAYMENT

Driveways and alley returns will be paid for at the contract unit bid price per square foot which shall be considered compensation in full for all costs incidental to construction thereof, including but not limited to excavation, fill, sawing, sealing, backfilling, curing and jointing.

Constructing concrete driveways and alley returns will be paid for on the basis of the following schedule:

Item No.	Item	Unit
25.05 E1	Concrete Driveway	Square Foot

25.06 CONCRETE CURB AND CURB AND GUTTER

A DESCRIPTION

This work shall consist of the construction of cast-in-place concrete curb, concrete curb and gutter, valley gutters, and curb radius constructed as an integral unit.

B MATERIALS

Materials shall conform to the requirements of 23.01B.

C CONSTRUCTION REQUIREMENTS

For the purposes of these construction requirements, the unmodified term "curb" shall be construed to include curb and gutter, valley gutters and curb radius.

C1 Preparation of Foundation

The width of the trench shall be such that the forms can be properly set and the backfill properly compacted.

The trench shall be excavated to the required elevation and the bottom thereof shall be compacted to the satisfaction of the Engineer. Class 4 backfill (if so specified) shall be placed to the required depth and compacted until firm (Table 33.01).

C2 Forms

The forms shall be shaped to conform to the design of the curb. All side forms shall be of the depth at least equal to the edge thickness and shall be sufficiently rigid to withstand the operations of placing and finishing the concrete without bulging.

All forms shall be set to true alignment and grade and shall be substantially staked and braced. When tested with a 10 foot straight edge, the tops of the forms shall not show a variation of over 1/8 inch from a straight line and the sides of straight forms shall not show a variation of more than 1/4 inch from a straight line.

The contact surfaces of all forms shall be treated with a form oil prior to placing the concrete.

C3 Joints

All transverse joints shall be constructed perpendicular to the subgrade, at right angles to the longitudinal axis of the curb and shall wherever practicable align with like joints in adjoining work.

Transverse isolation joints, filled with 1 inch preformed filler material shall be placed at the ends of all curved sections, at the ends of the curved portions of entrance and street returns and at locations requiring the isolation of permanent facilities. The filler material shall conform to the cross section of the concrete and shall be true to line.

Contraction joints shall be placed at approximately 10 foot intervals, spaced as uniformly as possible between the isolation joints.

Joints not sealed with preformed compression seals shall be sealed with low modulus silicone or hot pour.

C4 Placing Concrete

Immediately before placing the concrete, the insides of the forms shall be wetted and the foundation moistened with water.

Concrete shall in no case be placed on a frozen foundation. Unless cold weather protection and curing are furnished, concrete shall not be placed where the air temperature in the shade is less than 35 degrees F. nor shall it be placed where the air temperature is less than 40 degrees F. and falling.

The concrete shall be deposited in the forms in excess of the required depth by methods which will prevent segregation of the materials, compacted to fill all voids by hand tamping or internal vibrating, struck off to the required shape and grade and floated smooth.

C5 Finishing

The exposed surface shall be hand-floated with a wood, aluminum or magnesium float and immediately after the water sheen has disappeared, shall be finished to a uniform texture by brooming.

In conjunction with the final finishing operations, all edges (including those in contraction and isolation joints) shall be rounded to the radius shown in the standard plates or as directed, using an approved edging tool.

Immediately after removing the forms, all cavities shall be filled with mortar.

C6 Curing

Concrete shall be cured by approved methods for a period of not less than 72 hours.

In addition to the required cure covering, the Contractor shall protect the concrete after placement to prevent the temperature of the deposited concrete from falling below 50° F. until the required curing period has elapsed. The minimum curing period during cold weather for protected concrete shall be 72 hours and shall be subject to such extension as deemed necessary by the Engineer.

C7 Extruded Curb Construction

Concrete curb may be placed and formed to the required shape by using any extrusion machine of an approved type which will produce a finished product meeting the requirements of this specification for workmanship and quality.

C8 Workmanship and Quality Requirements

All concrete work constructed under this specification which does not meet the minimum requirements will be considered to be defective work.

The top surface of curbs, gutters and curb radius shall be free from humps, sags and other irregularities, shall be constructed to the elevations and widths shown in the standard plates and shall have edge alignment as straight as practicable on tangent sections and of uniform curvature on curved sections.

Except on curved sections, the surface of the concrete (on the top, front or back) shall not vary by more than 1/4 inch from the edge of a 10-foot straight edge placed thereon, parallel to the curb line.

The flow line surface of gutters shall be finished and shaped as may be necessary to eliminate low spots and to avoid entrapment of water.

The cross sectional dimensions of all concrete work shall conform substantially to the design dimensions shown in the standard plates.

Any work which, in the opinion of the Engineer, does not conform to the above described requirements shall be removed and replaced at the Contractor's expense.

D METHOD OF MEASUREMENT

Except as otherwise provided below, concrete curb and concrete curb and gutter will be measured, along the face of the curb at the gutter line, by length. No deduction will be made because of any manholes or catch basins encountered.

Valley gutters will be measured by area. Variable curb and gutter and transitional curb and gutter shall be considered to be curb and gutter.

Curb radius will be measured by area of the entire radius. No measurement of the curb required in conjunction with the radius will be made.

E BASIS OF PAYMENT

Payment for concrete curb, concrete curb and gutter, valley gutter and curb radius at the appropriate contract prices per unit of measure shall be compensation in full for all work and materials involved in constructing those items complete in place, including, but not limited to, all necessary excavation, foundation preparation, sand-gravel backfill, isolation joint fillers, joint sealing, reinforcement steel, backfilling and disposing of surplus materials.

Payment for concrete curb, concrete curb and gutter, valley gutters and curb radius will be made on the basis of the following schedule:

Item No.	Item	Unit
25.06 E1	Concrete Curb	Linear Foot
25.06 E2	Concrete Curb and Gutter	Linear Foot
25.06 E3	Valley Gutter	Square Yard
25.06 E4	Curb Radius	Square Yard

25.07 MONUMENT BOXES

A DESCRIPTION

This work shall consist of furnishing and installing a monument ring and cover.

B MATERIALS

All monument boxes and covers shall conform to the requirements of 36.11.

C CONSTRUCTION REQUIREMENTS

Monument boxes shall be located as shown on the plans or as directed by the Engineer. They shall be set to the exact alignment as staked by the Engineer and to the proper street grade.

D METHOD OF MEASUREMENT

Monument boxes will be measured separately for each and every one actually furnished and installed.

E BASIS OF PAYMENT

Payment for monument boxes at the contract unit bid price shall include compensation in full for furnishing both the ring and cover and all costs incidental to installing the same.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
25.07 E1	Monument Boxes	Each

25.08 ADJUSTMENT OF UTILITY STRUCTURES TO FINISH GRADE

A DESCRIPTION

This item shall consist of adjusting existing catch basins, manholes, inlets, valves, boxes and other utility structures located within the right of way.

B. MATERIALS

Materials shall conform to the applicable requirements of these specifications for each structure adjusted.

C. CONSTRUCTION REQUIREMENTS

The method of construction shall conform insofar as applicable to the requirements of 24.03.

Existing catch basins, manholes, inlets, valves, and boxes, shall be adjusted to the elevation, grade, or dimensions as indicated on the plans or as ordered by the Engineer. Castings shall be carefully removed and reinstalled by the Contractor as required. If the height of the structure walls is to be increased, the addition may be of solid concrete, blocks, or precast ring. In the event that the top part of the existing structure is weak and faulty, it shall be replaced as directed by the Engineer and the extension completed.

Where the casting is to be lowered, the masonry or concrete shall be removed to sufficient depth so that a seat of proper dimensions may be reconstructed to receive the casting at the new grade.

Where the eccentric cone of a manhole or catch basin must be turned so as to place the casting in a different relative position to the structure, the Contractor shall rotate the section by any feasible method. Where addition of manhole steps or ladder is required by the plans, these shall be installed as shown on the plans or standard plates.

D. METHOD OF MEASUREMENT

Adjustment of catch basin, manholes, inlets, and utility appurtenances will be measured by the unit complete in place.

No measurement will be made of valves and other appurtenances connected with the water distribution system unless there is a bid item for the adjustment of that valve or appurtenance.

E. BASIS OF PAYMENT

Payment at the contract unit bid price shall be compensation in full for all costs associated with the adjustment of utility structures.

Payment for rotate manhole and relocate catch basin at the contract unit price shall include final adjustment of the casting to the finished grade.

Payment for adjustment of utility structures will be made on the basis of the following schedule:

ITEM NO.	ITEM	UNIT
25.08 E1	Adjust Catch Basin	EA
25.08 E2	Adjust Manhole	EA
25.08 E3	Catch Basin Chute	EA
25.08 E4	Rotate Manholes	EA
25.08 E5	Relocate Catch Basin	EA
25.08 E6	Adjust ____________	EA

25.09 SEEDING

A DESCRIPTION

This work shall consist of seeding the areas shown in the plans or as designated by the Engineer.

B MATERIALS

The materials shall conform to the following requirements:

Topsoil	39.01
Seed	39.02

C CONSTRUCTION REQUIREMENTS

Seeding shall be done at such time of the year when the climatic conditions of temperature and moisture are most adaptable for growth and work of this nature. Seeding shall be done prior to June 15 for spring seeding and after September 1 for fall seeding. Seeding done between these dates shall require approval from the Engineer in writing.

Prior to spreading topsoil, the area shall be cleaned of all debris, rank vegetation and other material that is detrimental to the preparation of the seed bed. The area shall then be shaped to the required cross section which will be three inches lower than the finished elevation.

Topsoil shall be spread, leveled, and compacted to the finished elevation, a minimum depth of three inches. Topsoil shall be compacted by either a cultipacker type roller providing 60 to 90 pound per linear foot of roller or by equivalent approved hand roller or compacting methods. The finished surface shall be smooth and level.

The topsoil shall be fertilized before seeding with fertilizer (10-30-10) at a rate of 10 pounds per 1,000 square feet.

Seed shall be sown at a rate of six pounds per 1,000 square feet.

The top soil shall then be scarified to insure that the seed is covered to an average depth of 1/4 inch.

Fertilizer and seed shall be applied by approved equipment that will place the required amounts per square foot. Broadcasting will not be permitted when wind velocities prevent uniform distribution. All fertilizing and seeding shall be done in the presence of the Engineer or his authorized representatives.

C1 ESTABLISHMENT AND MAINTENANCE

The Contractor shall be responsible for the establishment and proper maintenance of seeded areas for a period of four weeks after completion of all seeding. Fall seeding completed after September 15 shall be maintained until June 1 of the following season. Work shall include watering, mowing, and protection of seeded areas.

The Contractor shall produce a stand of grass that shall be alive, growing, and healthy at the end of the maintenance period with no bare spots. Areas which do not meet these requirements shall be re-seeded.

Seeded areas shall be watered frequently to promote seed germination. Watering equipment shall be of a type that will not damage finished grades. Watering shall keep the ground surface moist to a depth of 1/2 inches for the first two weeks or until the seed has germinated. Watering shall be at intervals and rates such that wilting, puddling, and runoff do not occur. As the turf develops, the frequency of watering may be reduced and quantities increased as growth and moisture requirements dictate. Water will be available from the City. The Contractor shall pay the costs for water and meter hookups.

The seeded areas shall be mowed to a height of two inches whenever the average height of vegitation becomes four inches.

Seeded areas shall be protected against traffic or other use by erecting barricades and placing signs at appropriate intervals until final acceptance.

D METHOD OF MEASUREMENT

Seeding or any authorized reseeding will be measured by the square yard complete in place and will be measured to the nearest square yard. Any topsoil required to provide the minimum seedbed shall be incidental and will not be measured.

E BASIS OF PAYMENT

The accepted quantities of seeding will be paid for at the contract unit bid price which will include all incidental items required to conform to these specifications.

Seeding will not be paid for until after the end of the required maintainence period with the exception of late fall seeding with a maintenance period extending into the next growing season. Payment for this type of late fall seeding will be made during the season it was installed if the seeding was completed in accordance with these specifications and is approved by the Engineer. The project warranty period will not start until after the maintenance has expired. Retainage on the project will be reduced to 1% if all other phases of the project are complete and have been approved by the Engineer.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
25.09E01	Seeding	Square Yard

25.10 SODDING

A DESCRIPTION

This work shall consist of the furnishing and laying of live sod at locations shown on the plans or as designated by the Engineer.

B MATERIALS

The sod shall conform to the requirements of 39.03.

C CONSTRUCTION REQUIREMENTS

The area to be sodded shall be free from stones, roots, and other objectionable material and shall be graded to the required cross section which will be four inches lower than the finished elevation. Three inches of topsoil shall then be spread over the entire cross section prior to laying the sod.

The topsoil shall be leveled, lightly compacted, then the top 1/4 inch loosened and brought to a reasonably fine texture.

The earth bed upon which the sod is to be placed shall be moistened to the loosened depth if not naturally sufficiently moist, and the sod shall be placed thereon within 48 hours after it has been cut.

Sod shall be laid at right angles to the direction of water flow and shall be so laid so that the joints caused by abutting ends of sod strips are not continuous.

As the sod is laid, it shall be rolled sufficiently to "set" or press the sod into the underlying soil.

At the limits of sodded areas, the outside edges of the sod strips shall be turned into the soil to be below the adjacent area and a layer of earth placed over this juncture which shall be thoroughly compacted to conduct the surface water over the upper edge of the sod.

On the slopes steeper than one to four and at the outlet of culverts, the sod shall be "staked" or "pegged".

After the staking has been completed, the surface shall be cleared of loose sod, excess soil, or other foreign material, whereupon a thin layer of topsoil, meeting the requirements of 39.01, shall be scattered over the sod as a top dressing.

C1 ESTABLISHMENT AND MAINTENANCE

The Contractor shall be responsible for the establishment and proper maintenance of sodded areas for a period of three weeks after completion of all sodding. Fall sodding completed after September 30 shall be maintained until June 1 of the following season. Work shall include watering, mowing, and protection of sodded area.

The Contractor shall produce a stand of grass that shall be alive, growing, and healthy with roots grown into the subsoil and with no gaps between strips of sod at the end of the maintenance period. Areas which do not meet these requirements shall be re-sodded.

Sodded areas shall be watered frequently to promote root growth. Watering equipment shall be of a type that will not damage finished grades. Watering shall keep the ground moist to a depth of two inches for the first week or until the roots have grown into the subsoil. Watering shall be at intervals and rates such that wilting, puddling, and runoff do not occur.

As the turf develops, the frequency of watering may be reduced and quantities increased as growth and moisture requirements dictate. Water will be available from the City. The Contractor shall pay the costs for water and meter hookups.

The sodded areas shall be mowed to a height of two inches whenever the average height of grass becomes four inches.

Sodded areas shall be protected against traffic or other use by creating barricades and placing signs at appropriate intervals until final acceptance.

D METHOD OF MEASUREMENT

Sod will be measured by the square yard complete in place to the nearest square yard.

E BASIS OF PAYMENT

Sod will be paid for at the contract unit bid price for each square yard that is actually furnished and installed and accepted. Such payment will include, but not be limited to, furnishing any topsoil required, preparing the bed, furnishing and laying of sod, staking or pegging, watering, and maintenance.

Sodding will not be paid for until after the end of the required maintenance period with the exception of late fall sodding with a maintenance period extending into the next growing season. Payment for this type of late fall sodding will be made during the season it was installed if the sodding was completed in accordance with these specifications and is approved by the Engineer. The project warranty period will not start until after the maintenance period has expired. Retainage on the project will be reduced to 1% if all other phases of the project are complete and have been approved by the Engineer.

Payment will be based on the following schedule:

Item No.	Item	Unit
25.10E01	Sod	Square Yard

25.11 DRY MIXED CONCRETE

A DESCRIPTION

This item shall consist of a mixture of Class 4 gravel and cement without the addition of water in accordance with the requirements of this specification.

This specification applies to the production of low grade concrete for bedding or backfill purposes of underground piping work other than structured parts of manholes or similar structures. Dry mixed concrete may be used only where specifically designated on the plans or typical details or when directed by the Engineer.

B MATERIALS

Unless otherwise directed by the Engineer, the cement used in the work shall be standard Portland cement (Type I).

Portland cement	31.01
Aggregates	Class 4

C CONSTRUCTION REQUIREMENTS

C1 Proportions

Aggregates and cement may be measured by volume utilizing any uniform method of measurement approved by the Engineer. Unless otherwise specified, the job mix shall be on the basis of three sacks of cement per cubic yard of concrete or a volume ratio of 3 1/2:1.

C2 Mixing

For small quantities of dry mixed concrete prepared in the field, hand mixing operations will be permitted provided that thorough mixing of the components is obtained. Mixing by mechanical mixers or central plant mixing of the concrete will be allowed.

C3 Placement

Dry mixed concrete shall be placed without segregation of the mixture or the coarse aggregates from the mixture. Whether placed against undisturbed earth or in forms the mixture shall be compacted to miximum density by means of approved hand tempers or mechanical equipment.

D METHOD OF MEASUREMENT

Dry mixed concrete will not be measured for payment.

E PAYMENT

Furnishing dry mixed concrete on undergound piping work will be considered incidental work, and no direct compensation will be made therefore.

25.12 TREES

A QUALITY ASSURANCE

All plant materials specified shall conform to the "Standardized Plant Names" nomenclature of the joint Committee of Horticulture on Nomenclature. Sizing and grading standards shall conform to the "American Standard for Nursery Stock" published by the American Association of Nurserymen.

No substitutions of specified sizes, grades, species, or qualities shall be made.

All plants shall be nursery grown in similar climatic conditions and shall be rooted, pruned, maintained, and/or cultivated for a minimum of two years prior to the planting date in similar climatic conditions as the project location. All plant material shall be of northern adapted stock.

B INSPECTION AND ACCEPTANCE

The Contractor shall be responsible for all inspections and approval of plant materials that may be required by state, federal, and/or other authorities and shall secure permits and certificates as may be required.

The Contractor shall furnish certificates of compliance on all plant materials.

Each item furnished under the terms of the contract may be rejected for noncompliance with specified size, grade, species, height, form, spread, uniformity, health, damage, condition, dehydration, and/or disease.

The park district forester will make an inspection of the plant material for acceptabilities.

All such noncomplying plants or materials shall be removed immediately from the project site.

Final inspection of the plant shall be made by the park district forester.

C GUARANTEE AND REPLACEMENT

All trees planted in conformance with the contract shall be alive and in satisfactory condition at the end of the establishment period. The establishment period shall be 13 months from the date of planting.

The establishment period shall not begin until all of the following items of work as required in the specifications, the special provisions, and the plans have been performed on each and every plant material: proper planting, backfilling, fertilizing, watering, pruning, wrapping, staking, guying, water basin construction, and mulching. All plant material shall be in acceptable growing condition when the project enters in the establishment period.

Prior to final acceptance of the project, the Contractor shall properly maintain all plant materials planted under this contract and shall replace all unacceptable plant material in the fall and spring planting seasons. Replacements shall be performed in all of the exact terms, methods, materials, etc., as stated in this ordinance.

Such maintenance shall include additional pruning, protective measures against pests and diseases, watering as often as required by necessity, repairing damage to the watering basins, replacing wrap and mulch which has been displaced, and keeping the stakes firm and the guys adjusted.

The park district forester shall make an inspection of the establishment procedures. Establishment procedures that have not been performed shall be brought to the Contractor's attention and may cause the establishment period to be extended.

Prior to completion of the establishment period, the park district forester will make an inspection for acceptability. All items of maintenance shall have been performed on the plant material prior to the inspection. Any items of maintenance that have not been performed may make a plant unacceptable.

D GENERAL PLANT MATERIAL REQUIREMENTS

All plant materials shall conform to the current edition of the "USA Standard for Nursery Stock" sponsored by the American Association of Nurserymen, Inc.

All plant material shall comply with all applicable state and federal laws including inspection certificates which shall include the project number and plant material that the certification covers.

All plant material furnished shall be true to name and type, and legible labels shall be furnished to insyure that all species, varieties, boxes, bundles, bales, or other containers are identified. The information on the label shall cover the botanical genus, species, and common name, size, or age of each species or variety.

All plant material shall be sound, healthy specimens of their species or variety and shall have well formed tops and healthy root systems.

Plant materials which lack proper proportions, have serious injuries to the bark or roots, broken branches, objectionable disfigurements, shriveled dry roots, insect pests, diseases, or are not found to comply with these specifications in any way may be rejected. Rejected plant material shall be removed by the Contractor from the project as soon as practical.

E NURSERY GROWN PLANT MATERIALS

All plant materials shall be "nursery grown" by registered professional nurserymen unless otherwise specified.

Fresh dug material is given preference over plant material held in storage. Plant material held in storage will be rejected if excessive growth has occurred in storage.

Carrying and handling of the plant material should be according to professional landscape contractor's methods to insure that the plant parts are not injured or alowed to dry out.

F PACKAGING OF PLANT MATERIAL

All plants shall be packed to assure proper protection against freezing, drying, breaking, overheating, or other injury. All accepted precautions shall be taken to insure the arrival of the plant at their destination in good condition for successful growth.

G MULCH

Mulch shall be wood chips or bark chips minimum of three inches thick covering the entire area excavated for planting. Chips shall not contain any foreign material.

H STAKES

Stakes shall be wood or metal -- approximately 1 5/8" x 1 5/8" x 6'0" for wood and 1" x 1" x 6' for metal. Stakes shall be installed according to the Exhibit A herein.

I WIRE

A minimum size of wire used for guying shall be 14 gauge, soft drawn, or loc-tite plant ties may be used in lieu of hose and wire guying as provided for in Exhibit A herein.

J HOSE FOR GUYING

Hose shall be nylon or rubber or reinforced plastic and shall have an inside diameter of at lease 1/2 inch and a minimum length of six inches as provided for in Exhibit A herein.

K WRAP

Tree wrap shall be manufactured, loose-fitting, plastic tree wrap.

L TRANSPORTING PLANTS TO THE PLANTING SITE

L1 General Requirements

Plant materials shall not be removed from storage until the planting site is ready for proper and immediate planting.

Where applicable, bare root stock shall be adequately covered with wet soil, sawduct, wood chips, shingle toe, moss, peat, straw, hay, or other acceptable moisture holding media and shall be the dimensions as shown in Exhibit A herein.

L2 Ground Preparation

The hole for the plant material shall be excavated and shall be the dimensions as shown in Exhibit A herein.

L3 Backfill for Plant Material

The planting soil shall be a mix of topsoil, sand, and organic material such as peat or old well rotted cattle manure in the following proportins: three parts - topsoil, one part - sand, and one part - peat.

The planting soil shall be approved by the park district forester prior to planting.

L4 Pruning of Plant Material

All deciduous plant material shall be properly and systematically pruned by an experienced pruner. Techniques for pruning shall be the drop-crotch thinning method. Proper pruning includes leaving well-spaced scaffold branches according to professional standards. Terminal buds of all branches will be left, no heading back. Debris from pruning shall be removed immediately by the Contractor.

L5 Wrapping Plant Material

All deciduous trees shall be wrapped around the tree truck beginning from the first well developed branch that remains after pruning to below ground.

L6 Staking and Guying of Material

When the first watering of the plant material is complete, all trees shall be guyed as shown in Exhibit A. The stake shall securely support the trees and be in the ground at least two feet.

L7 Watering Basin

A watering basin shall be constructed for all plant materials as shown in Exhibit A. Surplus material from the execution shall be removed and the grade of the turf and surrounding area restored. The complete water basin shall be filled with water immediately upon planting.

L8 Mulching of Plant Material

The mulch shall be applied upon completion of the planting and subsequent watering and shall cover all disturbed earth. Mulch shall be confined to a neat circular area around the tree of approximately two feet in diameter.

M EXECUTION OF PLANTING PROCEDURES

The Contractor shall notify the park district forester when

- planting stock has arrived at the planting site
- Contractor will begin planting

Planting shall take place in the spring planting season of April 15 to June 15, the fall planting season of September 15 to November 15, or such other planting times as the park district forester may approve in writing.

The tree planting contractor shall plant accordingly to approved plans and specifications. The Contractor shall be responsible for locating all underground utilities or obstruction affecting the planting sites.

The roots of bare root trees shall be pruned at the time of planting to remove damaged or undesirable roots. Bare root trees shall have the roots spread to approximate the natural position of the roots and shall be centered in the planting pit. The planting soil backfill shall be worked firmly into and around the roots with care taken to fill in completely with no air pockets. The final level of the planting soil shall come to approximately two inches below turf level, and the tree shall be set at the same depth in relation to the soil surface as they were growing in the nursery.

The planting pit shall be dug a minimum of twelve inches wider than the root spread of each tree. The waste soil from the digging shall be removed immediately from each planting site and replaced with the necessary amount of approved planting soil and aggregate as required herein.

Each planting pit shall be backfilled with the appropriate planting soil placed in layers around the roots. Each layer shall be tamped carefully in a manner to avoid injury to the roots or disturbing the position of the tree. When approximately 2/3 to 3/4 of the planting pit has been backfilled, the hole shall be watered so as to settle the soil in and around all of the roots. After the water has been absorbed, the planting pit shall be filled with the planting soil, tamped lightly to grade and watered thoroughly again. Any further settlement shall be brought to grade with additional planting soil.

Guys shall be readjusted after settling has taken place. No part of any guy shall be in contact with any part of each tree. All excess wire shall be removed or wrapped in such a way as to eliminate any loose ends.

The Contractor shall wrap each tree upon planting.

N APPROVED PLANT SPECIES

This list of plant species may be adjusted by the park district forester as necessary to accommodate additions of newly tested species or the removal of species that have developed health problems. Should substitutions of plant species or variety be offered in place of any species on the list prior written approval must be secured from the park district forester.

<u>EVERGREEN SHRUBS</u>

Prince of Wales Juniper - <u>Juniperus horizontalis 'Prince of Wales'</u>

Hughes Juniper - <u>Juniperus horizontalis 'Hughes'</u>

Buffalo Juniper - <u>Juniperus sabina 'Buffalo'</u>

Mugho Pine - <u>Pinus mugo mughus</u>

Techny Arborvita, upright - <u>Thuja occidentalis 'Techny'</u>

Webber Juniper - <u>Juniperus horizontalis 'Webber'</u>

Arcadia Juniper - <u>Juniperus sabina 'Arcadia'</u>

Welch Juniper - <u>Juniperus scopulorum 'Welch'</u>

Pyramidal Arborvite - <u>Thuja occidentalis pyramidalis</u>

Techny Globe Arborvitae - <u>Thuja occidentalis 'Techny'</u>

Yucca - <u>Yucca glauca</u>

SHADE TREES

Marshalls Seedless Ash
Fraxinas pennsylvanica 'marshalls seedless'

Summit Ash
Fraxinas pennsylvanica 'summit'

Common Hackberry
Celtis occidentalis

Royal Red Maple
Acer platanoides 'Royal Red'

Paper Birch
Betula papyrifera

American Linden
Tilia americana

Pyramida American Linden
Tilia american fastigieta

Bur Oak
Quercus macrocarpa

Black Walnut
Juglans nigra

ORNAMENTAL TREES

Canada Red Cherry
Prunus virginiana 'Canada Red'

May Day Tree
Prunus padus commutata

Amur Chokecherry
Prunus maacki

European Mountain Ash
Sorbus aucuparia

Showy Mountain Ash
Sorbus decora

Toba Hawthorne
Crataegus toba

Royalty Crab
Malus 'Royalty'

American Plum
Prunus americana

Russian Olive
Elaeagnus angustifolia

Dolgo Crab
Malus 'Dolgo'

Radiant Crab
Malus 'Radiant'

Red Splendor Crab
Malus 'Red Splendor'

Kelsy Crab
Malus 'Kelsey'

Pink Spire Crab
Malus 'Pink Spire'

Vanguard Crab
Malus 'Vanguard'

EVERGREEN TREES

Colorado Blue Spruce
Picea pugens glauca

Colorado Green Spruce
Picea pugens

Black Hills Spruce
Picea glauca densata

Scotch Pine
Pinus sylvestris

Austrian Pine
Pinus nigra

Ponderosa Pine
Pinus ponderosa

DECIDUOUS SHRUBS

Crimson Pygmy Barberry
Berberis thunbergi atropurpurea nana

Bailey Red Twigged Dogwood
Cornus baileyi

Gray Dogwood
Cornus racemosa

Yellow Twig Dogwood
Cornus stolonifera flaviramea

Peking Cotoneaster
Cotoneuster acutifolia

Winged Euonymus
Euonymus alatus

Sea-buckthorn
Hippophae rhamnoides

Emerald Mound Honeysuckle
Lonicera xylosteum compacta

Minature Snowflake Mockorange
Philadelphus sp 'Miniature Snowflake'

Dwarf Ninebark
Physocarpus opalifolius nanus

Goldfinger Bush Cinquefoil
Potentilla fruticosa 'Goldfinger'

Russian Almond
Prunus tenella 'Fire Hill'

Columnar Buckthorn
Rhamnus frangula columnaris

Cut Leaf Sumac
Rhus typhina laciniata

Red Berried Elder
Sambucus pubens

Ash Leaf Spirea
Sorbaria sorbifolia

Goldflame Spirea
Spirea bumalda 'Goldflame'

Pygmea Peashrub
Caragana pygmea

European Variegated Dogwood
Cornus elegantissima

Colorado Red Osier Dogwood
Cornus stolonifera coloredoensis

Isanti Dogwood
Cornus stolonifera isanti

Autumn Olive
Eleagnus umbellata

Dwarf Winged Euonymus
Euonymus alatus compactus

Annabelle Hydrangea
Hydrangea arborescens grandiflora 'Annabelle'

Golden Mockorange
Philadelphus coronarius aureus

Golden Ninebark
Physocarpus opulifolius aureus

Gold Drop Cinquefoil
Potentilla fruticosa 'Gold Drop'

Jackmann Bush Cinquefoil
Potentilla fruticosa 'Jackmanni'

Nanking Cherry
Prunus tomentosa

Smooth Sumac
Rhus glabra, Morden selection

Golden Elder
Sambucas canadensis aurea

Silver Buffaloberry
Shepherdia argentea

Froebel Spirea
Spiraea bumalda 'Froebeli'

Miss Kim Lilac
Syringa putula

Common Purple Lilac - Syringa vulgaris purpurea

Nannyberry - Viburnum lentago

Compact European Cranberry Bush - Viburnum opulus 'compactum'

Arrowwood - Viburnum dentatum

Bailey Compact American Cranberry Bush - Viburnum trilobum 'Baily compact'

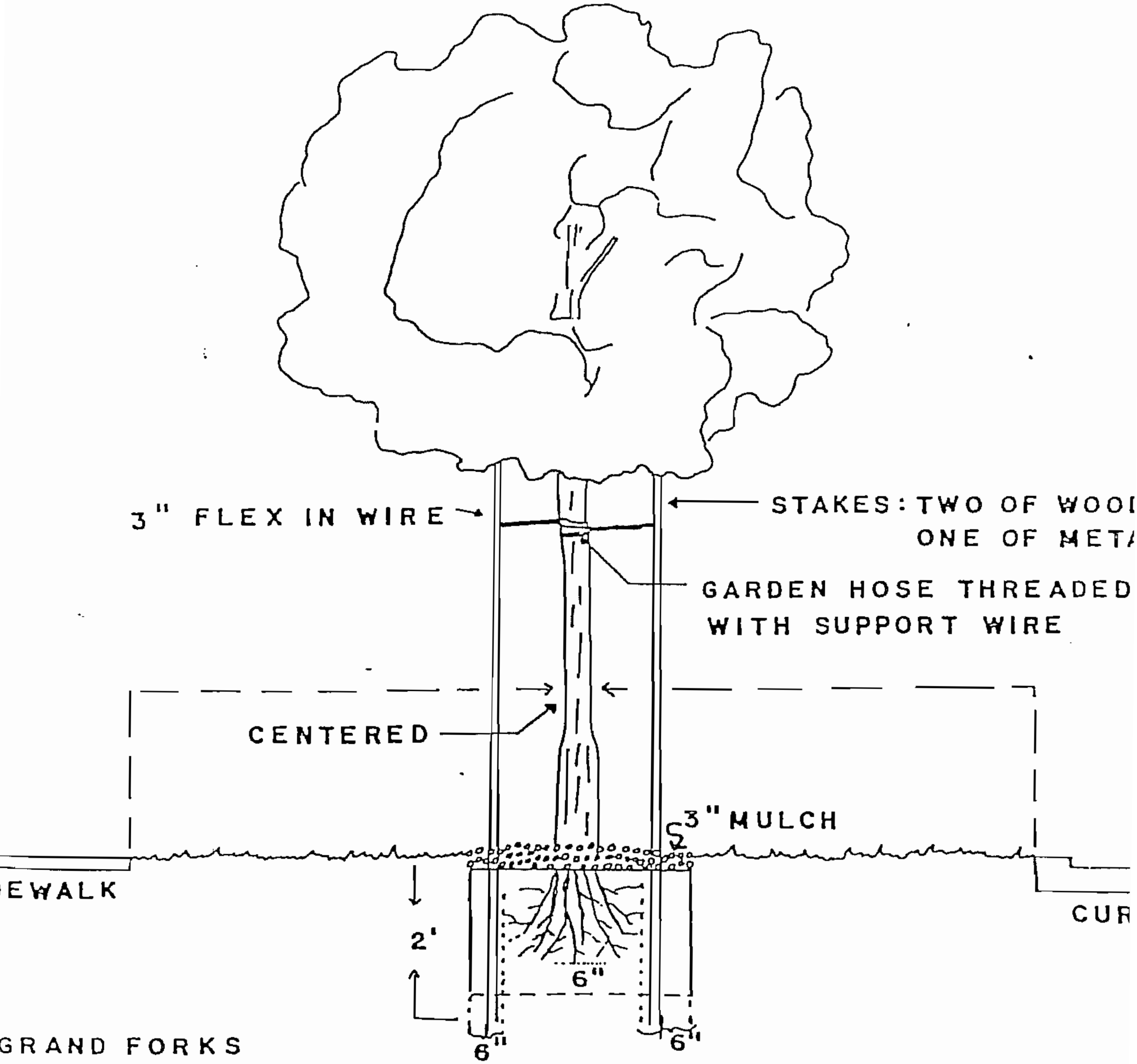
O BASIS OF PAYMENT

Payment at the contract unit bid price shall constitute full payment for furnishing and installing the specified size and species of tree or shrub in accordance with these specifications.

Payment will be made on the basis of the following schedule:

Item No.	Item	Unit
25.12S15-1	Species Name - Species Height	Each
25.12S15-2	Species Name - Species Caliper	Each

EXHIBIT A



GRAND FORKS
PARK BOARD
TREE PLANTING
DIAGRAM

DIVISION III

DIVISION III

MATERIALS

30.01 GENERAL STATEMENT

Where the specifications or special provisions require that materials conform to AASHO or ASTM specifications, the latest standard specifications and all modifications thereto in effect on the date of the invitation for bids shall apply.

If materials are used in the work for which there is no prescribed schedule of testing by the Owners, the Contractor shall furnish a statement from the supplier certifying that the product conforms to the specifications. The certificate of compliance shall show the following:

a. Project number to which the material is consigned.
b. Name of the contractor to which the material is supplied.
c. Kind of material supplied.
d. Quantity of material represented by the certificate.
e. That the material has been found in conformity with the pertinent specification required by the contract.
f. Signature of a person having legal authority to bind the supplier.

The Engineer reserves the right to sample and test all material at the job site. In such cases, the results of the tests so taken shall govern the acceptance or rejection of the materials tested.

31.01 HYDRAULIC CEMENT AND LIME

A Portland Cement

Portland Cement shall conform to AASHO M85 for the particular type of cement used. Air-entraining Portland Cement shall conform to AASHO M134 for the particular type of cement used.

B Hydrated Lime

Hydrated lime shall conform to ASTM C6.

31.02 ADMIXTURES FOR CONCRETE

A Air-entraining Admixture

Air-entraining admixtures shall conform to AASHO M154 or ASTM C260.

B Others

Any other admixture shall conform to the applicable AASHO or ASTM specifications.

31.03 WATER

Water for use in concrete or mortar shall be subject to the approval of the Engineer. It shall not be saline or brackish and shall be reasonably clear. It shall be free from oil, acid, injurious alkali or vegetable matter. Preferably the water used shall be potable. Non-potable water may be used if mortar cubes made with the water in question have 7 and 28 day strengths equal to at least 90% of the companion specimens in which potable water was used.

When required by the Engineer, the quality of the water shall be determined in accordance with AASHO T26.

31.04 SUBMITTAL OF SHOP DRAWINGS

A. The Contractor shall submit a minimum of four copies of shop drawings and/or product data for all materials and/or products to be installed or constructed. Shop drawings shall first be reviewed by the Contractor prior to being sent to the Engineer. They shall be submitted to the Engineer and approved by the Engineer prior to any fabrication or construction taking place.

B. Submittals shall contain:

1. Project Number and Title
2. Date of Submission
3. The names of:
   a. Contractor,
   b. Supplier,
   c. Manufacturer.
4. Clear identification of the material or product
5. Certification of Contractor Review

32.01 BITUMINOUS MATERIALS

Bituminous materials shall conform to the requirements of the following cited specifications for the type specified or permitted:

Type	Specification
Asphalt Cement	AASHO M-20
Rapid Curing Cutback Asphalt	AASHO M-81-621
Medium Curing Cutback Asphalt	AASHO M-82-621
Slow Curing Asphalt in Road Oils	AASHO M-141-621
Emulsified Asphalt	AASHO M-140
Tars	AASHO M-52

and shall be applied within the temperature ranges indicated in the following table:

Type and Grade of Material	Application Spray	Temperature Range of Mix
RT 1-2-3	60-130	60-130
RT 5-6	85-150	85-150
RT 7-8-9	150-225	150-225
RT 10-11-12	175-250	175-250
RC 70	105-175	
RC 250	140-225	
RC 800	175-225	
RC 3000	215-290	
MC 70	105-175	90-155
MC 250	140-225	125-200
MC 800	175-255	160-225
MC 3000	215-290	200-260
SC 70	105-175	90-155
SC 250	140-225	125-200
SC 800	175-225	160-225
SC 3000	215-290	200-260
All Emulsions	50-140	50-140
All Penetration Grades Asphalt Cement	350 Max.	As required to achieve viscosity of 75-150 seconds, Saybolt-Furol 350 Maximum

33.01 AGGREGATE FOR BASE AND INCIDENTAL ITEMS

A Scope

This specification covers gravel, sand and crushed rock for surfacing, base courses, sub-bases, subgrade correction, sub-drains, and special backfill.

B Requirements

The material shall consist of sound, durable particles of gravel and sand, with which may be included limited amounts of fine soil particles as binding material. It shall not contain sod, roots, plants and other organic matter, or any other objectionable materials.

The aggregate shall conform to the requirements of table 33.01.

C Sampling and Testing

Sampling and testing shall be in accordance with the following methods:

Sampling .... AASHO T2
Liquid Limit (L.L.) .... AASHO T89
Plastic Limit (P.L.) .... AASHO T90
Plasticity Index (P.I.) .... AASHO T91
Los Angeles Abrasion Test .... AASHO T96
Percentage of clay .... AASHO T88

TABLE 33.01

DESIGNATION	SIZE 2	CLASS 4	CLASS 6	CLASS 13	MODIFIED CLASS 13	CLASS 42	CLASS 43	CLASS 45	SPECIAL[4] CLASS I
Typical Use		Backfill, Subgrade, Base, etc.				Seal Coat Aggregate			PVC BEDDING
Total % Pass Sieve Size	Note: Gradation limits shown below are equivalent to ND Highway Department gradations for similarly designated material.								
3"									
2"	100								
1 1/2"	90-100								
1"	20-55			100	100				100
3/4"	0-15	100	100	70-100	70-100				92-100
5/8"						100			
1/2"						95-100	100		
3/8"	0-5		90-100				95-100	100	36-64
No. 4		35-85	35-75	38-75	38-75	20-85	20-85	85-100	19-28
No. 8						0-17			
No. 10				22-62	22-62		0-17		
No. 16								45-80	9-16
No. 30		10-50		12-37	12-37				
No. 50								10-30	
No. 100									0-2
No. 200		0-20	0-8	0-12	5-15	0-4	0-4	0-3	
Shale [1]		15%		12%	12%	8%	8%	3%	
L.A. Abrasion [1]		50%		50%	50%	40%	40%		
Plasticity Index [2]		10-30		15	4-10				
Fractured Faces [3]		10%		10%	10%				

FOOTNOTES:

1. Maximum Allowable Percentages.

2. Determined on Minus No. 200 Material - Max. Allowable unless range shown.

3. Values shown are minimum percentages of particles having at least 2 fractured faces. Only the material larger than the No. 8 Sieve is tested and is considered as the Total Sample.

4. This material is a blend of 4 parts crushed coarse aggregate and 1 part fine aggregate as per section 816 (aggregate) of NDSHD specifications.

33.02 AGGREGATES FOR CONCRETE MIXTURES

A Fine Aggregates

Fine aggregate for concrete shall conform to the requirements of AASHO M6, with the following modifications:

1. Shale and soft rock shall not exceed 2% by weight.

2. The sum of the percentages of shale, clay lumps, coal and other deleterious substances shall not exceed 3% by weight.

3. When fine aggregate is subjected to five alterations of the sodium sulfate soundness test the weighted percentage of loss shall be not more than 10% by weight.

The gradation of fine aggregate shall meet one of the following gradations. Either gradation may be used, but once adopted, no change in gradation will be made during the course of the work.

FINE AGGREGATE GRADATION

Sieve Size	% Passing by Weight
No. 4	100
No. 6	95-100
No. 10	85-97
No. 20	50-70
No. 50	5-20
No. 100	0-5

Sieve Size	% Passing by Weight
3/8"	100
No. 4	95-100
No. 16	45-80
No. 50	5-30
No. 100	0-8

The gradation of the material shall be reasonably uniform and not subject to extreme variations permitted in the above tables.

B Coarse Aggregate

Coarse Aggregate for concrete shall conform to the requirements of AASHO M80, with the following modifications:

1. Shale and soft particles shall not exceed 0.7% by weight.

2. Clay balls and lumps shall not exceed 0.3% by weight.

3. Total soft particles (including items 1 and 2 above) shall not exceed 3.0% by weight.

4. Thin and elongated pieces shall not exceed 10.0% by weight.

COARSE AGGREGATE GRADATION

Sieve Size	% Passing by Weight
2"	100
1-1 1/2"	95-100
3/4"	40-75
3/8"	15-30
No. 4	0-8

The gradation of the material shall be reasonably uniform and not subject to extreme variations permitted in this table.

34.01 CONCRETE PIPE, NON-REINFORCED

This pipe shall conform to the requirements of AASHO M-86 for the specified diameters and strength classes.

34.02 CONCRETE PIPE, REINFORCED

This pipe shall conform to the requirements of AASHO M-170 for the specified diameters and strength classes. Elliptical pipe shall be furnished where specified.

Pre-cast reinforced concrete end sections shall conform to the requirements of the cited specifications to the extent to which they apply.

Tie bolts and nuts shall be of steel conforming to ASTM A307 Grade A. Washers shall be of steel conforming to ASTM A366 or ASTM A415. Tie bolts, nuts and washers shall be galvanized in accordance with ASTM A153. Fastener castings shall be gray iron castings conforming to ASTM A48 Class 20.

34.03 VITRIFIED CLAY PIPE

This pipe shall conform to the requirements of ASTM designation C200 for extra strength pipe.

34.04 CORREGATED METAL PIPE

These conduits (circular and pipe arches) and the coupling bands shall conform to the requirements of AASHO M-36 for the specified sectional dimensions and gauges. Special sections, such as elbows, and flared end sections, for these conduits shall be the same gauge as the conduit to which they are joined, and shall conform to the applicable requirements of AASHO M-36.

Corregated aluminum pipe shall conform to the requirements of AASHO M-196.

34.05 ASBESTOS-CEMENT PIPE

A Sewers

This pipe shall conform to the latest ASTM designation C428, Class 2400 for pipes up to and including 12" in diameter, and Class 3300 for all pipe over 12" in diameter. The pipe shall have joints of the rubber gasket type slip-on type. The pipe shall be as manufactured by Johns-Manville, Certain-Teed, or equal.

B Water Distribution

This pipe shall conform to the latest AWWA Standard C400, Class 200. The pipe shall have joints of the rubber ring gasket type and shall be as manufactured by Johns-Manville, Certain-Teed, or equal. Each length of pipe shall be marked with the nominal size, the class, the name of the manufacturer or his trademark, the hydrostatic proof pressure and the date of manufacture. All component parts of the coupling shall be marked with the make, size and class of pipe for which they are intended. Machined over all pieces shall be used only for adapters and closures.

34.06 CAST IRON PIPE

Cast iron pipe where specified in the work shall be manufactured in accordance with American Standards Association Specifications ASA 21.6 or ASA 21.8. The wall thickness of the pipe shall be calculated in accordance with the ASA Specifications A21.1, "Manual for the Computation of

Strength and Thickness of Cast Iron Pipe", for the following conditions: Working pressure, 150 psi; earth cover over pipe, 8 feet; Trench conditions, B; Trench width d + 2 feet: Bursting Tensile Strength of Iron 18,000 psi; Ring Crushing Strength of Iron 40,000 psi. Truck loads, impact load Water Hammer and Safety factor are to be taken from the standard tables appearing in the manual. Pipe wall shall be standard thickness Class Number 22 for all sizes up to and including 10", Class Number 23 for 12" pipe, and Class Number 23 for pipe above 12", unless otherwise specified. Pipe shall be coated and standard thickness cement lined in accordance with ASA Specifications A21.4. Pipe joints shall be the slip-on type gasket joint.

All cast iron pipe and fittings shall be produced by a recognized foundry and shall be marked with the Underwriters Laboratories, Inc. inspection label.

34.07 DUCTILE IRON PIPE

Ductile iron pipe where specified in the work shall be manufactured in accordance with ANSI A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151).

All buried pipeline and appurtenances including pipe, fittings, branch lines, and hydrant leads shall be wrapped with polyethylene for its entire length. The polyethylene shall meet the specification of ANSI A21.5 (AWWA C105). All pipe and fittings furnished shall be bituminous coated on the outside as required in the above specification and shall be standard thickness cement-mortar lined and bituminous seal coated in accordance with ANSI A21.4 (AWWA C104).

34.08 CONCRETE CYLINDER PIPE

Reinforced concrete, steel cylinder type, prestressed water pipe where specified in the work shall be of a quality equal to that manufactured by Lock Joint Concrete Pressure Pipe, a division of International Pipe and Ceramics Corp., under Class 150 prestressed concrete, steel cylinder pipe. The reinforced concrete waterpipe, steel cylinder type prestressed shall conform to standards of AWWA C301. Before fabrication, the design computations shall be submitted to the Engineer, based on 8 ft. cover, Pw150, using a safety factor of 2.0 for Pwh.

34.09 POLYVINYLCHLORIDE (PVC) PIPE

When specified for gravity sewers, this pipe, and any necessary fittings, shall conform to the requirements of ASTM D3034, SDR 35. The pipe shall have integral-bell gasketed joints and couplings conforming to ASTM D3212, and shall be as manufactured by Certain-Teed, Johns-Manville, or equal.

When specified for water distribution systems, this pipe shall conform to the requirements of AWWA Standard C900, Class 150. The pipe shall have integral-bell gasketed joints and couplings conforming to ASTM D3139, and shall be as manufactured by Certain-Teed, Johns-Manville, or equal. Fittings for this pipe shall be cast iron fittings for CI-dimensioned pipe, conforming to AWWA Standard C110.

Each length of PVC pipe supplied shall be marked with the manufacturer's name or trademark, nominal pipe size, PVC cell classification or material code, dimension ratio or standard dimension ratio number, the product type, pressure class or pressure rating, the standard specification designation, and a production record code.

35.01 PREFORMED EXPANSION JOINT FILLER FOR CONCRETE

Preformed expansion joint filler for concrete shall conform to the requirements of AASHO 33.

35.02 CONCRETE JOINT SEALER

A. Hot poured elastic type shall conform to AASHTO M-301

B. Low Modulus Silicone Sealant shall be furnished in a one part silicone formulation. The silicone sealant material shall have a movement capability of + 100% and - 50% of joint width. This materiall shall meet the following requirements:

Test	Limit	Method
Flow	0.3 inch maximum	ASTM C-639
Extrusion Rate	75-250 grams/min.	ASTM C-603
Tack-Free Time	20-75 minutes	ASTM C-679
Specific Gravity	1.010-1.515	ASTM D-792, Method A
Durometer Hardness		
Type A: (Cured 7 days at 77 Degrees F ± 3 Degrees and 45% to 50% R.H.)	10-25 (0 degrees F)	ASTM D-2240
Tensile Stress (at 150% elongation, 7-day cure at 77 Degrees F ± 3 Degrees and 45% to 50% R.H.)	45 psi maximum	ASTM D-412 (Die C)
Elongation: (7-day cure at 77 Degrees F ± 3 Degrees and 45% to 55% R.H.)	1000% minimum	ASTM D-412 (Die C)
Movement capability and adhesion (7-day cure in air, 77 Degrees F ± 3 Degrees then 7 days in water, 77 Degrees F ± 3 Degrees)	No adhesive or cohesive failure after 10 cycles (0 Degrees F)	ASTM C-719*
Bond to concrete mortar concrete briquets (air cured 7 days at 77 Degrees F ± 3 Degrees)	50 psi minimum (0 Degrees F)	AASHTO T-132**

*A 1-inch by 2-inch by 3-inch concrete block shall be prepared according to ASTM C-719. A sawed face shall be used for the bond surface. Two inches of block shall be sealed leaving a 1/2 inch on each end of the specimen unsealed. The depth of the sealant shall be 3/8 inch and the width 1/2 inch. The sealant shall be subject to a movement according to ASTM C-719 at the rate of 1/8 inch per hour. One cycle is defined as an extension to one inch and returning to the initial 1/2 inch width.

**Briquets, molded according to AASHTO T-132, shall be sawed in half and bonded with approximately 10 mils of sealant and tested using clips meeting AASHTO T-132. The briquets shall be dried to a constant weight in an oven at 100 Degrees C $\pm$ 5 Degrees. They shall be tested in tension at a loading rate of .3 inch/minute.

35.03 BACKER ROD

Backer rod shall be of a non-moisture absorbing, resilient material compatible with the sealant. No bond or reaction shall occur between the rod and the sealant.

36.01 REINFORCEMENT BARS

Steel reinforcement for concrete pavements shall conform to the following applicable requirements:

A. Bar Reinforcement	AASHO M 31
B. Steel Wire Fabric	AASHO M 55
C. Steel Bar Mats	AASHO M 54

36.02 DOWEL BARS

Dowel bars for pavements shall conform to the requirements of AASHO Designation M31, M42, or M53 for plain bars of any grade specified therein.

All dowel bars shall be given a shop coating of rust-inhibitive primer and greased at the job site.

36.03 DRAINAGE CASTINGS

A Manhole Castings

Manhole frames and covers shall be as shown on the standard plates and of the quality manufactured by the Neenah Foundry Company with a solid cover provided with two pick holes on opposite sides of the cover. The combined weight of the frame and cover shall be approximately 400 pounds. Castings shall be dipped in pitch and thoroughly covered with pitch before they are delivered to the job. When specified in the plans, a manhole grate casting manufactured by the Neenah Foundry Company will be substituted for the solid cover as specified above.

B Manhole Steps

The manhole steps shall be furnished and installed as indicated on the standard plates and shall be cast iron of the type manufactured by James B. Clow and Sons, Catalog No. F-3650.

C Catch Basin Castings

Catch basin castings shall be as shown on the standard plates and shall be of the quality manufactured by the Neenah Foundry Company.

36.04 GATE VALVES

The valve furnished shall have bronze non-rising stems, O-ring seals, bronze two-inch operating nut, and shall open counterclockwise. The valve shall be manufactured in excess of full compliance with AWWA C500 for gate valves and AWWA C509 for wedge valves. Gate valves shall have mechanical release wedging device and bronze diskrings (fully machined). The valve shall be equal to those manufactured by the A. P. Smith Valve Company, the Mueller Company, James B. Clow and Sons, American-Darling Valve, or M & H Valve Co. Wedge valves shall have a cast iron gate having a vulcanized sythetic rubber coating or a rubber seat mechanically retained on the gate. The valve shall be Mueller resilient seat gate valve manufactured by Mueller Co. Joints shall be of the slip-on type with gaskets unless otherwise specified.

36.05 TAPPING SLEEVES AND VALVES

The tapping sleeves and valves shall be designed to operate at a working pressure of 200 psi. The valves shall conform to the requirements of 36.04. The sleeves shall have either lead end or mechanical joints and shall be of the full-sleeve type. The sleeve shall be constructed entirely of 304 stainless steel, including the flange, and shall be fully lined with a rubber gasket.

36.06 FIRE HYDRANTS

Fire hydrants shall be of the compression type, shall have five-inch valves, six-inch connections, two - two and one-half inch hose nozzles, one - four and one half inch pumper nozzle, placed 32 inches above grade and shall open to the left. All hose connections shall be Grand Forks standard. The hydrant shall conform to AWWA standard specification C-502. The hydrants shall be furnished painted yellow, and any paint damaged in shipping or handling shall be spot painted or repaired by the Contractor before acceptance. The hydrants shall be as manufactured by the Waterous Company (Pacer model) or by American-Darling Valve (Model B-62-B).

36.07 VALVE BOXES - WATER

The valve boxes furnished shall be Buffalo-type three piece equal to that manufactured by Clow Company No. F2450 with bases and dimensions of each section to be as follows:

No. 6	Round base for 8" or smaller gate valves
No. 160	Oval base for 10" through 16-inch valves
No. 162	Oval base for 18" through 20-inch valves
No. 6	Round base for butterfly valve

Mueller, H-13204 or equivalent plastic valve boxes with 5 1/2 inch shaft may be used when equipped with a cast iron cover. The cover shall be marked "Water".

36.08 CAST IRON FITTINGS

Fittings shall be manufactured in accordance with ASA Specification A21.10. Cast iron fittings for sizes up to and including 12 inches shall have a working pressure of 250 pounds per square inch conforming with ASA Specification A21.10. Fittings larger than 12 inches shall have a working pressure of 150 pounds per square inch conforming with ASA Specification A21.10. The fittings shall be cement mortar lined and bituminous seal coated conforming with the latest ASA Specification A21.4. Bell and spigot or flange fittings where indicated on the drawings shall conform to ASA A21.10 or ANSI A21.15 (AWWA C115), respectively.

Fittings or appurtenances with mechanical joints, flanged joints, or similar bolted connections shall be assembled with COR-TEN bolts when installed in the ground. The joints shall then be wrapped with 6 mil. or heavier poly-ethylene and tied to prevent direct contact between the joint, including bolts, and the adjacent soil or sand bedding.

36.09 BUTTERFLY VALVES

All butterfly valves shall be of the tight closing type with rubber seats. No metal-to-metal sealing surfaces are permitted. Valves shall be bubble tight at 150 psi rated pressures with flow in either direction and shall be satisfactory for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. Valves shall meet the full requirements of AWWA Specification C504 Class 150-B. The manufacturer shall have manufactured tight closing AWWA rubber seated butterfly valves and buried service operators for a period of at least five years.

Valve bodies shall be constructed of cast iron ASTM A-126 Class B and shall have integrally cast slip-on joint ends. Discs shall be constructed of high strength cast iron.

Shafts shall be one piece extending full size through the valve disc and bearings; stub shafts are not acceptable.

Seats shall be a Buna N or rubber full circle seat not penetrated by the valve shaft.

Bearings shall be sleeve type and self-lubricating with load not to exceed 2500 psi.

Valve operator shall be traveling nut type designed to withstand 300 ft. lbs. of input torque at full open or closed positions without damage to the valve or operator; must be fully gasketed and grease packed and designed to withstand submersion in water to 10 psi.; valves shall close with a clockwise rotation of the AWWA nut and shall require approximately the same number of turns as gate valves to move from fully open to fully closed position.

36.10 VALVE BOXES - SEWER

These valve boxes shall conform to the requirements of 36.07 except that the cover shall be marked "SEWER".

36.11 MONUMENT BOXES

All monument boxes shall be similar or equal to Neenah Foundry casting No. R-1976.

36.12 PVC FITTINGS - WATER

PVC pressure fittings for water shall be manufactured in accordance with AWWA Developing Technology Document 1.C9.

37.01 RIPRAP MATERIALS

The rock shall be durable field or quarry stone of approved quality, sound, hard, and free from seams, cracks, or other structural defects.

Rock shall conform to the size requirements for the class specified. The class of rock is

	Class A	Class B
Maximum Size	250 lbs.	400 lbs.
75% must be within the following range	10 lbs. to 180 lbs.	10 lbs. to 300 lbs.
Within an average weight of	50 lbs. to 80 lbs.	80 lbs. to 150 lbs.

Not less than 90 percent (by weight) shall weigh over 10 pounds.

For hand-placed and grouted riprap, the individual stones except those used for chinking, shall weigh not less than 50 pounds each.

The filter blanket material shall be well graded gravel or crushed stone and shall conform to the following gradation requirements:

Sieve Size	Total % Passing	Sieve Size	Total % Passing
3"	100	No. 10	35-65
1 1/2"	80-100	No. 40	5-30
1"	75-90	No. 100	0-12
No. 4	50-80		

37.02 CONCRETE MASONRY UNITS

This material shall conform to the requirements of ASTM C 139.

37.03 SECTIONAL CONCRETE MANHOLE AND CATCH BASIN UNITS

Manholes and catch basins shall be of pre-cast reinforced concrete sewer pipe sections of a quality meeting ASTM designation C76 Class II.

Joints shall be sealed at the time of setting with preformed joint sealant such as Ram-Nek or Kent-Seal No. 2. During times when the temperature falls below 40° F., the joint sealant shall be installed as recommended by the manufacturer.

Bases may be either pre-cast or cast in place with concrete having a compression strength of 3000 psi.

37.04 PRE-CAST CONCRETE CURB

Pre-cast concrete curb shall conform to the requirements of 25.06 "Portland Cement Concrete Curb and Curb and Gutter" with the following exceptions: The sections shall substantially conform to the dimensions shown in the drawings; and the section shall be so reinforced so as not to allow cracking of the section.

38.01 CONCRETE CURING MATERIALS

Curing materials shall conform to the following requirements as specified:

Cotton Mats for Curing Concrete	AASHO M-73
Burlap Cloth made from jute or kenaf	AASHO M-182
Waterproof Paper for Curing Concrete	AASHO M-139
Liquid Membrane Forming Compounds for Curing Concrete	AASHO M-148
White Polyethylene Sheeting (Film) for Curing Concrete	AASHO M-171

38.02 FORM COATING MATERIALS

The material used for treating forms for concrete shall be light commercial oil or other suitable substance that will prevent adherence of the concrete to the forms and will not reduce the strength of the concrete. In addition, the material used for treating forms which will be in contact with concrete surfaces that are exposed to view in the finished work shall be a substance that will not appreciably affect the color of the concrete.

38.03 CONCRETE TREATING OIL

This specification covers a mixture of two petroleum products to produce a spray solution for application on concrete. The mixture shall consist of equal parts of Stoddard solvent and neutral petroleum oil. The Stoddard solvent shall conform to ASTM designation D484. The neutral petroleum oil shall be plain petroleum with a viscosity of 75-100 sec. at 100^{0} F.

39.01 TOPSOIL

Topsoil shall consist of loose, friable, loamy black soil that is typical of this area and shall be free of excess acid and/or alkali. It shall be free from sod, hard lumps, gravel, subsoil, stones, concrete pieces or other objectionable materials which will prevent formation of a suitable seedbed.

39.02 SEED

The seed mixture shall consist of the following grasses:

For berms and boulevards - 63% Park Blue Grass, 33% red fescue

For ditches, dikes, etc. - 35% Alta fescue, 30% perenial rye grass, 30% Park blue grass, 5% slender wheat grass at 25 #/AC.

Minimum germination shall be 80%; maximum inert matter and other seeds 4% maximum weed seed shall be 0.5%.

39.03 SOD

Sod shall be densely rooted blue grass or other approved grasses, free of noxious weed and objectionable grasses.

Before cutting, the sod shall be raked free of all debris and the grass cut to a length of approximately 2 inches. The thickness of the sod shall be such as to contain practically all of the dense root system of the grasses, but never less than one inch.

All sod shall be delivered to the site of installation at such a time that it can be placed within 48 hours after being cut. From the time it is cut until it is installed, the sod shall be protected against drying out.

DIVISION IV

DIVISION V

NOTICE TO CONTRACTORS
CALL FOR CONSTRUCTION BIDS

Notice is hereby given that sealed bids will be received by the undersigned until 2:00 p.m. on ______________, at his office in the City Hall in the City of Grand Forks, North Dakota, at which time they will be publicly opened and read. The aforesaid bids will be presented to the members of the City Council at their next regularly scheduled meeting for furnishing all labor, materials, equipment, other facilities, and things necessary or incidental for construction of Grand Forks City Project No. ______, to-wit:

Each bid must be submitted upon the basis of cash payment for the work, on blanks furnished by the City Engineer, and shall be accompanied by a separate envelope containing an acceptable bidder's bond, running to the City of Grand Forks, in a sum equal to five percent of the full amount of the bid, executed by the bidder as principal and by a surety company authorized to do business in North Dakota, conditioned that if the principal's bid be accepted and the contract awarded, the bidder, within ten days after notice of award, will execute and effect a contract in accordance with the terms of his bid and a contractor's bond.

Each bid shall contain a copy of the license or certificate or renewal thereof issued by the secretary of state enclosed in the required bid bond envelope. No contract shall be awarded to any contractor unless he is the holder of a license in the class within which the value of the project falls.

All work shall be done according to the plans, bid documents and Standard Construction Specifications for the City of Grand Forks on file in the Office of the City Auditor, City Hall, Grand Forks, North Dakota.

All bids must be submitted in a bidding envelope that is securely sealed. The envelope shall be plainly marked to indicate its contents and shall show the following information:

1. The name of the person, firm, or corporation submitting the bid;

2. Project title and district number, where applicable.

No bid will be read or considered which does not fully comply with the above provisions as to bond and licenses, and any deficient bid submitted will be returned to the bidder unopened.

Bids will be taken under advisement and the award of the contract, if awarded, will be made within thirty (30) days after the date of opening the bids. The work shall be completed by ______________.

The City Council reserves the right to reject any or all bids or to waive any informality in the bids received and to accept any bid deemed to be most favorable to the interest of the City of Grand Forks.

Copies of the contract documents, including plans and specifications, may be seen at the office of the Grand Forks City Engineer, City Hall, Grand Forks, North Dakota. A copy of the plans and proposal documents may be obtained for a non-refundable charge of fifteen dollars ($15.00) per set, payable to the City of Grand Forks. There will be a separate charge of $15.00 for each copy of the Standard Construction Specifications Book.

Done by order of the City Council of the City of Grand Forks, North Dakota, this ____ day of ______________, 19 _____.

Donald O. Tingum
City Auditor

(SEAL)

PROPOSAL

_______________ District No. ___________ Project No. ___________

Date ________________

To the Honorable Mayor and
Members of the City Council
City of Grand Forks
Grand Forks, North Dakota

The undersigned hereby certifies that he has personally examined the location and construction details of work outlined on the plans and specifications for

in the City of Grand Forks, North Dakota, and has read and thoroughly understands the plans and specifications and contract documents governing the work embraced in this improvement and the method by which payment will be made for said work and hereby proposes to undertake and complete the work embraced in this improvement in accordance with said plans, specifications, and contract documents and at the following schedule of rates and prices:

BID NO.	ITEM NO.	ITEM	APPROX. QUANTITY	UNIT PRICE		AMOUNT	
				Dollars	Cents	Dollars	Cents

BID NO.	ITEM NO.	ITEM	APPROX. QUANTITY	UNIT PRICE		AMOUNT	
				Dollars	Cents	Dollars	Cents

BID NO.	ITEM NO.		APPROX. QUANTITY	UNIT PRICE		AMOUNT	
				Dollars	Cents	Dollars	Cents

TOTAL BID $ ____________

Accompanying this proposal is a bid security required to be furnished by the contract, the same being subject to forfeiture in any event of default by the undersigned.

The undersigned is duly and regularly licensed as required by Chapter 43-07, North Dakota Century Code, as amended, and holds a Class ____ Contractors License No. ______ which expires ____________________.

Name of Bidder ____________________

____

By ____________________

Title ____________________

Official address:

____

____

____

NON-COLLUSION AFFIDAVIT

State of North Dakota)
) SS
County of __________)

________________________________, being first duly sworn, on his oath says that the bid above submitted is a genuine and not a sham or collusive bid, or made in the interest or on behalf of any person not therein named; and he further says that the said bidder has not directly or indirectly induced or solicited any bidder on the above work or supplies to put in a sham bid, or any other person or corporation to refrain from bidding; and that said bidder has not in any manner sought by collusion to secure to himself an advantage over any other bidder or bidders.

____
(Contractor)

Subscribed and sworn to before me this ________day of _________, 19___.

Notary Public in and for the State of
North Dakota
residing at __________________________

CONTRACT

PROJECT NO. , DISTRICT NO.

THIS AGREEMENT, made and entered into in duplicate, this ______ day of ______ ______________, 19____, by and between the City of Grand Forks, North Dakota, hereinafter called the Owner, and ____, hereinafter called the Contractor,

WITNESSETH:

That in consideration of the terms and conditions contained herein and attached and made a part of this agreement, the parties hereto covenant and agree as follows:

ARTICLE I

The Contractor shall perform all work and furnish all tools, materials, and quipment for

in accordance with and as described in the attached Plans and Special Provisions and the Standard Construction Specifications of the Owner on file in the Auditor's Office, City Hall, Grand Forks, North Dakota, which are by this reference incorporated herein and made a part hereof, and shall perform any alterations in or additions to the work provided under this contract and every part thereof. Contractor has received copies of Notice to Contractor, an Accepted Proposal, Special Provision, Plans, this Instrument and, further, has received and/or examined and is familiar with the contents of the Standard Construction Specifications for the City of Grand Forks and any amendments thereto and revisions thereof.

Work shall start within 10 days after execution of contract, or by May 15, whichever is later, and be completed by ______________________________, time being of the essence.

The parties agree that should Contractor fail to complete the work or deliver its material within the time agreed upon, Contractor agrees to pay and will pay to Owner, for each and every day of such delay beyond the time of completion of work or delivery of materials as above-defined, the sum of Fifty Dollars ($50.00) in either case, which sum is hereby, in view of the difficulty of estimating such damages, agreed upon, fixed, and determined by the parties hereto, as the liquidated damages that Owner will suffer by such default and not by way of penalty, and shall be deducted as such from the balance due to Contractor.

The Contractor shall provide and bear the expense of all equipment, work and labor of any kind or type whatsoever that may be required for the transfer of materials and for constructing and completing the work provided for in this contract and every part thereof, except such as are mentioned in the specifications to be furnished by the Owner.

ARTICLE II

The Owner hereby promises and agrees with the Contractor to employ, and does employ the Contractor to provide the material and to do and cause to be done the above described work and to complete and finish the same according to the attached Plans and Special Provisions and Standard Construction Specifications and the terms and conditions herein contained and hereby contracts to pay for the same according to the specifications and the schedule of unit or itemized prices as shown in the Proposal hereto attached, at the time and in the manner and upon the conditions provided for in this contract.

ARTICLE III

The Contractor for himself, and for his heirs, executors, administrators, successors, and assigns does hereby agree to the full performance of all the covenants herein contained upon the part of the Contractor.

ARTICLE IV

It is further provided that this contract shall consist of the following component parts:

1. Notice to Contractors
2. The accepted Proposal
3. Special Provisions
4. Plans
5. Standard Construction Specifications for the City of Grand Forks
6. Standard Plates
7. The required Bonds
8. All Addenda
9. All provisions required by law to be inserted in this contract, whether actually inserted or not.
10. This Instrument

This Instrument, together with the documents hereinabove mentioned form the contract, and they are as fully a part of the contract as if hereto attached or herein repeated. In the event that any provision in any of the component parts of this contract conflicts with any provision of any other component part, the provision in the component part first enumerated herein shall govern, except as otherwise specifically stated.

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be executed the day and year first hereinabove written.

CITY OF GRAND FORKS, NORTH DAKOTA

Attest:

This ______ day of ________________, 19___ By ______________________________

Mayor

____

City Auditor

____

Approved as to legality

By ______________________________

______________________________ By ______________________________

PERFORMANCE BOND

BOND TO CITY OF GRAND FORKS, NORTH DAKOTA

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 ______________________________, as a surety corporation, and qualified under the laws of the State of North Dakota to become surety upon bonds of contractors with municipal corporations, as Surety, are jointly and severally held and firmly bound to the City of Grand Forks, North Dakota, in the amount of $____________for the payment of which sum on demand we bind ourselves and our successors, heirs, administrators or personal representatives, as the case may be.

This obligation is entered into in pursuance of the statutes of the State of North Dakota, the ordinances and resolutions of the City of Grand Forks, North Dakota, dated at ________________, North Dakota, this ______ day of __________________________, 19___.

Nevertheless, the conditions of the above obligation are such that:

WHEREAS, under and pursuant to Resolution No.______of the City of Grand Forks, North Dakota, passed ____________________________, 19______, the Mayor of said City of Grand Forks, has let or is about to let to the said ____ ____, the above bounden Principal, a certain contract, the said contract providing for

(which contract is referred to herein and is made a part hereof as though attached hereto), and

WHEREAS, the said Principal has accepted, or is about to accept, the said contract, and undertake to perform the work therein provided for in the manner and within the time set forth;

NOW, THEREFORE, if the said ____ shall faithfully perform all of the terms, conditions, and provisions of said contract in the manner and within the time therein set forth, or within such extensions of time as may be granted under said contract, and shall pay all bills or claims on account of labor or material, including supplies used for machinery and motor power equipment, performed, furnished and used in and about the performance of the contract, including all demands of subcontractors and shall hold and save said City of Grand Forks, North Dakota, harmless of and from all costs, damages, loss liability, judgments and executions that may be brought against it by such work or the prosecution thereof by the said contractor, or its acts or omissions or those of its agents, servants and employees in the premises and shall have made or will make prior to the commencement of any work by himself or any subcontractors under such contractor, full and true report to the Workmen's Compensation Bureau of the payroll expenditures for the employees to be engaged in such work and shall pay the premium thereon prior to the commencement of such work and shall repair and replace all defective work or unsatisfactory filling of trenchs which may appear within the period of one year from the date of the final acceptance of the work by the City of Grand Forks, North Dakota, and then and in that event this obligation shall be void; but otherwise it shall be and remain in full force and effect.

____

(Principal)

Approved

By ____________________________________

____

____

(Surety)

By ____________________________________

PURCHASER'S CONTINGENT PROTECTIVE LIABILITY AND PROPERTY DAMAGE

Policy No. ___ ___ ___ ___ ___ _ Inception Date ___ ___ ___ ___ __ Expiration Date ___ ___

Insuring Company ___ ___ ___ ___ ___ ___ __ Address ___ ___ ___ ___ ___ ___ ___.

Agent ___ ___ ___ ___ ___ ___ ___ ___ ___Address ___ ___ ___ ___ ___ ___ ___.

Issued in name of the City of Grand Forks, North Dakota Yes ( ) No ( )
Liability Limits are the same as Public Liability and Property Damage above. Yes ( ) No ( )
Liability Limits, if other than above ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ _

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ _

CONTRACTOR'S CONTINGENT OR PROTECTIVE LIABILITY AND PROPERTY DAMAGE

Policy No. ___ ___ ___ ___ ___ Inception Date ___ ___ ___ ___ Expiration Date ___ ___

Insuring Company ___ ___ ___ ___ ___ ___ ___ Address ___ ___ ___ ___ ___ ___ ___

Agent ___ ___ ___ ___ ___ ___ ___ ___ _ Address ___ ___ ___ ___ ___ ___ ___

Is Contractor completely covered from any and all claims. Yes ( ) No ( )

Exceptions, if any ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ _

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ _

AUTOMOBILE PUBLIC LIABILITY AND PROPERTY DAMAGE

Policy No. ___ ___ ___ ___ ___ Inception Date ___ ___ ___ ___ Expiration Date ___ ___

Insuring Company ___ ___ ___ ___ ___ ___ ___ Address ___ ___ ___ ___ ___ ___ ___

Agent ___ ___ ___ ___ ___ ___ ___ ___ ___ Address ___ ___ ___ ___ ___ ___ ___

Limit of Liability:	Bodily Injury Liability	$ ________________	Each Person
		$ ________________	Each Accident
	Property Damage Liability	$ ________________	Each Accident

Coverage is provided for operation of all owned vehicles. Yes ( ) No ( )
Coverage is provided for operation of all non-owned vehicles. Yes ( ) No ( )

The insurance covered by this certificate will not be cancelled or materially altered, except after ten (10) days written notice has been received by the City of Grand Forks, North Dakota.

Dated at ___ ___ ___ ___ ___ ___ __ on ___ ___ ___ ___ By ___ ___ ___ ___ __
Authorized Insurance
Company Representative

No disclaimer, modification or alteration to this Certificate shall operate to reduce the coverage shown, nor act in any way to the detriment of the City but shall be effective only between the Insurance Companies and its or their Authorized Representative.

CERTIFICATE OF INSURANCE

Project No. _ _ _ _ _

District No. _ _ _ _ _

To the Honorable Mayor and
Members of the City Council
City of Grand Forks
Grand Forks, North Dakota

Gentlemen:

This is to certify that the following policies, subject to their terms, conditions and exclusions, have been issued by the named companies and that they fully comply with the requirements of the Standard Construction Specifications for the City of Grand Forks, North Dakota, and all Special Provisions attached hereto, all of which are on file in the Office of the City Auditor of the City of Grand Forks, North Dakota.

The insured is _

PUBLIC LIABILITY AND PROPERTY DAMAGE

Policy No. _ _ _ _ _ _ _ Inception Date _ _ _ _ _ Expiration Date _ _ _

Insuring Company _ _ _ _ _ _ _ _ Address _ _ _ _ _ _ _ _ _

Agent _ _ _ _ _ _ _ _ _ _ _ Address _ _ _ _ _ _ _ _ _

Limits of Liability:	Bodily Injury	$ ________	Each Person
		$ ________	Each Occurrence
		$ ________	Each Accident
	Property Damage	$ ________	Each Occurrence
		$ ________	Each Accident
		$ ________	Aggregate

The policy (does) (does not) include coverage for "hold harmless agreement."

Exceptions, if any _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _

EMPLOYERS LIABILITY AND WORKMEN'S COMPENSATION

Policy No. _ _ _ _ _ _ Inception Date _ _ _ _ Expiration Date _ _ _

Insuring Company _ _ _ _ _ _ _ _ Address _ _ _ _ _ _ _ _ _

Agent _ _ _ _ _ _ _ _ _ _ Address _ _ _ _ _ _ _ _

Coverage – Workmen's Compensation – Statutory Employers Liability Limit $ _ _ _ _

Locations covered _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Exceptions, if any _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

MINIMUM WAGE AFFIDAVIT FORM

State of North Dakota)
) SS
County of_______)

I, the undersigned, having been duly sworn, depose, say and certify that in connection with the performance of the work, payment for which this voucher is submitted, I have paid the following rate per hour for each classification of laborers, workmen, or mechanics, as indicated upon the attached list, now referred to and by such reference incorporated in and made an integral part hereto, for all such employed in the performance of such work; and no laborer, workman or mechanic so employed upon such work has been paid less than the prevailing rate of wage or less than the minimum rate of wages as specified in the principle contract, that I have read the above and foregoing statement and certificate, knowing the contents thereof and the substance as set forth therein is true to my knowledge and belief.

____
Contractor

Subscribed and sworn to before me on this

____day of______________, 19__.

____
Notary Public in and for the State of
North Dakota

residing at__________________

CITY OF GRAND FORKS
CONTRACT CHANGE ORDER

Change Order Number:______________ Date:______________________________
Project:____
City of Grand Forks Project Number:____________

Applicant's Name: ____
Applicant's Address:____
Contract For: ____

THE FOLLOWING CHANGES ARE HEREBY MADE TO THE CONTRACT DOCUMENTS:

(A) Item No.	(B) Description of Changes	(C) Decrease in Contract Price	(D) Increase in Contract Price
	TOTAL	$	$

CHANGE TO CONTRACT PRICE:

Total Increase in Contract Price (Column D): $____________
Total Decrease in Contract Price (Column C): $____________
Net (Increase)(Decrease) In Contract Price: $____________

Original Contract Price: $____________
Total Change Due to Previous Change Orders: $____________
Current Contract Price Adjusted by Previous Change Orders: $____________
Net (Increase)(Decrease) in Contract Price Due to This Change Order: $____________
New Contract Price Including This Change Order: $____________

CHANGE TO COMPLETION DATE:

Previous Completion Date:______________________
The Completion Date will be (unchanged)(increased)(decreased) by ________ (calendar)(working) days due to this Change Order
New Completion Date:_________________________

______________________ ________ ______________________ ________
Contractor's Signature Date Resident Project Rep. Date

______________________ ________ ______________________ ________
Resident Engineer Date City Engineer Date

1. Will the proposed change alter the size of the project?
   ___ Yes ___ No If yes, explain.

2. What effect will this change have on other prime contractors?

3. Has the consent of the surety been obtained?
   ___ Yes ___ Not Necessary

4. Will this change affect the expiration or extent of insurance coverage? ___ Yes ___ No

   If yes, will the policies be extended? ___ Yes ___ No

5. What effect will the proposed change have on operationals maintenance costs?

7. Necessity for change:

FORCE ACCOUNT

CONTRACTOR ______________________ PROJ. NO. __________

DESCRIPTION ______________________ AREA __________

______________________ DATE __________

LABOR	RATE	HRS.	TOT.	EQUIPMENT	RATE	HRS.	TOT.
TOTAL				TOTAL			

MATERIAL				LABOR + 15%	
				EQUIP.	
		TOTAL		MAT. + 15%	

CITY ENG. DEPT. of GRAND FORKS, N.D.	CONTRACTOR	SALES TAX	
by:	by:	TOTAL	
title:	title:		

WEEKLY STATEMENT OF WORKING DAYS

PROJECT NO.________________

____

DATE________________

STATEMENT NO.____________

TO: ________________________________. (Contractor)

The following statement shows the number of working days charged to your contract for the week ending______________________, 19____.

Starting Date____________________, 19____.

Date	Day	Weather Condition	Working Day
	Monday		
	Tuesday		
	Wednesday		
	Thursday		
	Friday		

Working days this week ______________

Working days previously reported ______________

Total working days to date ______________

Working days specified____

Working days remaining____

REMARKS:____

____

(Authorized Official)

NOTE: The contractor will be allowed 7 days in which to protest in writing the correctness of this statement, otherwise it shall be deemed to have been accepted as correct.

LETTER FOR EMPLOYMENT OF SUBCONTRACTOR

_______________, 19__
(Date)

Mr.______________
City Engineer
Box 1518
Grand Forks, North Dakota 58201

RE: Project No.__________
District No.__________

Dear Sir:

We, the undersigned, request permission of the City of Grand Forks to employ a subcontractor in order to fully perform the work covered by the terms of the above referenced contract.

We intend to employ the firm(s) of

a.
b.
c.

for the purpose(s) of performing the following described work,______________________
____
____
____

and represent and warrant that the work will be performed by said subcontractor(s) in a good and workman like manner and under our direct supervision. We further represent and warrant that the work to be performed by them constitute approximately___percent of the total dollar value of said contract.

Very truly yours,

__________________________ (Signature of Surety)

____________________________ Contractor

(Date)
____

(Name)
Engineering Department
City of Grand Forks
P. O. Box 1518
Grand Forks, ND 58206-1518

Dear ____________________:

Re: Force Account Work for Project No._______, District No. ______

This work was ordered by _____(Name)_____, _____(Title)_____,

and was necessary to __________(Description of Work)__________.

Labor:		
Operator - \$10.00*/hour x 1.30** = \$13.00/hour		
10 hours @ \$13.00 =	\$130.00	
Laborer - \$ 5.00*/hour x 1.30** = \$ 6.50/hour		
10 hours @ \$ 6.50 =	\$ 65.00	
	\$195.00	
Overhead and Profit (+15%)	29.25	
		\$ 224.25
Equipment:		
1 C.Y. Backhoe - 10 hours @ \$40.00***		400.00
Materials:		
12" RCP - 50 L.F. @ \$7.00****=	\$350.00	
18" RCP - 20 L.F. @ \$9.00****=	180.00	
	\$530.00	
Overhead and Profit (+15%)	79.50	
		\$ 609.50
Sales Tax - \$530.00 @ 4%		21.20
TOTAL		\$1,254.95

Very truly yours,

____

*Payroll wage
**Multiplier for benefits
***Rental rate based on Blue Book for construction equipment
****Invoice price

NOTICE TO PROCEED

Date ______________________

Project No. ______________

District No. ______________

To: ______________________________
(Contractor)

Gentlemen:

This is to notify you that work shall commence on ________________ (Date) on the above referenced project to construct ______________________________ ______________________________ (Description).

The following action by your firm prior to the start of construction, and/or within 5 working days of the receipt of this notice, is required.

- ☐ Submit a bar chart (Art. 17.02) showing the dates on which each major operation under this contract will be started and completed.
- ☐ Forms for submitting a bar chart are attached for your use. Other forms, or PERT or CPM charts may be used upon approval of the Engineer.
- ☐ Meet with the Engineer at __________ A.M./P.M. on ____________________ (date) at __________________________ (location) for a pre-construction conference.
- ☐ Other.

Yours very truly,

____
City Engineer

cc: City Auditor

PROPOSED PROGRESS CHART

PROJECT:________________________ PREPARED BY________________

CONTRACTOR:______________________ DATE_____________________

CONTRACT AWARD__________________ BEGIN CONSTRUCTION________ COMPLETION DATE__________

	WORK ITEM	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	% Comp.
																										95
																										90 85
																										80 75 70
																										65 60
																										55 50
																										45 40
																										35 30
																										25 20
																										15 10
																										05 0

RECEIPT, RELEASE, WAIVER OF LIENS, AFFIRMATION OF PAYMENTS

The undersigned acknowledges having received payment from the City of Grand Forks of ____ Dollars ($____________) in full payment of all labor and material furnished by the undersigned to said city of anyone in the improvement of ____ at ____; and for value received hereby waives all rights and liens which the undersigned may now or hereafter have, claim or assert for all and any labor or materials furnished for said improvement and premises, against the City of Grand Forks or any person or corporation or against the land and the buildings and appurtenances thereof, in the County of Grand Forks and State of North Dakota, described as follows:

The undersigned, in consideration of the payment acknowledged herein, affirms that all labor and materials for said improvement were furnished by the undersigned or his agent, employees, or by and through the undersigned by the following subcontractors or materialmen, to-wit:

and further affirms that the attached receipts and releases represent payment and release in full of all existing or possible future mechanics' liens or rights against said improvement and premises and any money in the hands of city appropriated for payment of any of said labor and materials.

In witness whereof the undersigned has hereto set his hand and seal (caused its hand and seal to be set by its ____________________ and duly attested by its secretary) the ________ day of ____________________, 19____.

____

By:

Its:

Attest:

____

Secretary

(Acknowledgement)

CITY OF GRAND FORKS

APPLICATION FOR PAYMENT

Application No.: ____________ Application Date: ____________
Payment Period: From ____________ To ____________ Completion Date: ____________
Project: ____________
City of Grand Forks Project No.: ____________

Applicant's Name: ____________
Applicant's Address: ____________
Contract For: ____________

STATEMENT OF PAST CONTRACT TRANSACTIONS

Summary of Previously Approved Change Order Amounts:		Summary of Previously Approved Applications for Payments:	
____________	$ ________	____________	$ ________
____________	$ ________	____________	$ ________
____________	$ ________	____________	$ ________
____________	$ ________	____________	$ ________
____________	$ ________	____________	$ ________
____________	$ ________	____________	$ ________
Total Change	$ ________	Total Payments	$ ________

STATEMENT OF CONTRACT AMOUNT

Original Contract Amount	$ ________
Total Change by Change Order	$ ________
Total Contract Amount to Date	$ ________

PAYMENT APPLICATION

Total Amount Completed to Date	$ ________
Material Stored	$ ________
Total Completed and Stored to Date	$ ________
______ % Retainage	$ ________
Total Due Less Retainage	$ ________
Less Previous Payments	$ ________
Amount Due This Application	$ ________

CERTIFICATION

Certifying Agency's Name: ____________
By: ____________ Date: ____________
Amount Certified: ____________

I hereby certify that the work performed and material supplied to date as shown herein represents the actual value of accomplishment under the terms of the contract for the above project and all authorized changes thereto.

Contractor's Signature	Date	Resident Project Rep.	Date
Resident Engineer	Date	City Engineer	Date

CITY OF GRAND FORKS

SUMMARY OF QUANTITIES

Item No.	Description of Item	Contr. Unit Pr.	Est. Contr. Quantity	Contract Amount	Quantities			*	Completed Amount
					This Est.	Prev. Est.	Total	F	

CITY OF GRAND FORKS

SUMMARY OF QUANTITIES

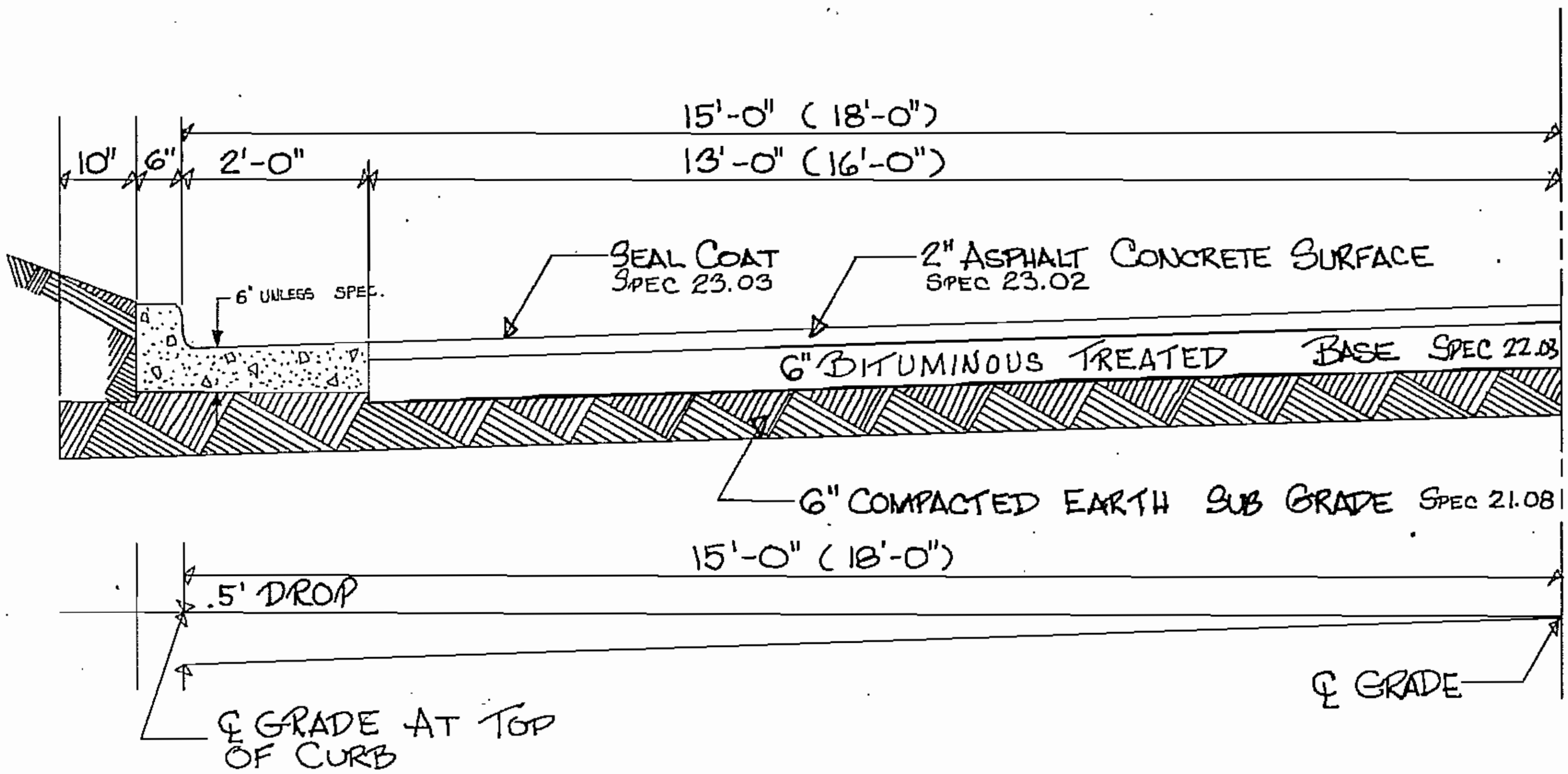
Item No.	Description of Item	Contr. Unit Pr.	Est. Contr. Quantity	Contract Amount	Quantities			*	Completed
					This Est.	Prev. Est.	Total	F	Amount

Total Contract Amount to Date $ ____________

Total Amount Completed to Date $ ____________

DIVISION VI

TYPICAL 8" ASPHALTIC CONCRETE SECTION



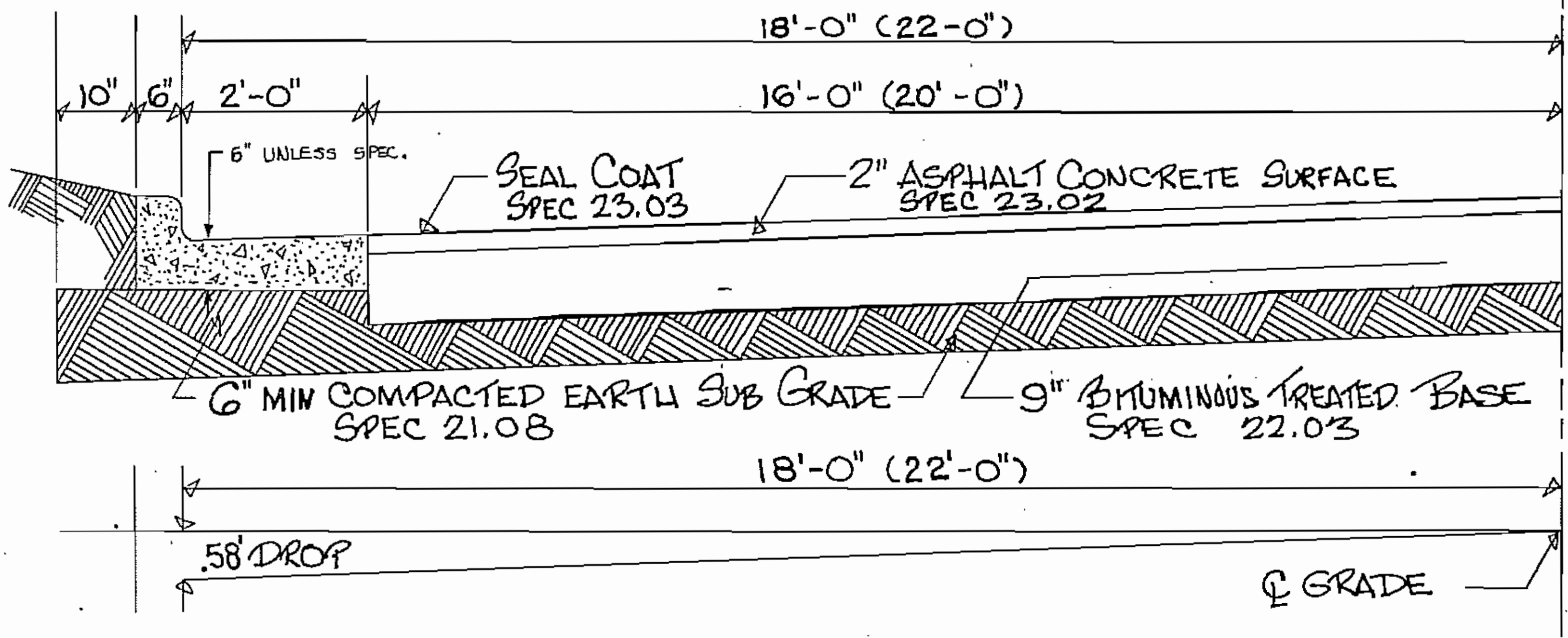
NOTE: FIGURES ARE FOR 31'-0" PAVEMENT. ( ) INDICATES THE DIMENSIONS FOR 37'-0" PAVEMENT

REV. 3/77 B.J.B.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 8" SECTION ASPHALTIC CONCRETE PAVEMENT		
CITY ENGINEER: F.B ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970

60.01

TYPICAL 11" ASPHALTIC CONCRETE SECTION

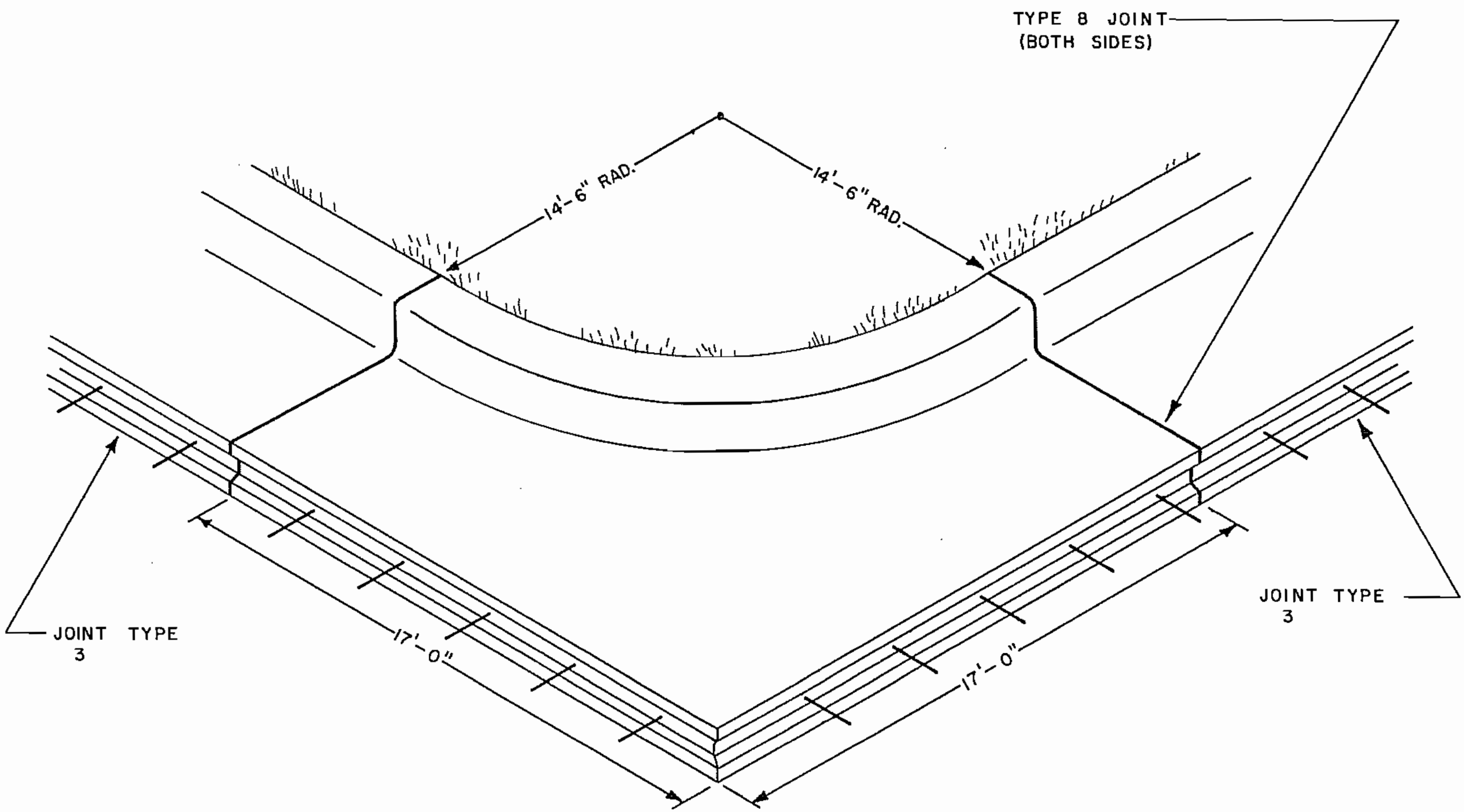


NOTE: FIGURES ARE FOR 37'-0" PAVEMENT. ( ) INDICATES THE DIMENSIONS FOR 45'-0" PAVEMENT

REV. 3/77 B.J.B.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 11" SECTION ASPHALTIC CONCRETE PAVEMENT		
CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE NONE
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J.K.J	DATE: APRIL 1, 1970

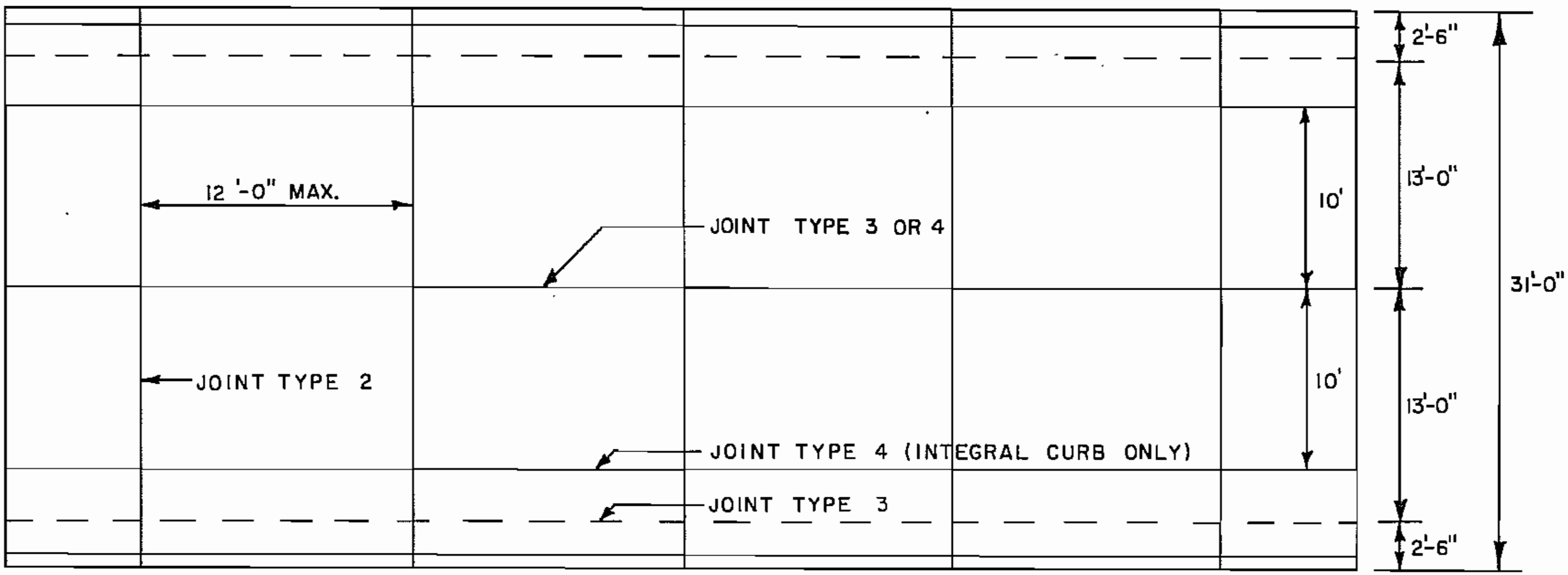
60.02



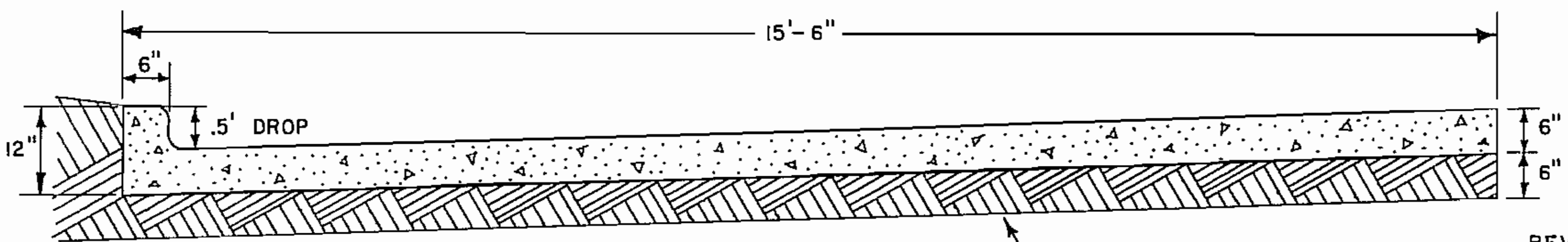
NOTE: FOR TYPICAL CURB & GUTTER SECTION
SEE PLATE 63.02.

SPEC. 25.06 REV. 2/83 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
INTERSECTION RADIUS, CURB, & JOINT DATA		
CITY ENGR. F. B.O.,	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76



NOTE: DASH LINES SHOW TYPICAL LAYOUT FOR SEPARATE CURB & GUTTER

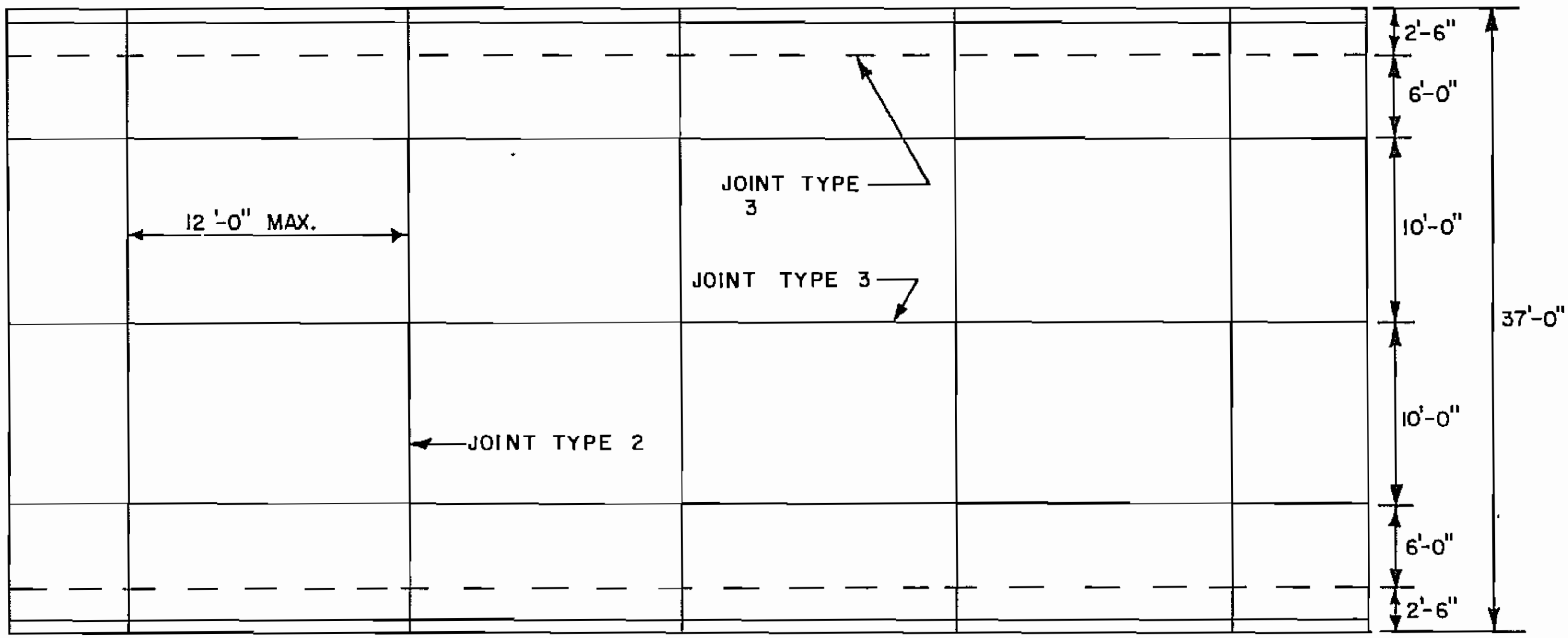


NOTE: ALL JOINTS NOT DESIGNATED WILL BE TYPE 4 OR 5

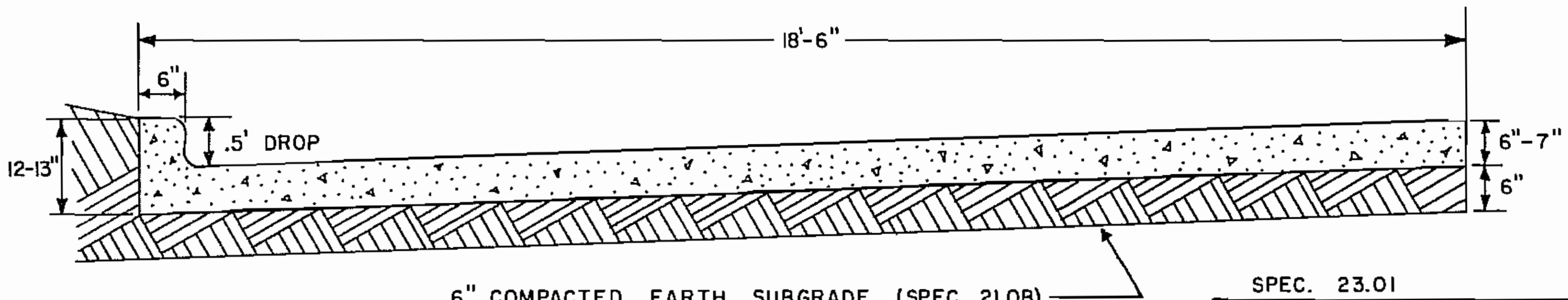
SPEC. 23.01

REV. 2/90 G.L.U.
REV. 3/85 G.L.U.
REV. 2/83 G.L.U.
REV. 3/77 B.J.B.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 31' CONCRETE STREET JOINT LAYOUT & CROSS - SECTION		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/76



NOTE: DASH LINES SHOW TYPICAL LAYOUT FOR SEPARATE CURB & GUTTER



NOTE: ALL JOINTS NOT DESIGNATED WILL BE TYPE 4 OR 5.

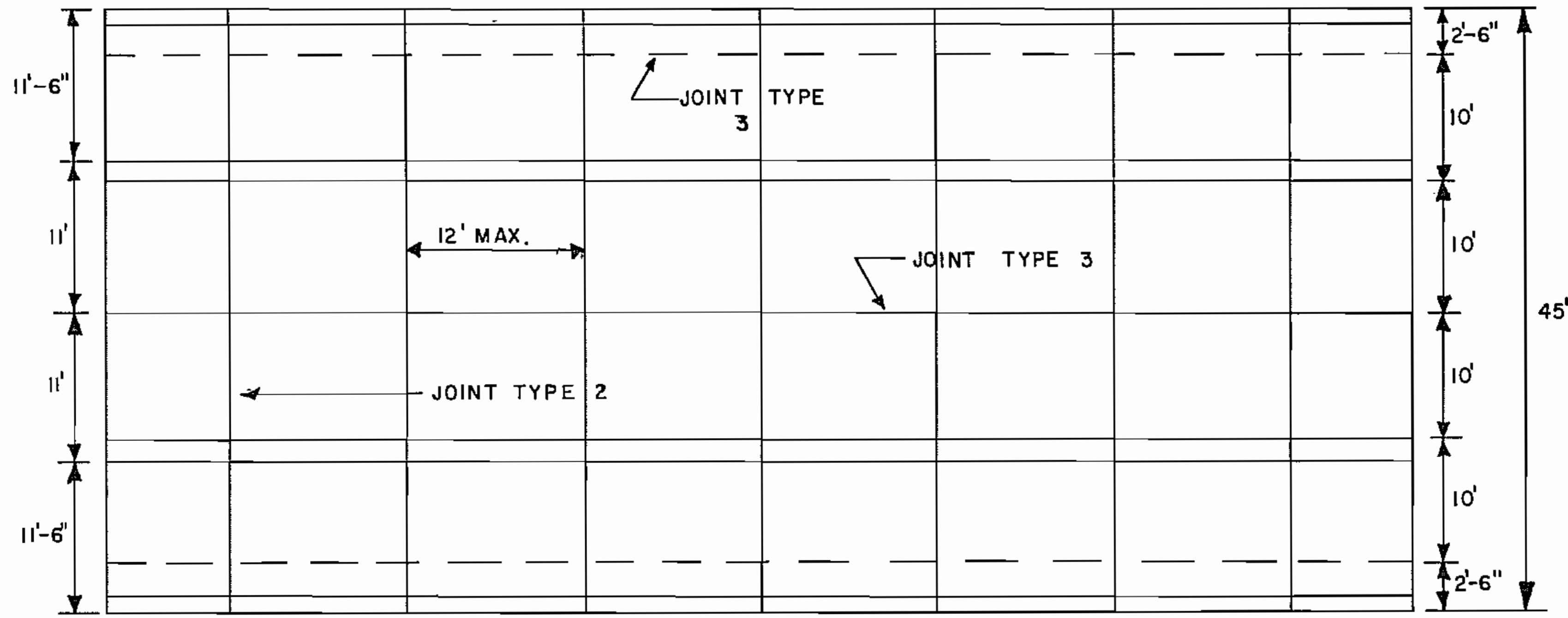
SPEC. 23.01

REV. 2/90 G.L.U.
REV. 3/85 G.L.U.
REV. 2/83 G.L.U.

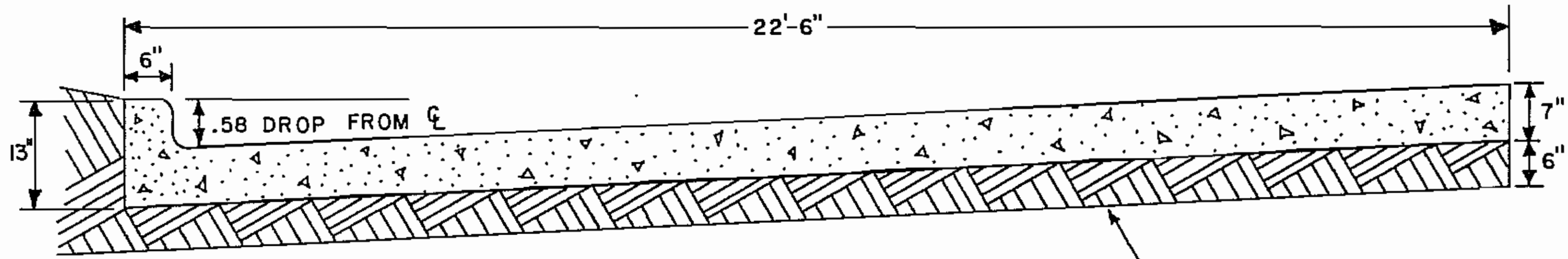
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

TYPICAL 37' CONCRETE STREET
JOINT LAYOUT & CROSS-SECTION

CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76



NOTE : DASH LINES SHOW TYPICAL LAYOUT FOR SEPARATE CURB & GUTTER



6" COMPACTED EARTH SUBGRADE (SPEC. 21.08)

NOTE : ALL JOINTS NOT DESIGNATED WILL BE TYPE 4 OR 5.

SPEC. 23.01

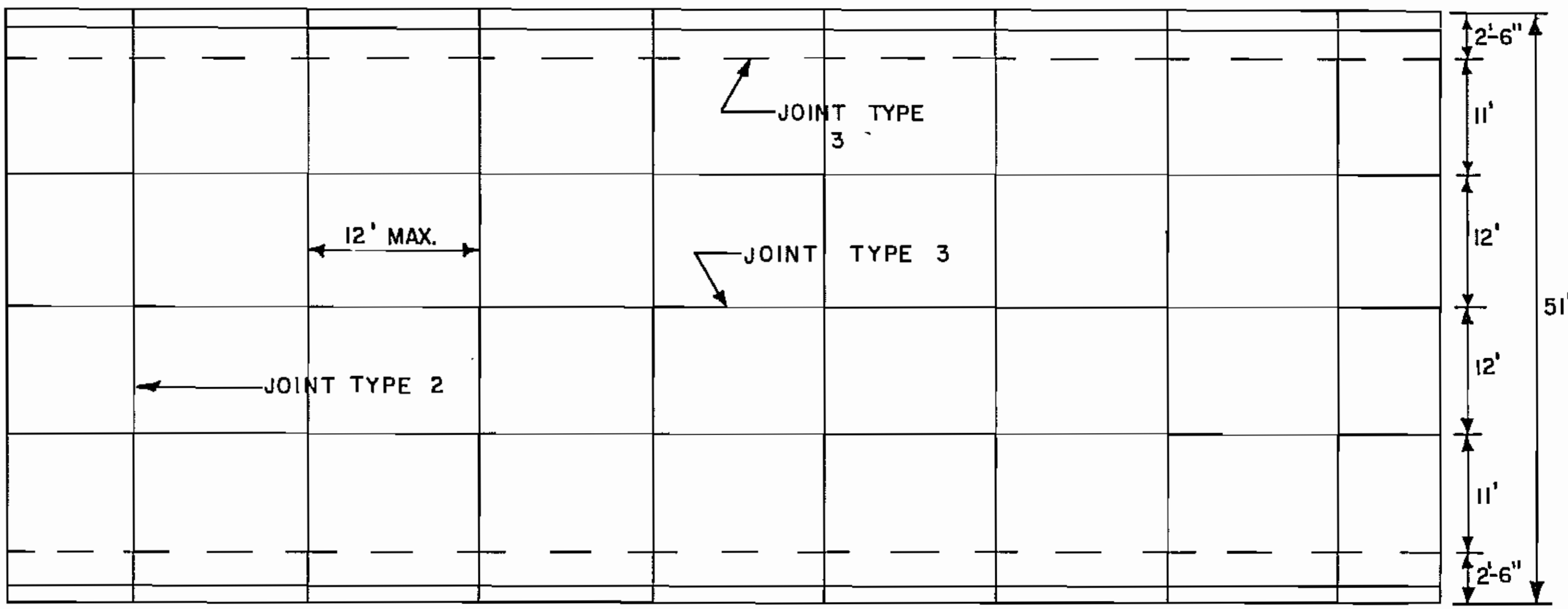
REV. 2/90 G.L.U.
REV. 3/85 G.L.U.
REV. 2/83 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

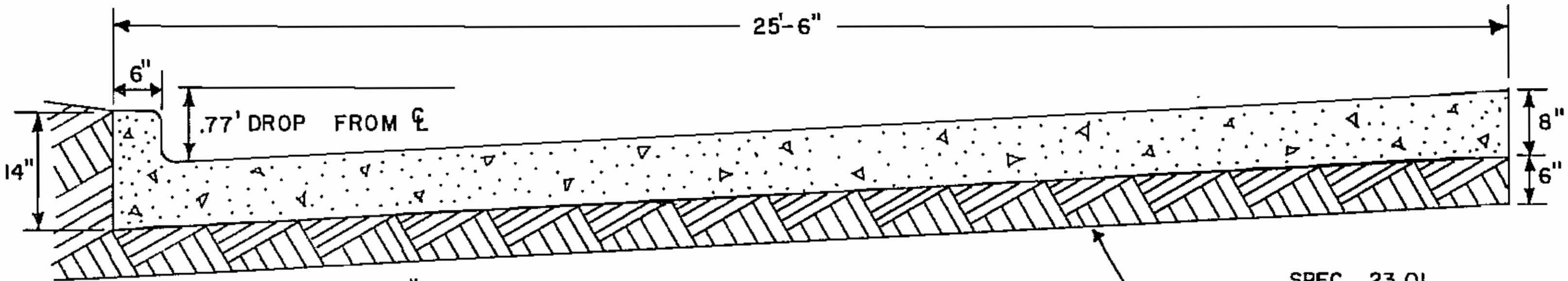
TYPICAL 45' CONCRETE STREET
JOINT LAYOUT & CROSS-SECTION

CITY ENGR F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76

61.03



NOTE: DASH LINES SHOW TYPICAL LAYOUT FOR SEPARATE CURB & GUTTER



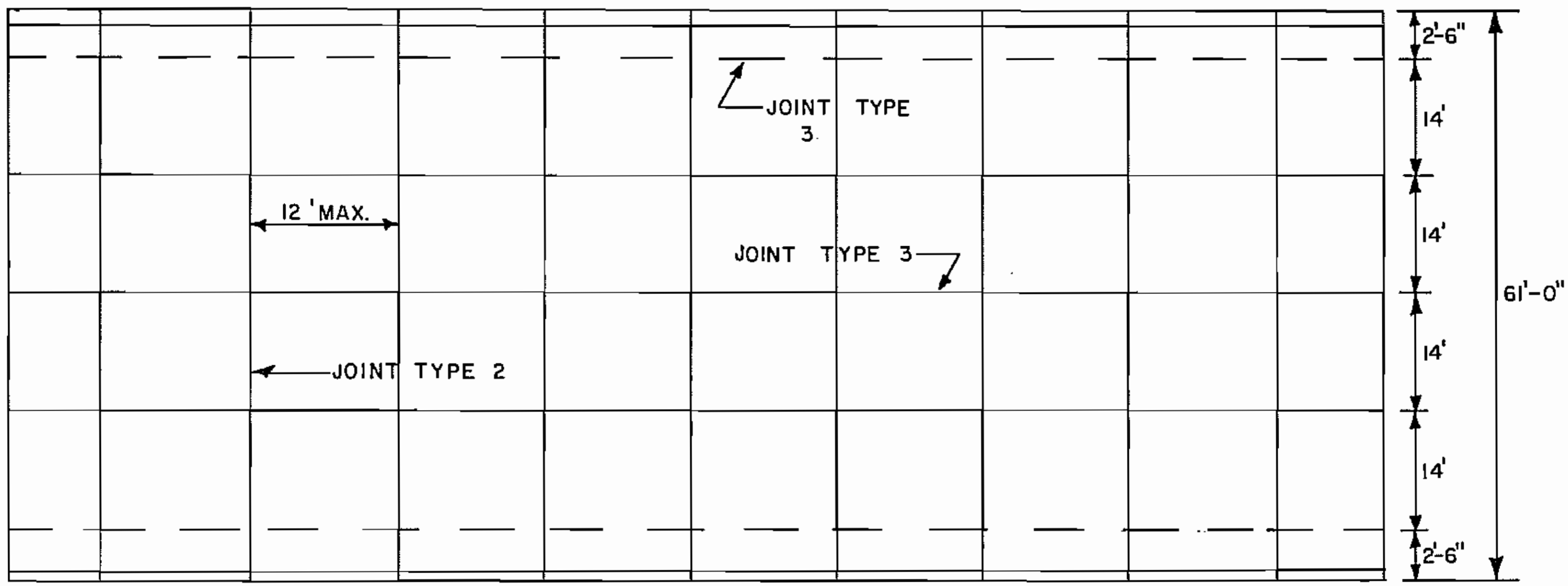
NOTE: ALL JOINTS NOT DESIGNATED WILL BE TYPE 4 OR 5.

SPEC. 23.01

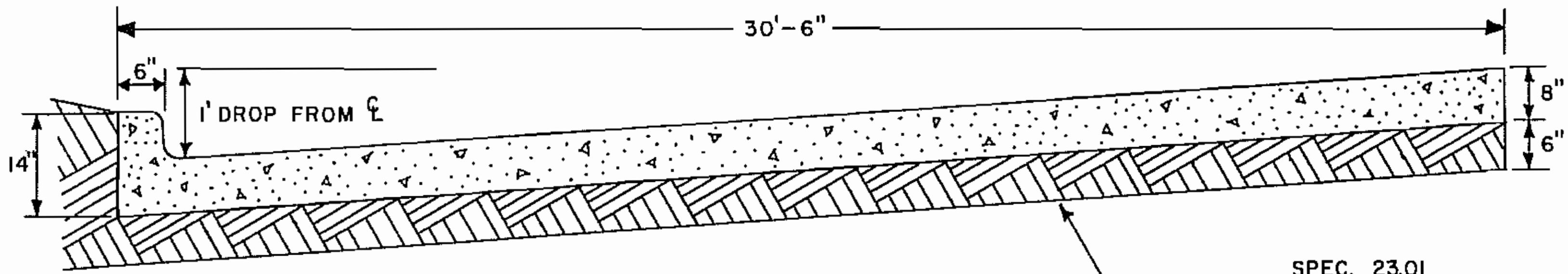
REV. 2/90 G.L.U.
REV. 3/85 G.L.U.
REV. 2/83 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 51' CONCRETE STREET JOINT LAYOUT & CROSS-SECTION		
CITY ENGR. F.B.Q.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76

61.04



NOTE: DASH LINES SHOW TYPICAL LAYOUT FOR SEPARATE CURB & GUTTER



6" COMPACTED EARTH SUBGRADE (SPEC. 21.08)

NOTE: ALL JOINTS NOT DESIGNATED WILL BE TYPE 4 OR 5.

SPEC. 23.01

REV. 2/90 G.L.U.
REV. 3/85 G.L.U.
REV. 2/83 G.L.U.

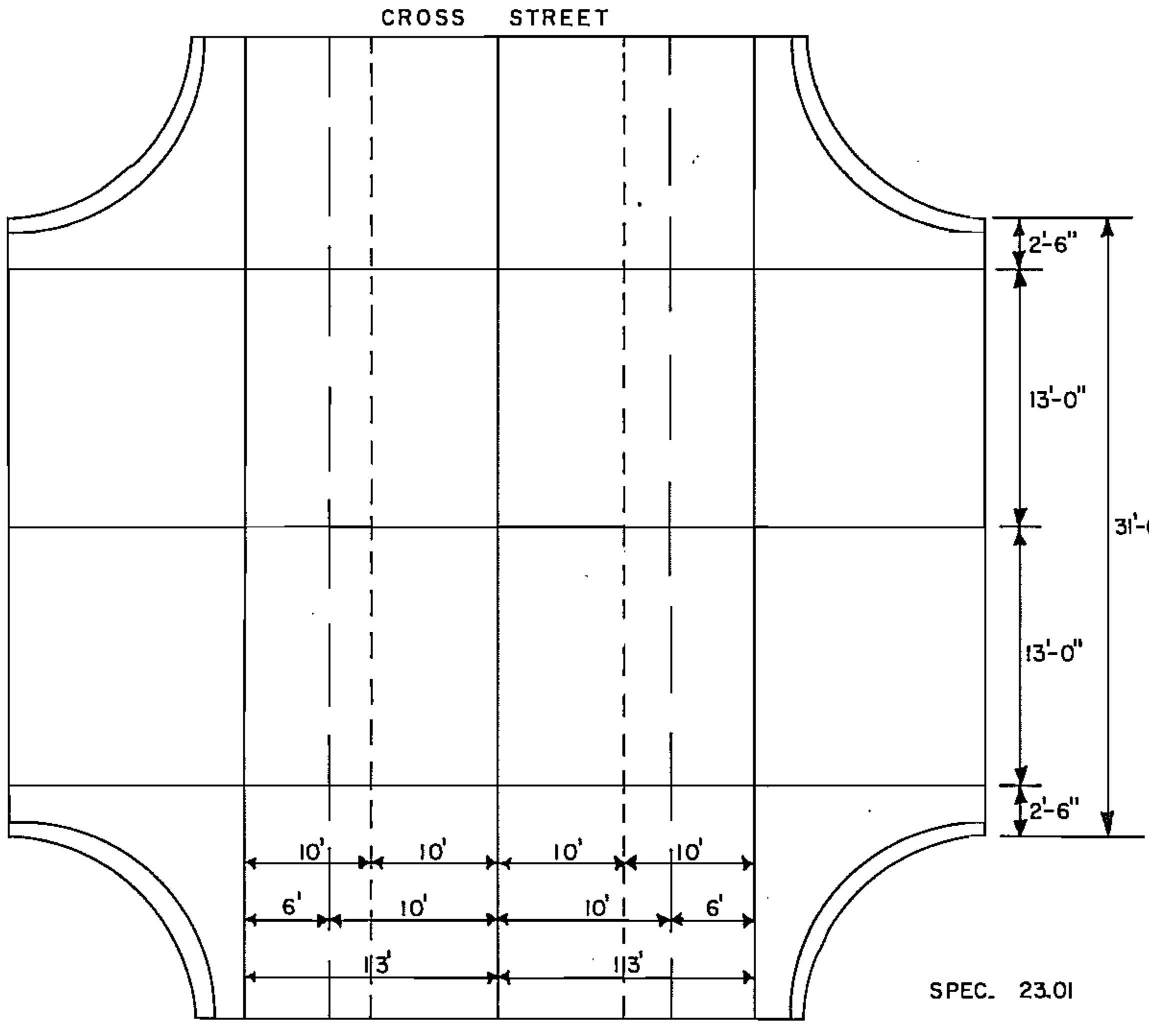
CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 61' CONCRETE STREET JOINT LAYOUT & CROSS – SECTION		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76

NOTE 1: SOLID LINES INDICATE 31' CROSS STREET. LONG DASH LINES INDICATE 37' CROSS STREET. SHORT DASH LINES INDICATE 45' CROSS STREET.

NOTE 2: INTERSECTION PAVEMENT THICKNESS IS TO BE THE SAME AS THE MAXIMUM THICKNESS OF THE INTERSECTING STREET.

NOTE 3: ALL JOINTS SHOWN SHALL BE TYPE 3, 4, OR 5 EXCEPT AS SPECIFIED IN NOTE 4.

NOTE 4: INTERSECTION SHALL BE COMPLETELY ISOLATED BY THE JOINT TYPE 8.



SPEC. 23.01

REV. 3/85 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 31' CONCRETE STREET INTERSECTION & JOINT LAYOUT		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76

NOTE 1: SOLID LINES INDICATE 31' CROSS STREET. LONG DASH LINES INDICATE 37' CROSS STREET. SHORT DASH LINES INDICATE 45' CROSS STREET.

NOTE 2: INTERSECTION PAVEMENT THICKNESS IS TO BE THE SAME AS THE MAXIMUM THICKNESS OF THE INTERSECTING STREET.

NOTE 3: ALL JOINTS SHOWN SHALL BE TYPE 3, 4, OR 5 EXCEPT AS SPECIFIED IN NOTE 4.

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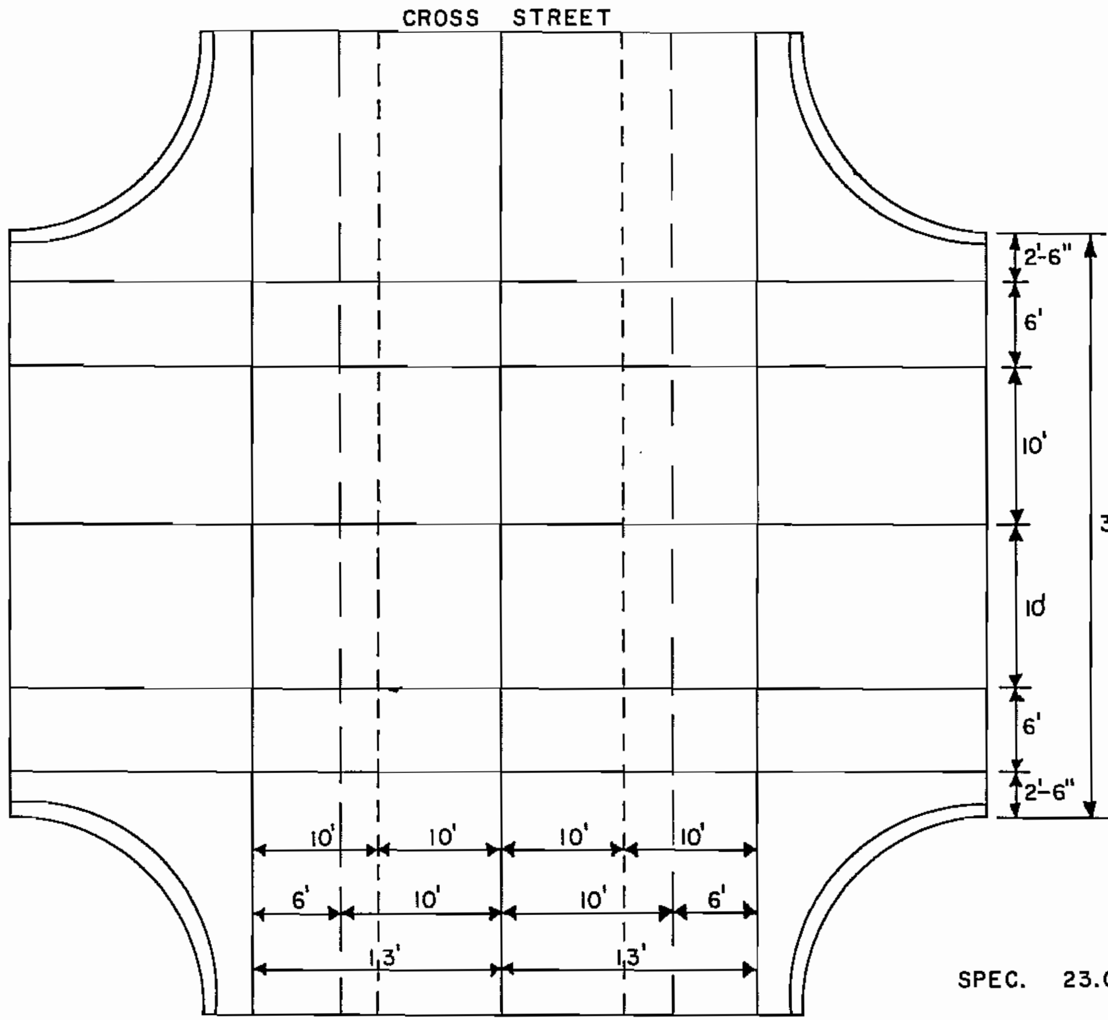


SPEC. 23.01

REV. 3/85 G.L.U.

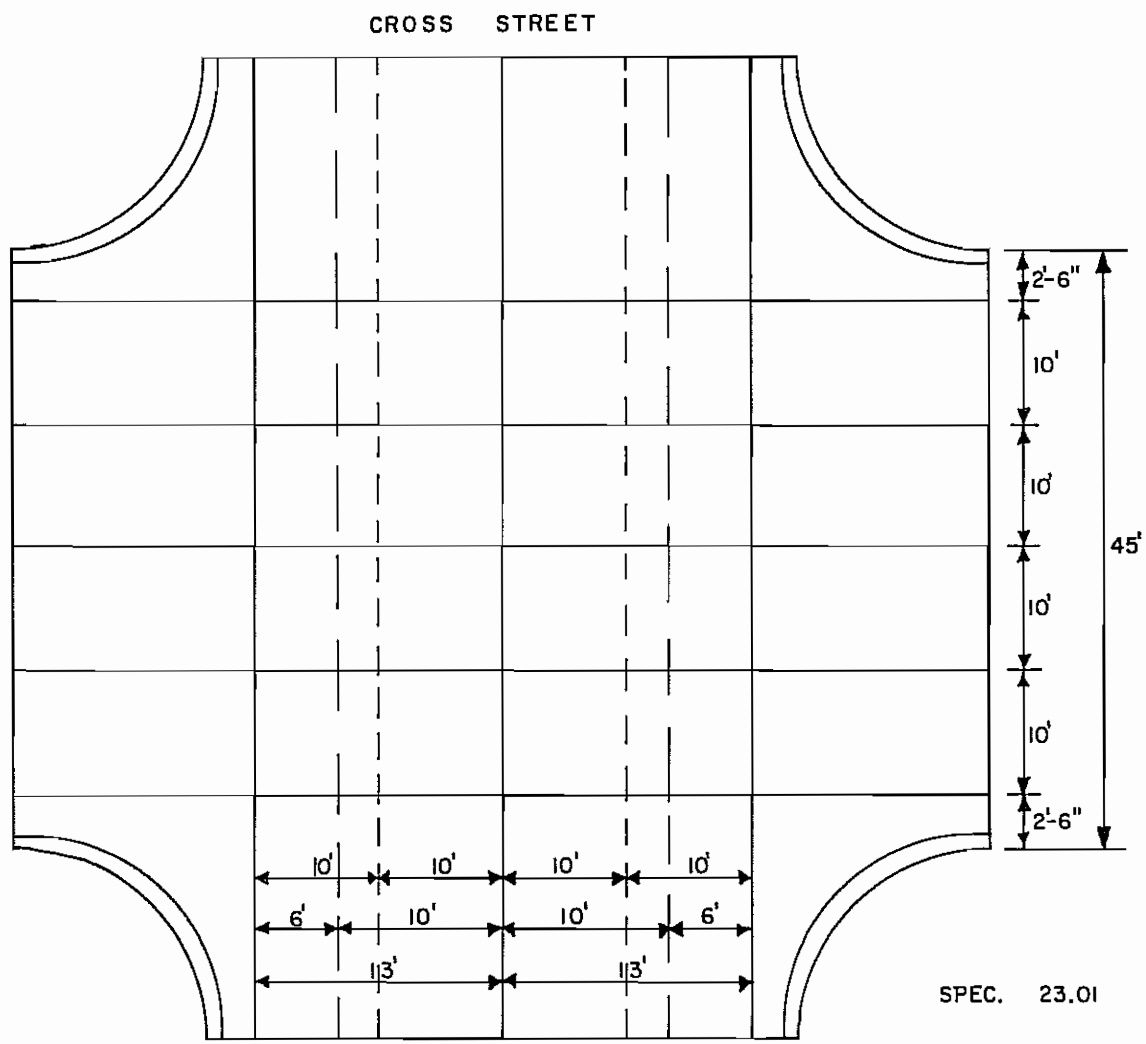
CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 37' CONCRETE STREET INTERSECTION & JOINT LAYOUT		
CITY ENGR. F.B.Ø.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/76

NOTE 1: SOLID LINES INDICATE 31' CROSS STREET. LONG DASH LINES INDICATE 37' CROSS STREET. SHORT DASH LINES INDICATE 45' CROSS STREET.

NOTE 2: INTERSECTION PAVEMENT THICKNESS IS TO BE THE SAME AS THE MAXIMUM THICKNESS OF THE INTERSECTING STREET.

NOTE 3: ALL JOINTS SHOWN SHALL BE TYPE 3, 4, OR 5 EXCEPT AS SPECIFIED IN NOTE 4.

NOTE 4: INTERSECTION SHALL BE COMPLETELY ISOLATED BY THE JOINT TYPE 8.



SPEC. 23.01

REV. 3/85 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 45' CONCRETE STREET INTERSECTION & JOINT LAYOUT		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76

NOTE 1: SOLID LINES INDICATE 31' CROSS STREET. LONG DASH LINES INDICATE 37' CROSS STREET. SHORT DASH LINES INDICATE 45' CROSS STREET.

NOTE 2: INTERSECTION PAVEMENT THICHNESS IS TO BE THE SAME AS THE MAXIMUM THICKNESS OF THE INTERSECTING STREET.

NOTE 3: ALL JOINTS SHOWN SHALL BE TYPE 3, 4, OR 5 EXCEPT AS SPECIFIED IN NOTE 4.

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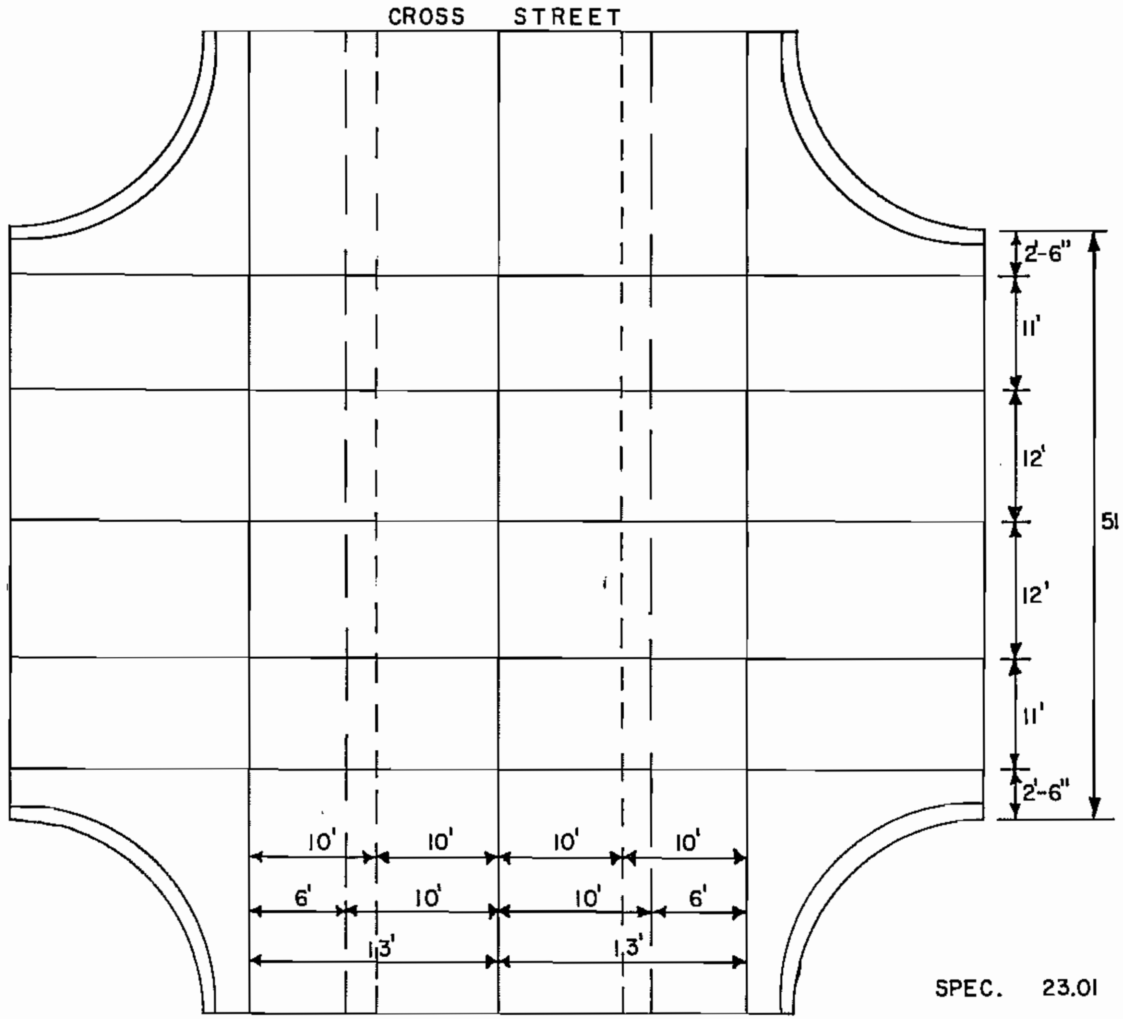


SPEC. 23.01

REV. 3/85 G.L.U.

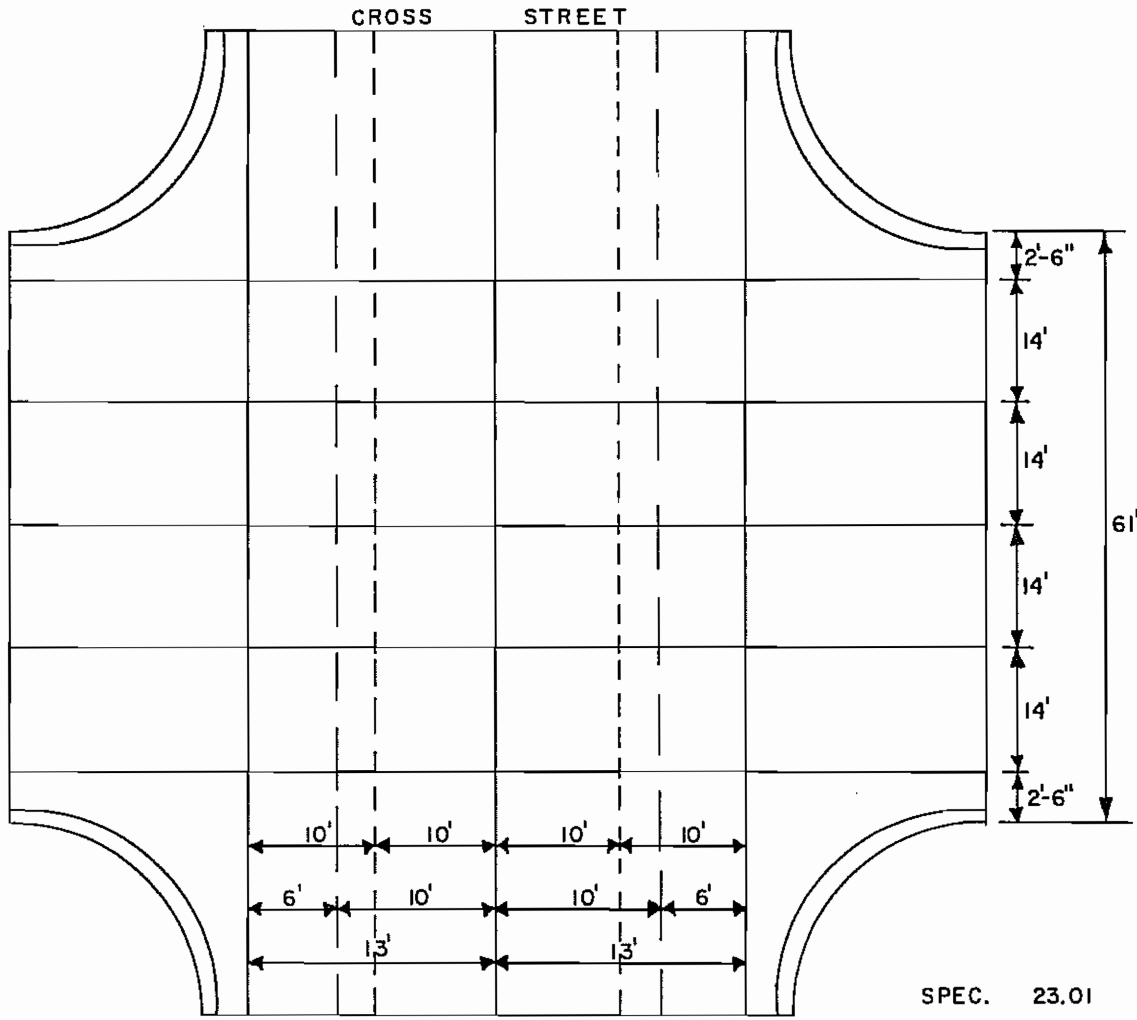
CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 51' CONCRETE STREET INTERSECTION & JOINT LAYOUT		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3 / 76

NOTE 1: SOLID LINES INDICATE 31' CROSS STREET. LONG DASH LINES INDICATE 37' CROSS STREET. SHORT DASH LINES INDICATE 45' CROSS STREET.

NOTE 2: INTERSECTION PAVEMENT THICKNESS IS TO BE THE SAME AS THE MAXIMUM THICKNESS OF THE INTERSECTING STREET.

NOTE 3: ALL JOINTS SHOWN SHALL BE TYPE 3, 4, OR 5 EXCEPT AS SPECIFIED IN NOTE 4.

NOTE 4: INTERSECTION SHALL BE COMPLETELY ISOLATED BY THE JOINT TYPE 8.

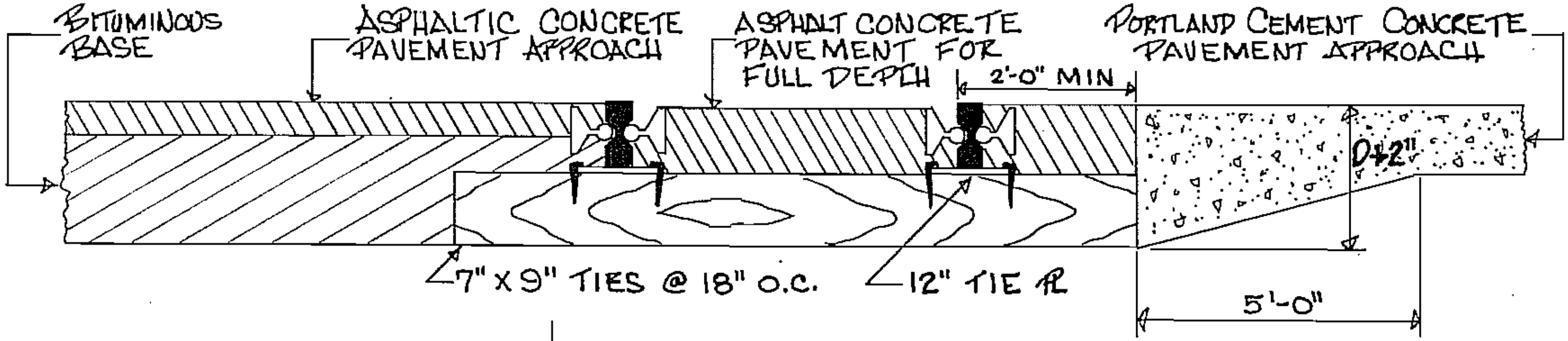


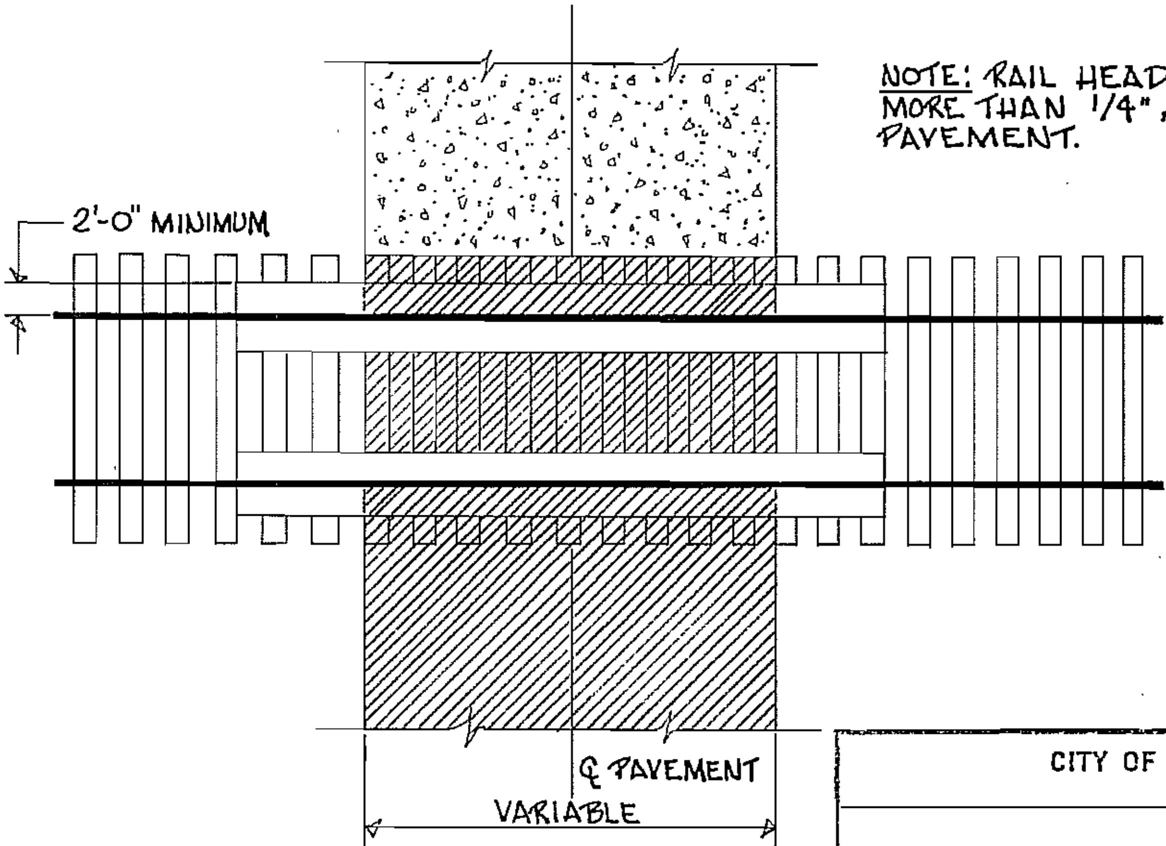
SPEC. 23.01

REV. 3/85 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL 61' CONCRETE STREET INTERSECTION & JOINT LAYOUT		
CITY ENGR. F.B.Q.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/76

61.10





NOTE: RAIL HEAD MUST NOT PROTRUDE MORE THAN 1/4" ABOVE APPROACH PAVEMENT.

NOTE: RAILWAY COMPANY WILL ATTEND TO ALL ADJUSTMENTS & REPAIR TO TRACKS, INCLUDING INSTALLATION OF FLANGE RAILS, FLANGE RAIL CHAIRS, OR OTHER SUPPORTS AND STRAPS, PRIOR TO CROSSING INSTALLATION.

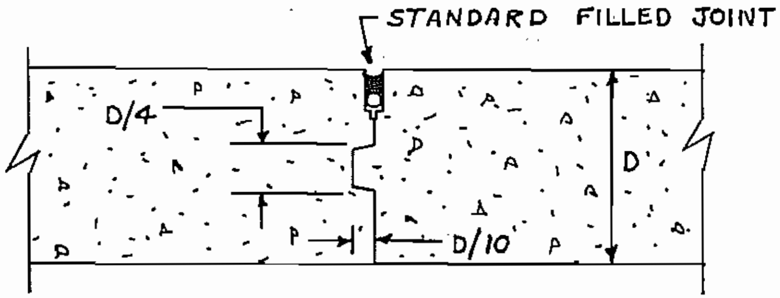
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

STANDARD RAILROAD CROSSING

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970

SPEC 23.01

TYPE 1



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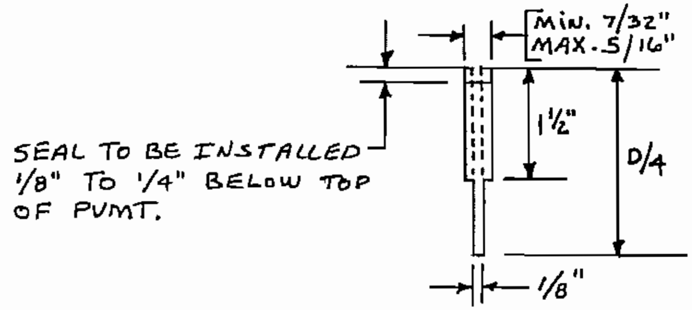

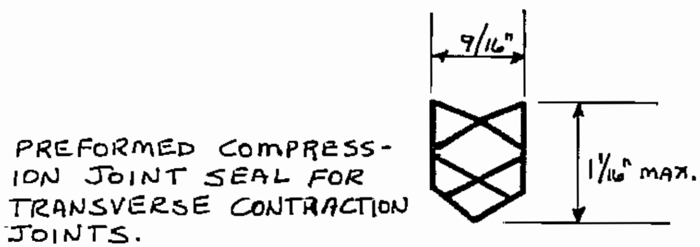

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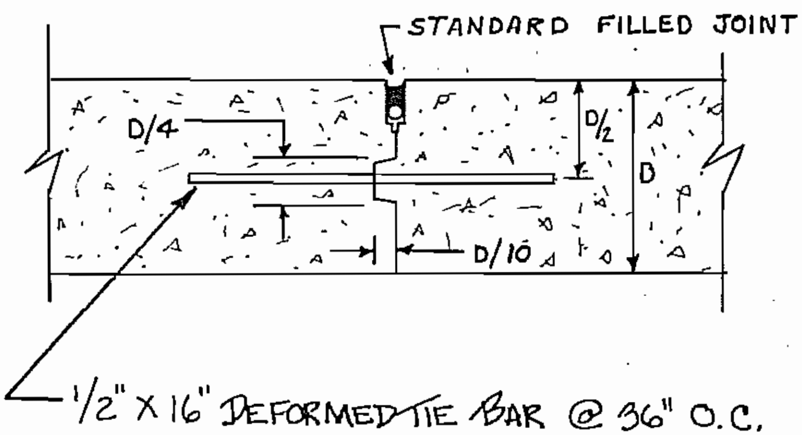
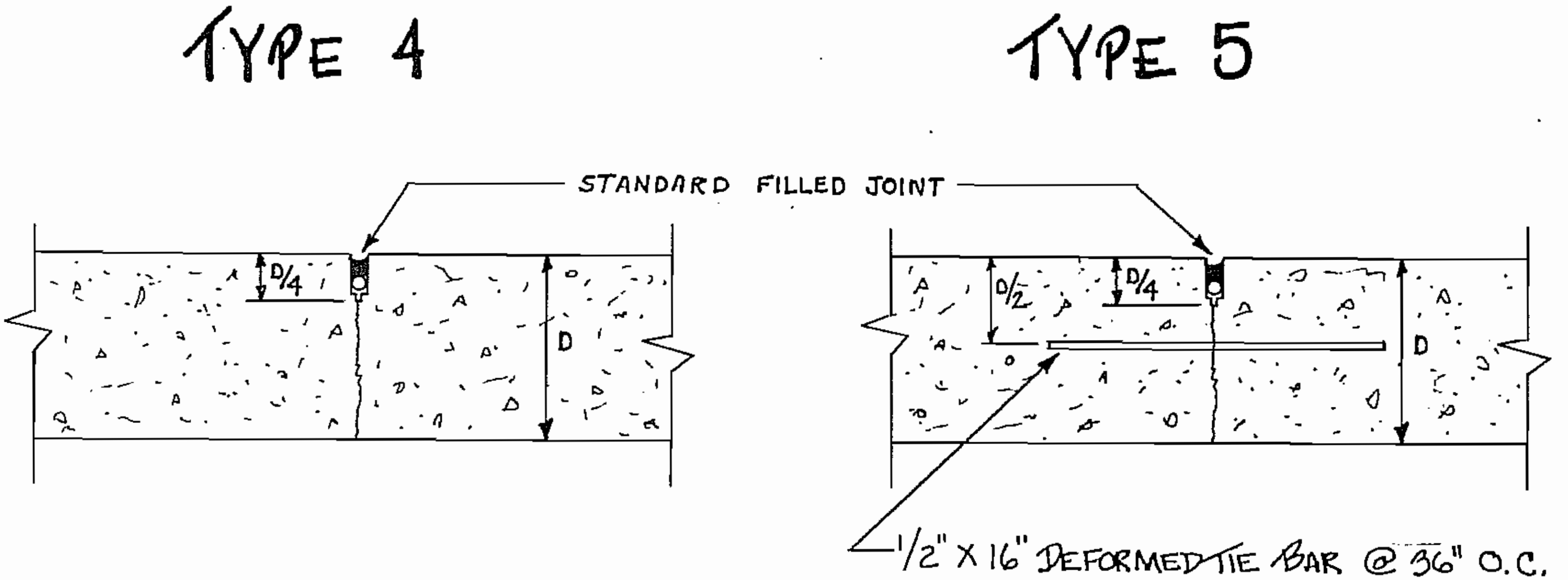


REV 2/90 G.U.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

JOINTS

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970



SPEC 23.01

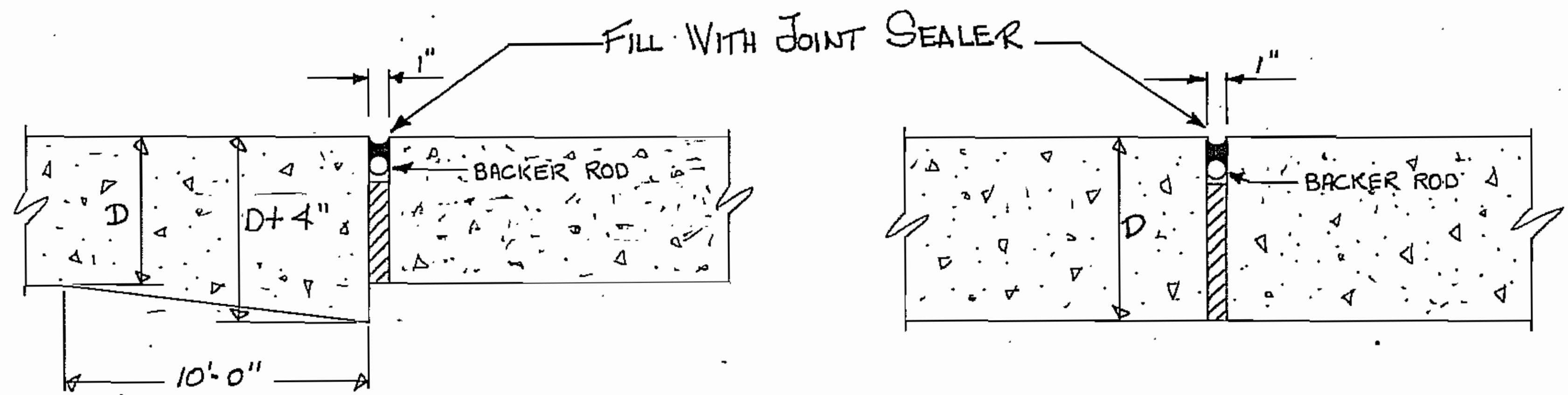
REV. 2/90 G.L.U.
REV. 3/85 G.L.U.
REVISED MARCH 74

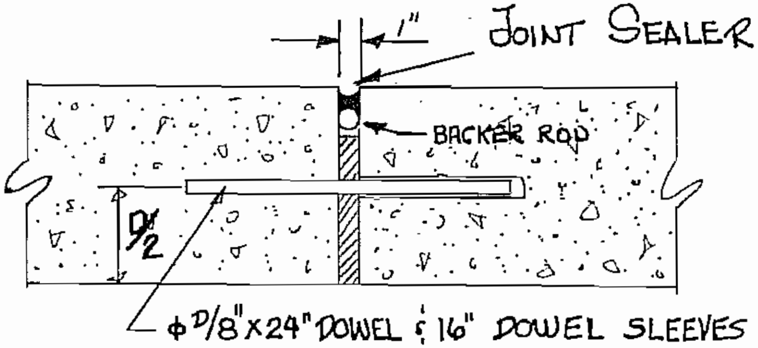
CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
JOINTS		
CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: J. K. J.	DATE: APRIL 1, 1970

62.02

TYPE 6

TYPE 7





TYPE 8

<u>NOTE:</u> FOR TYPE 8 JOINT USE D/8" X 24" SMOOTH DOWELS AND 16" DOWEL SLEEVES. DOWELS SHALL BE GREASED THE FULL LENGTH. ALL DOWEL SLEEVES SHALL BE PLUGGED OR CRIMPED ON OPEN END. ALL JOINTS SHALL BE SEALED. DOWELS SHALL BE SUPPORTED BY AN APPROVED SUPPORT MADE OF NO.7 AWG WIRE, SPACED 12" O.C. UNLESS OTHERWISE SHOWN ON THE PLANS.

REV. 2/90 G.L.U.
REV. 3/85 G.L.U.

REVISED MARCH 74

SPEC 23.01

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

ISOLATION JOINTS

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY:	CHECKED BY: J. K. J.	DATE: APRIL 1, 1970

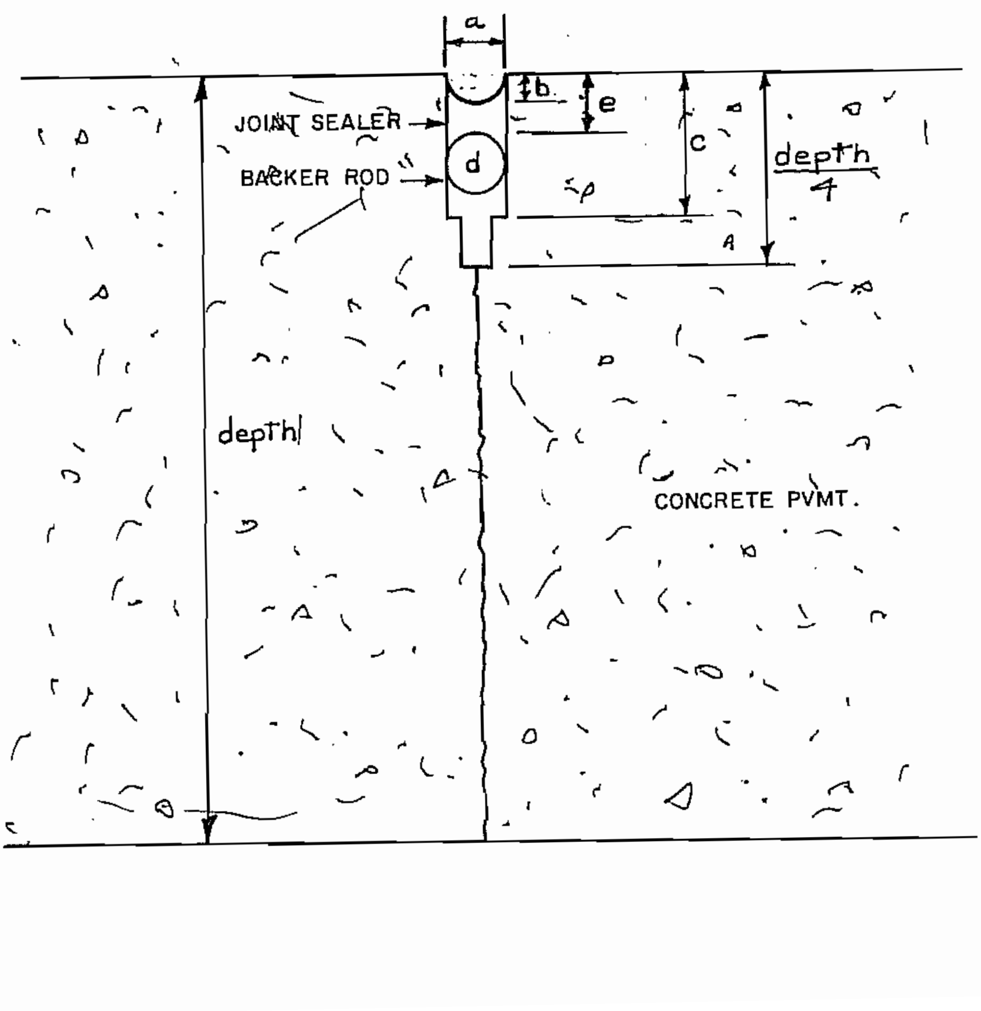
62.03

a Joint Width, Inches	b Sealant Bead Thickness Inches	c Minimum Joint Depth Inches	d Backer Rod Diameter, Inches	e Backer Rod Placement Depth Inches
1/4	1/4	1	3/8	1/2
*3/8	1/4	1 1/4	1/2	1/2
1/2	1/4	1 1/4	5/8	1/2
5/8	5/16	1 1/2	3/4	9/16
3/4	3/8	1 3/4	1	7/8
7/8	7/16	1 7/8	1	11/16
1	1/2	2	1¼	3/4
1	1/2	2+	1¼+	3/4

*Standard joint width unless otherwise noted.

NOTE: Joint sealer shall be hot poured or low-modulus silicone.

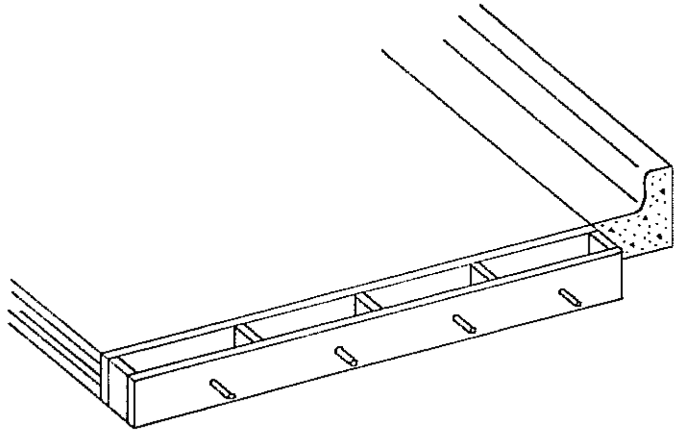
STANDARD FILLED JOINT



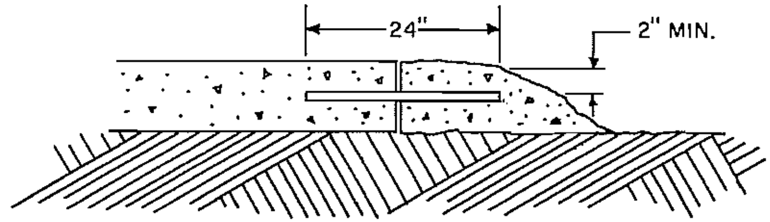
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

STANDARD FILLED JOINT

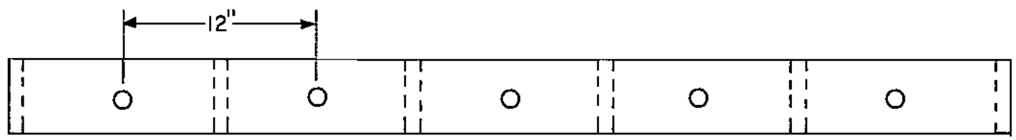
CITY ENGR.	F.B.O	DRAWN BY:	G.L.U.
APPROVED BY:	[signature]	CHECKED BY:	[signature]
SCALE: NONE		DATE: 2/90	



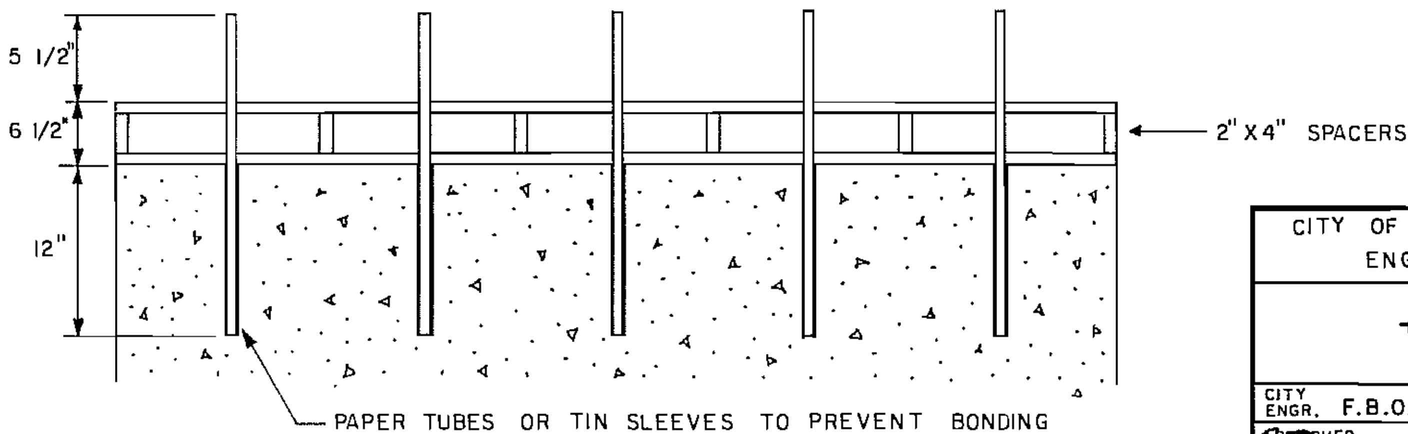
Dowel Bars are to be completely covered with concrete at all terminal joints. 1" expansion board is to be used to prevent bond. Dowels are to be fully greased.



Header Material:
2" x 6" with 3/4" Dowels for 6" pavement.
2" x 8" with 7/8" Dowels for 7" pavement.

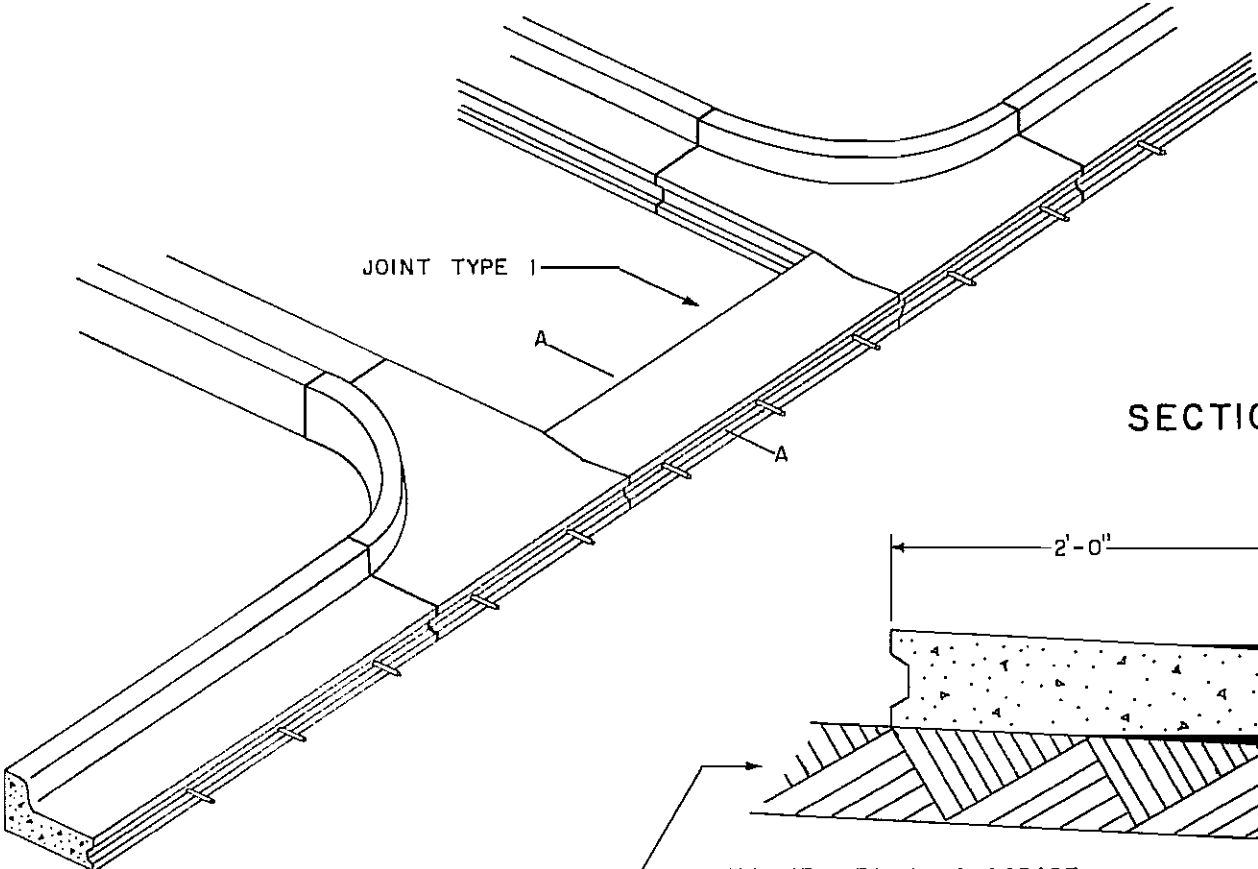


All materials shall be made available for inspection prior to construction.

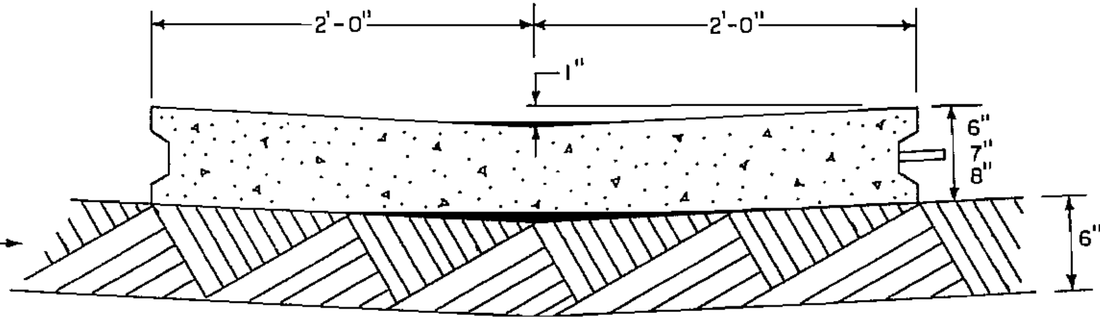


REV. 2/90 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPE 8 JOINT FORM		
CITY ENGR. F.B.O.	DRAWN BY: B. J. B.	SCALE: NONE
APPROVED	CHECKED BY:	DATE: 3/77



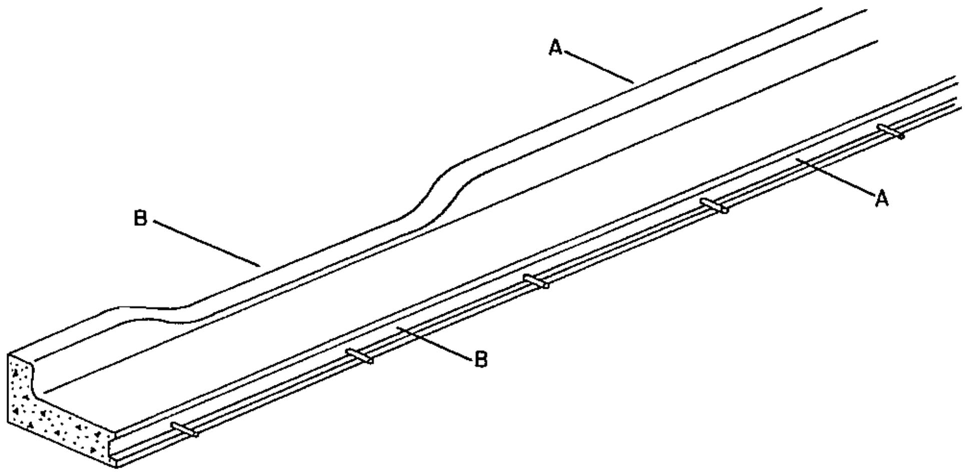
SECTION A-A



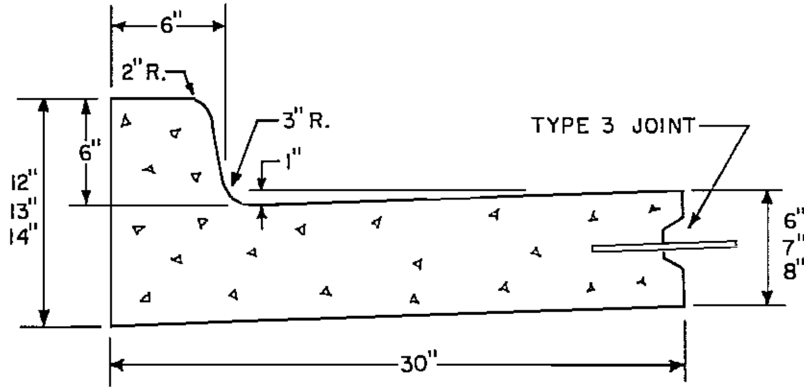
NOTE 1: Maximum panel length within valley gutter shall be 13'-0".
2: Valley gutter shall be bound on both ends by Type 3 Joints.
3: Joint of Face Side shall match adjacent joint type.
4: Joint on Back Side shall be Type I.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
TYPICAL VALLEY GUTTER		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/77

63 01

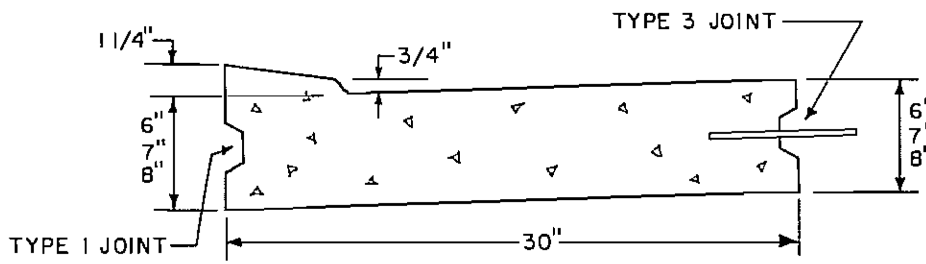


SECTION A-A



FULL CURB

SECTION B-B

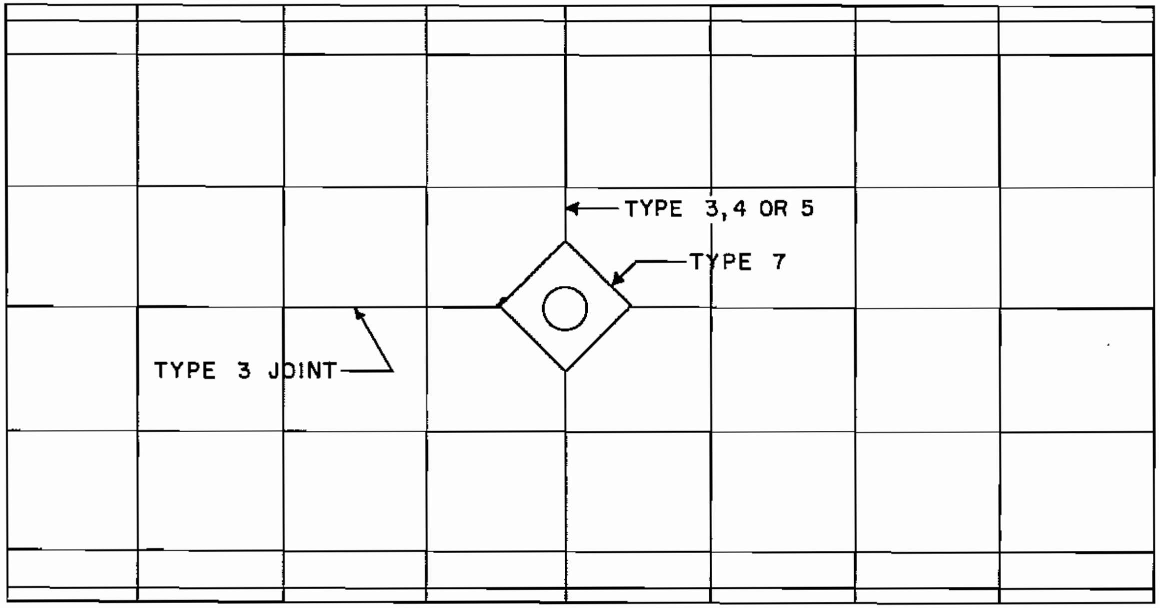


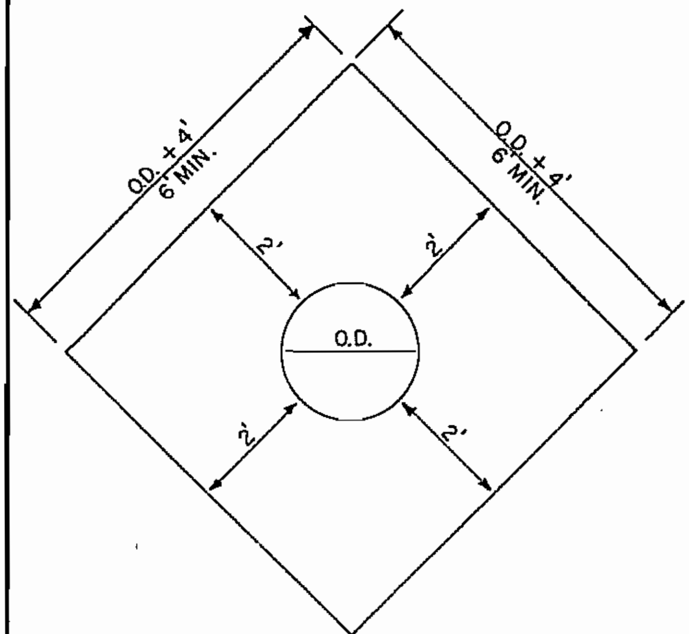
DEPRESSED CURB

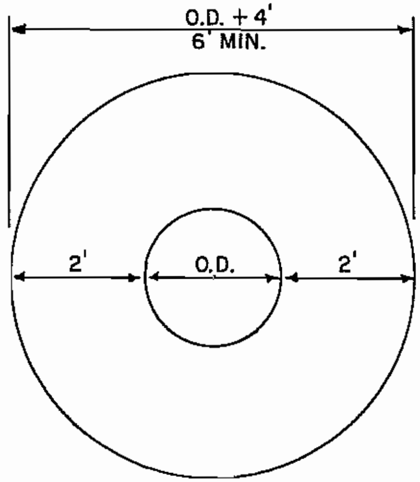
(TYPICAL FOR DRIVEWAY OR ALLEY)

REV. 2/83 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
CURB & GUTTER DETAILS		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE 3/77







NOTE: SEE PLATE NO. 65.01 FOR CATCH BASIN ISOLATION DETAIL.

STANDARD M.H. DETAILS

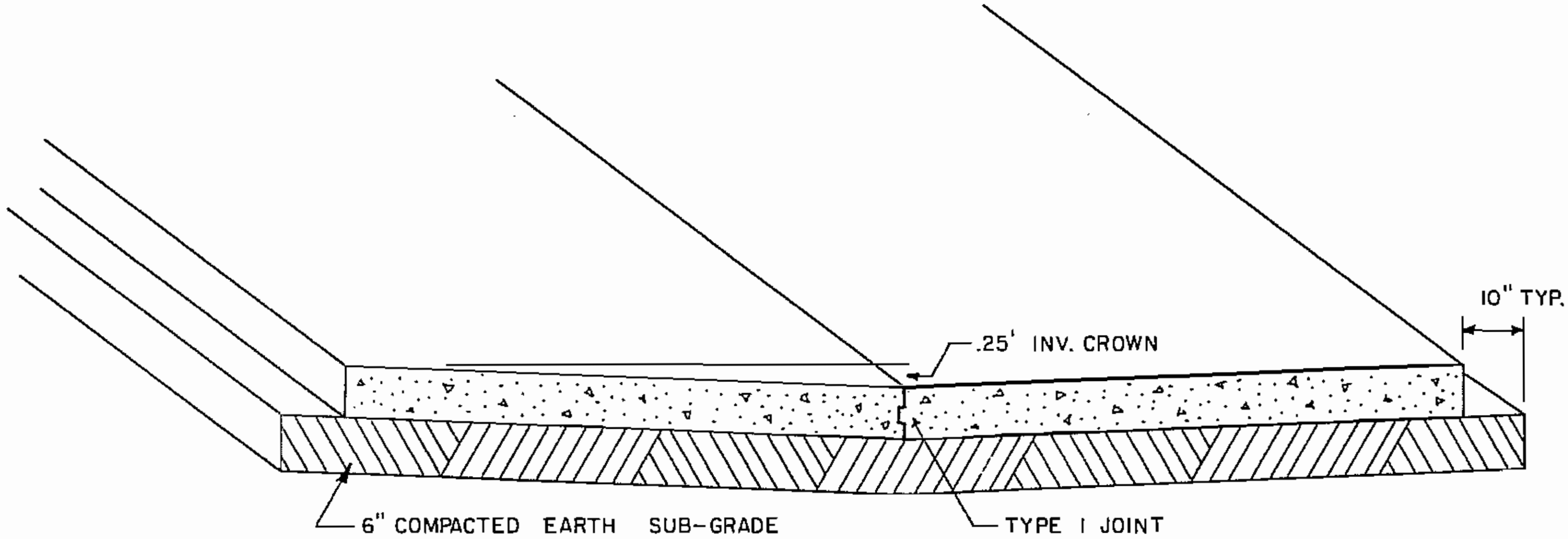
REV. 3/85 G.L.U.
REV. 3/77 B.J.B.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

MANHOLE ISOLATION DETAIL

CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/76

63.03



NOTE 1: LONGITUDINAL JOINTS SHALL BE SPACED 10' MAX.

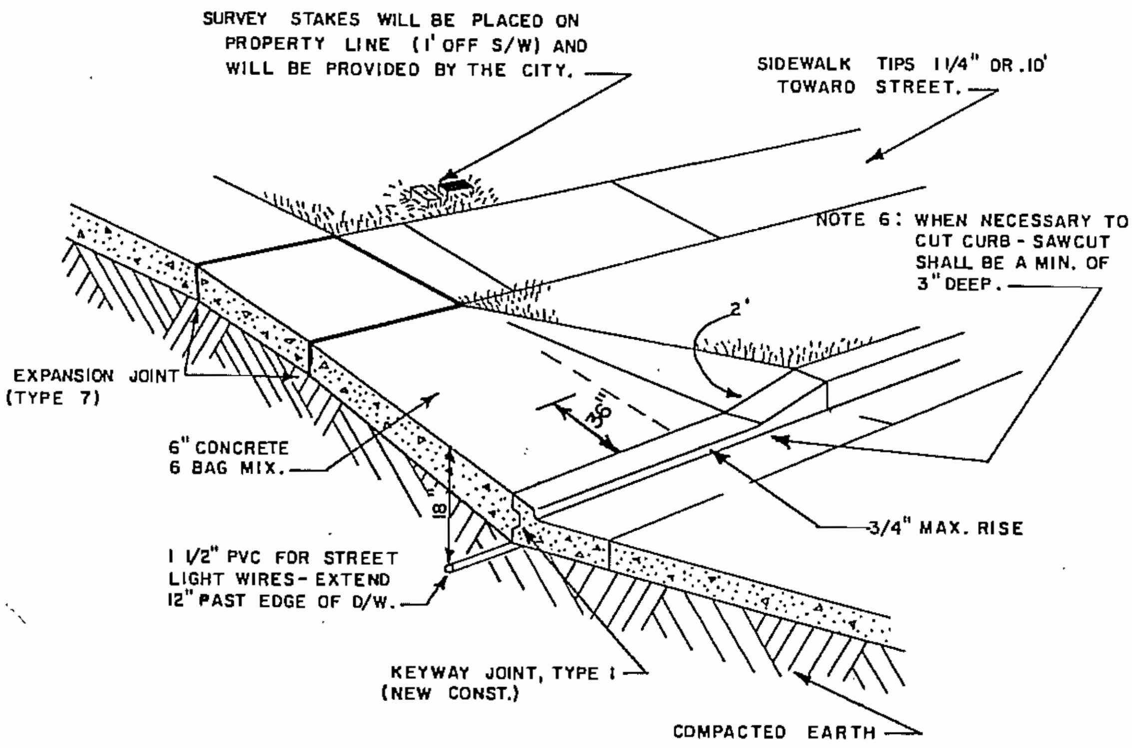
NOTE 2: TRANSVERSE JOINTS SHALL BE TYPE 2 OR 4. SPACED 12' MAX.

SPEC. 23.01

REV. 2/90 G.L.U.
REV. 3/85 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
6" OR 8" CONCRETE ALLEY PVMT.		
CITY ENGR. F.B.O.	DRAWN BY: BJB	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [initials]	DATE: 3/77

64.01



1. D/W Widths - All residential D/W's - 30' max. @ S/W
   38' max. @ Street
   commercial D/W's - 30' max. @ S/W
   42' max. @ Street

2. Where necessary to remove existing curb, it must be sawcut or removed to an existing joint. The gutter sawcut shall be a minimum of 3 inches deep.

3. When two D/W's serve the same property, they shall be separated by:
   10' @ the S/W line for residential
   14' @ the S/W line for commercial

4. A common D/W to serve 2 properties may not be over 30' wide @ the S/W.

5. Contraction joints shall be provided in D/W approaches. Joints shall not exceed 12'.

6. On corner lots, the D/W shall be no closer than 15' @ the S/W from the property line for one and two family homes in a residential district, and shall be no closer than 50' @ the S/W from the property line for multiple family, business and industrial districts.

7. No use shall be permitted to take direct access to a collector street at any point within 120' of any intersection with another collector st. or an arterial st.

8. A 75' wide lot in a R-1 and R-2 zoning district with a 25' front yard set back and a 30' wide D/W will meet the restriction that no more than 40% of the front yard area may be paved or otherwise utilized for parking purposes.

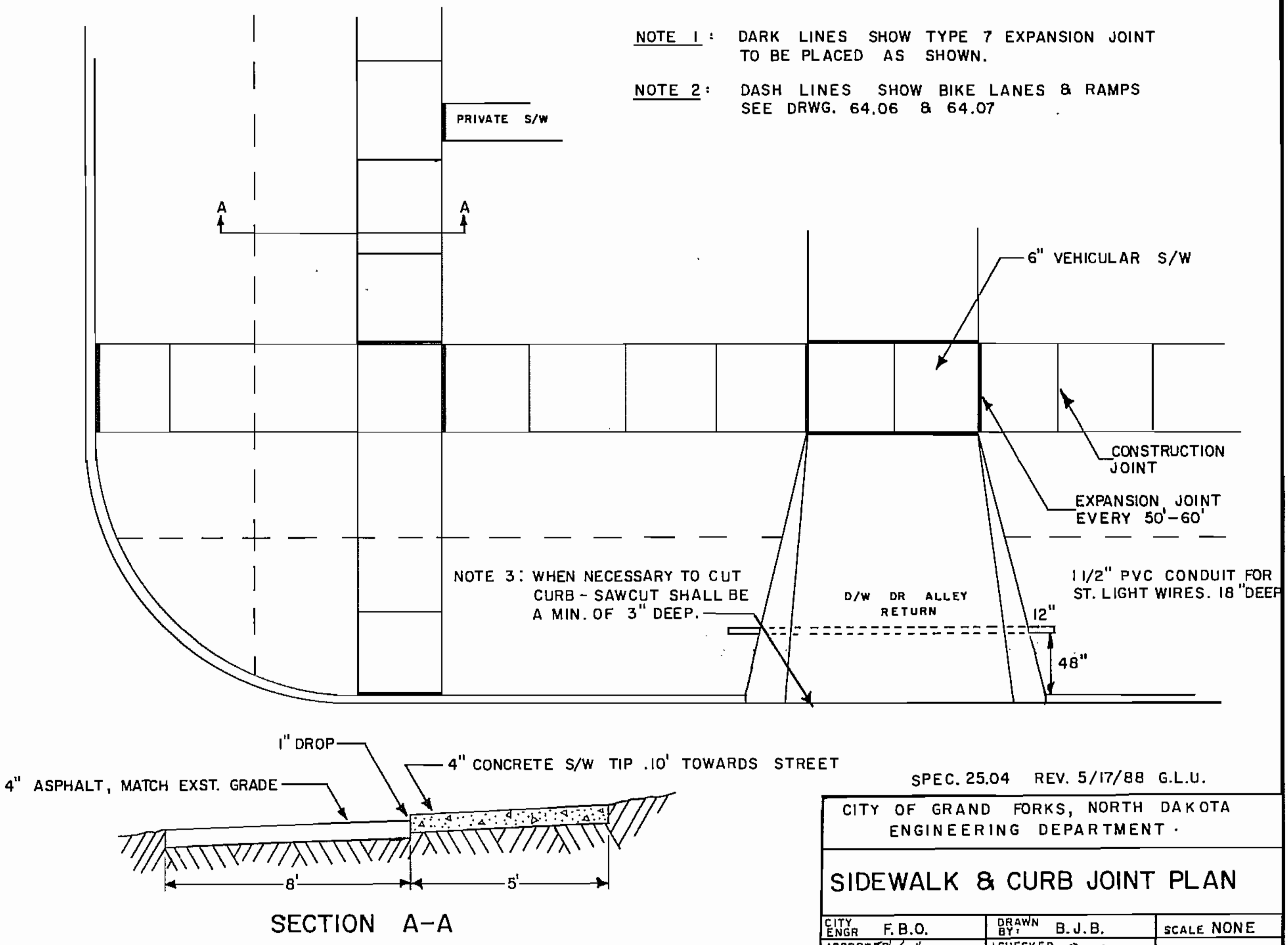
9. In all zoning districts except B-4, D/W's shall be no closer than 5' from the side and rear lot lines.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

TYPICAL DRIVEWAY DETAILS

CITY ENGR. F.8.O.	DRAWN BY: G.L.U.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: K. Ven	DATE: 2/28/90

64.02



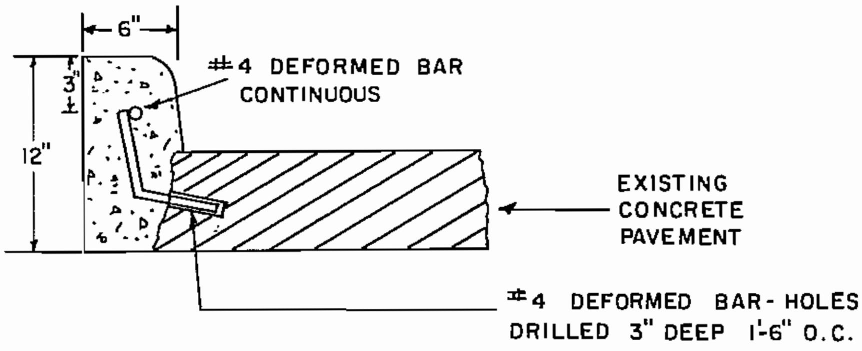
SPEC. 25.04 REV. 5/17/88 G.L.U.

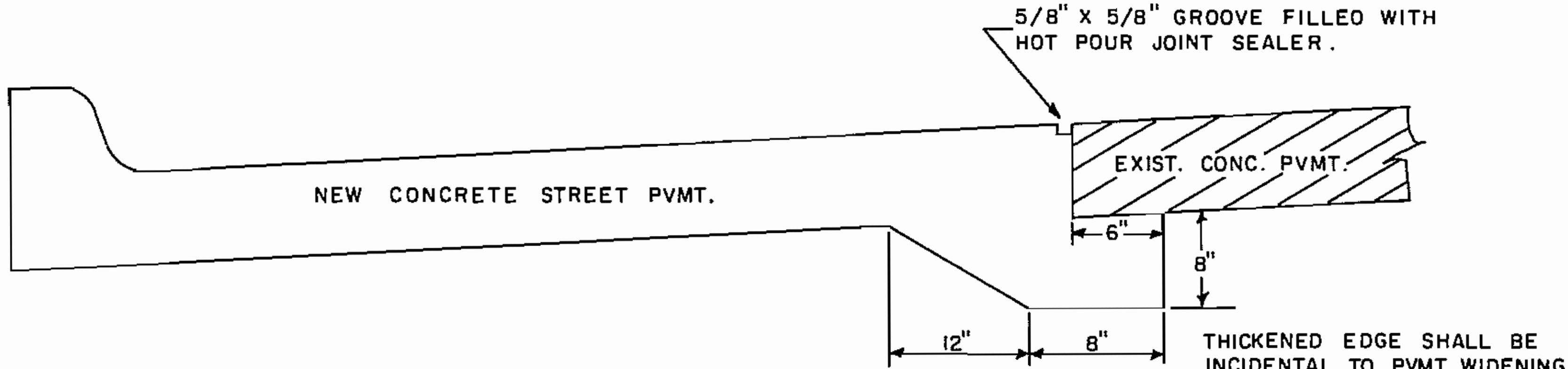
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT.

SIDEWALK & CURB JOINT PLAN

CITY ENGR F.B.O.	DRAWN BY: B.J.B.	SCALE NONE
APPROVED BY: [signature]	CHECKED BY: [initials]	DATE: 3/76

6" X 12" CURB



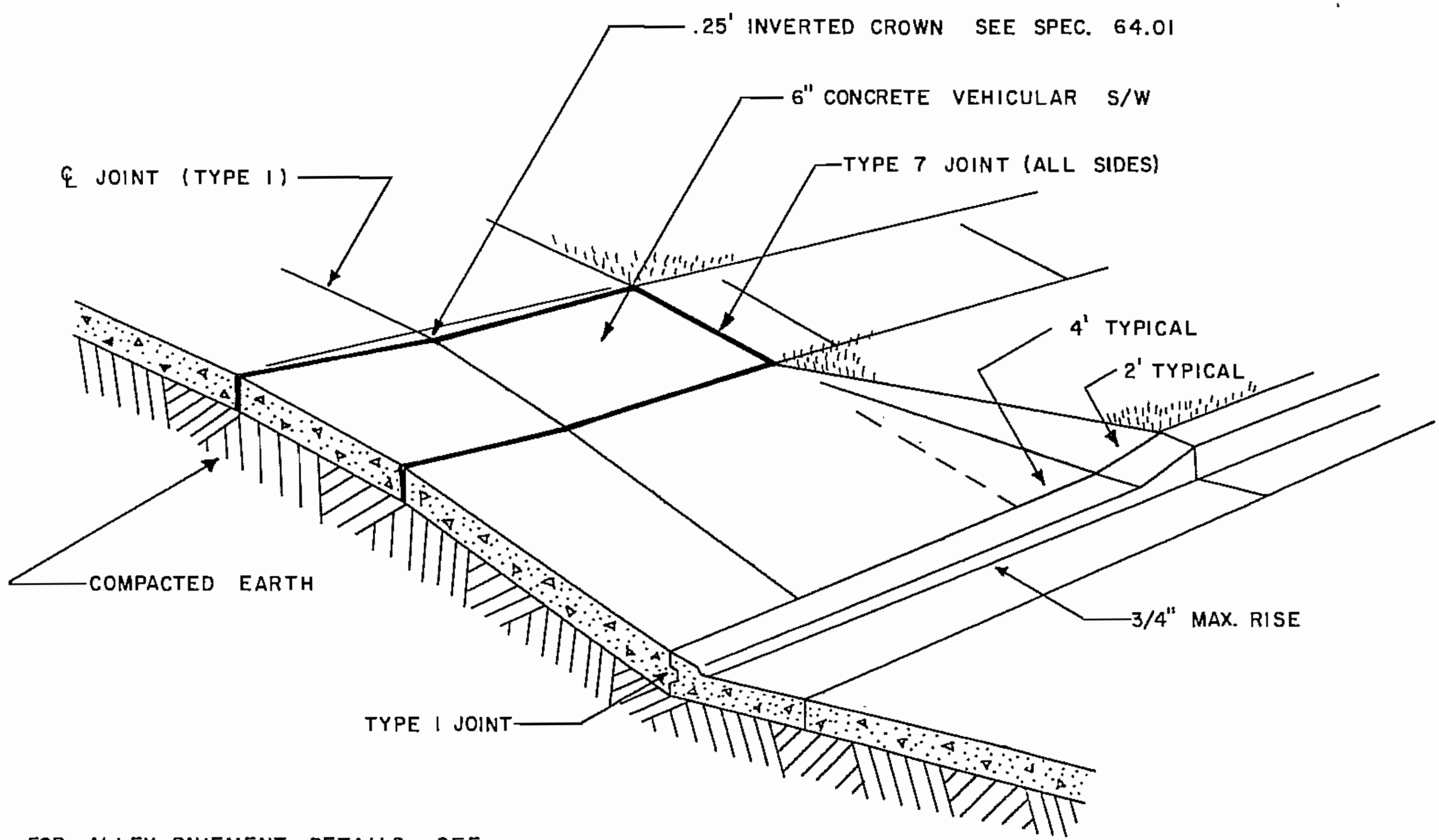


STREET WIDENING DETAIL

REV. 2/90 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
CONCRETE CURB & STREET WIDENING DETAIL		
CITY ENGR. F. B. ORTHMEYER	DRAWN BY: G.L.URNESS	SCALE: NONE
APPROVED BY:	CHECKED BY: K. Vein	DATE: 2/21/85

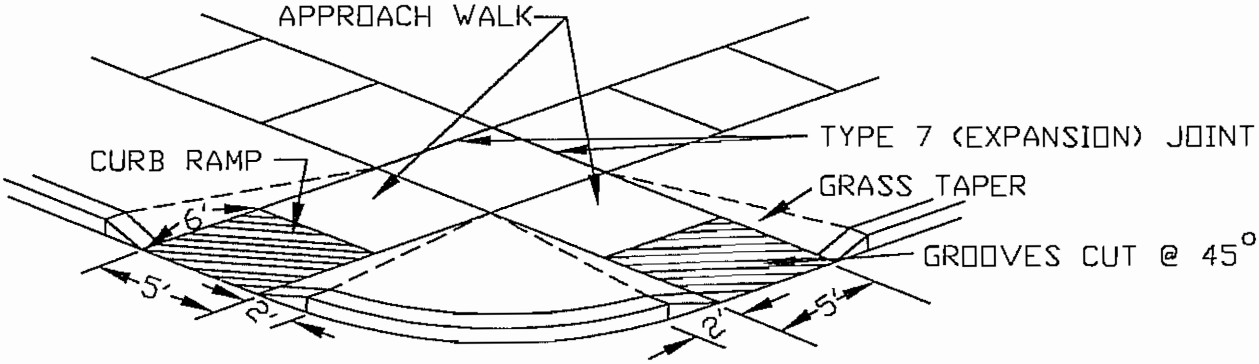
64.04

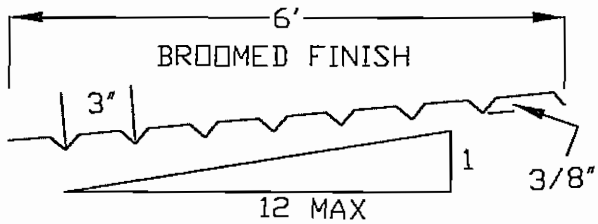


NOTE I FOR ALLEY PAVEMENT DETAILS SEE (DRWG. 64.01)

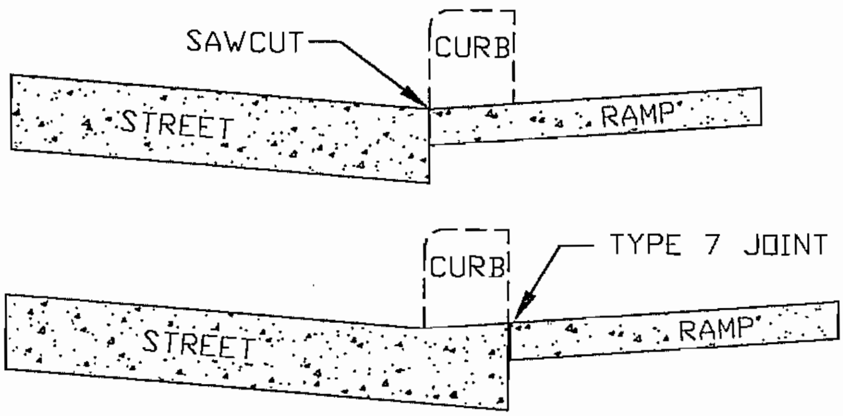
CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
ALLEY RETURN DETAILS		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/76

64.05





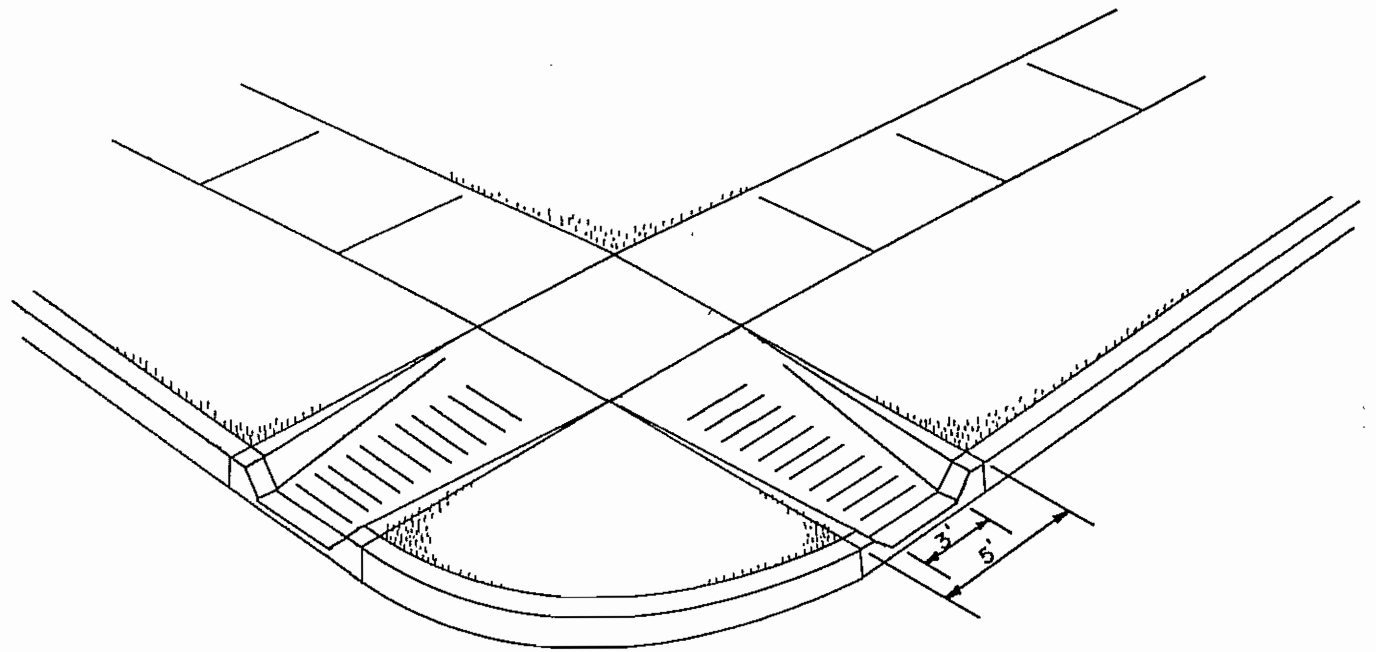
CURB RAMP TEXTURE DETAIL

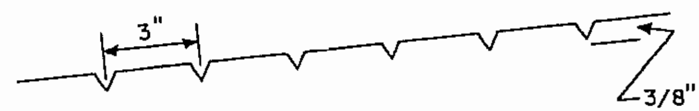


NOTE: THIS APPLIES ONLY WHEN EXISTING CURB & GUTTER IS CORRECTLY DEPRESSED

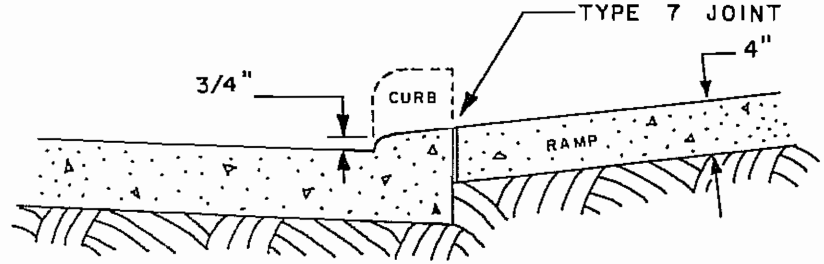
CURB RAMP DETAIL

NOT TO SCALE





TEXTURE DETAIL

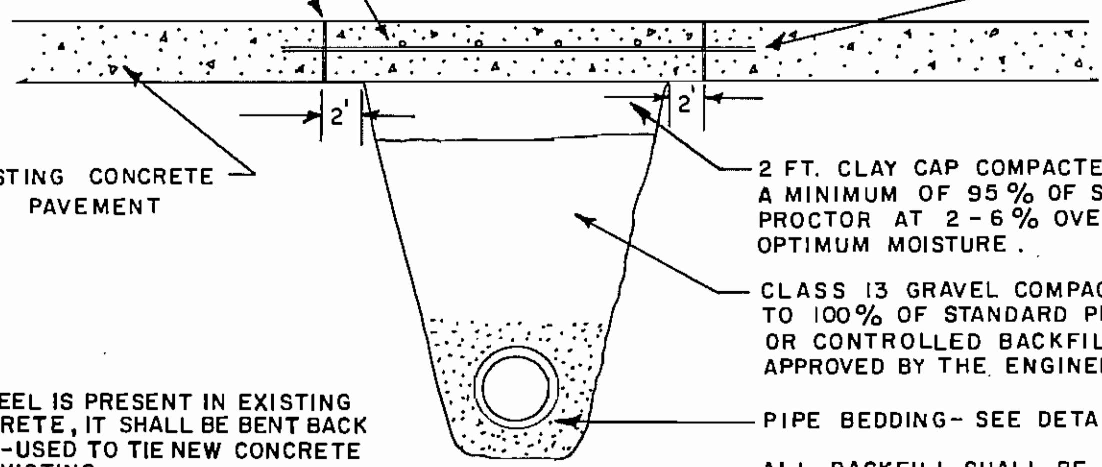


REV. 2/90 G.L.U.
REV. 2/83 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
CURB RAMPS FOR PHYSICALLY HANDICAPPED		
CITY ENGR. F.B.O.	DRAWN BY B.J.B.	SCALE NONE
APPROVED BY:	CHECKED BY:	DATE FEB.'77'

64.07

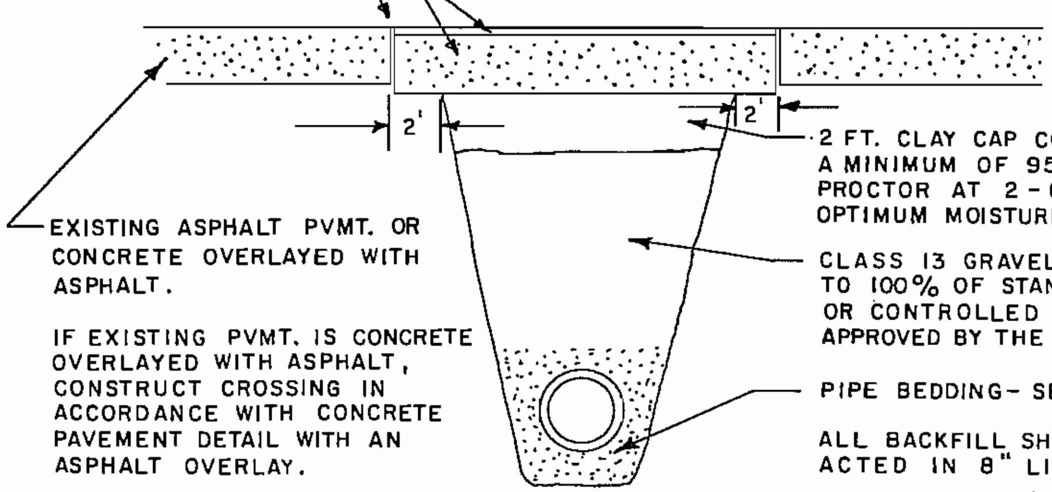
CONCRETE PAVEMENT



* IF STEEL IS PRESENT IN EXISTING CONCRETE, IT SHALL BE BENT BACK & RE-USED TO TIE NEW CONCRETE TO EXISTING.

ALL BACKFILL SHALL BE COMPACTED IN 8" LIFTS.

ASPHALT PAVEMENT



IF EXISTING PVMT. IS CONCRETE OVERLAYED WITH ASPHALT, CONSTRUCT CROSSING IN ACCORDANCE WITH CONCRETE PAVEMENT DETAIL WITH AN ASPHALT OVERLAY.

ALL BACKFILL SHALL BE COMPACTED IN 8" LIFTS.

CONTRACTOR SHALL INSTALL CONTROLLED BACKFILL WHEN SPECIFIED BY THE ENGINEER.

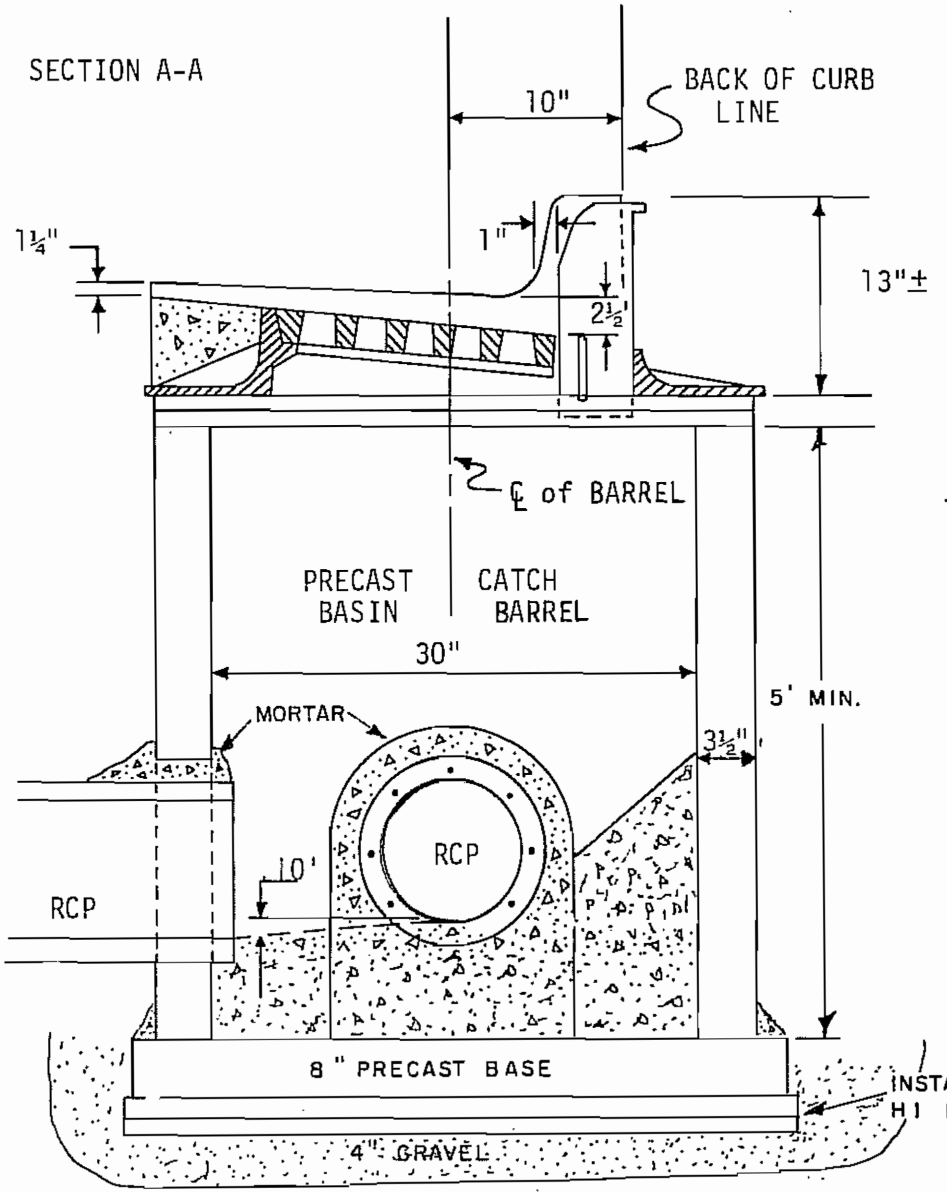
REV. 2/90 G.L.U.
REV. 3/85 G.L.U. - REV. 3/87 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

STREET CROSSING & PVMT. REPAIR DETAIL

CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE DEC. '82'

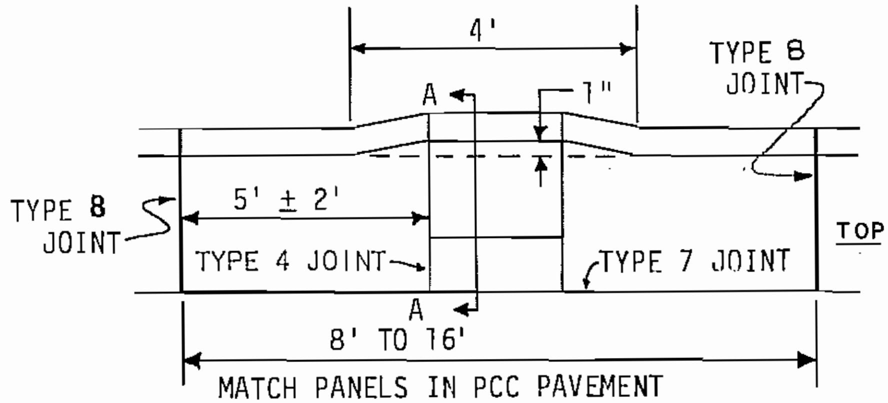
64.09



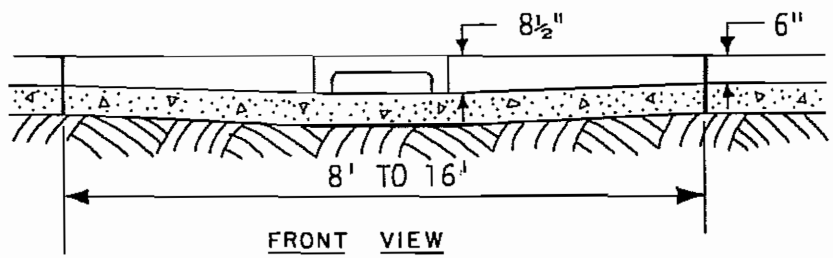
NOTE 1: WHEN ADJUSTING RINGS ARE USED TO BRING CATCH BASIN TO GRADE, THEY SHALL BE MORTARED TOGETHER AND SHALL BE SMOOTH BOTH INSIDE AND OUTSIDE.

NOTE 2: USE NEENAH CASTING NO. R- 3065 INLET GRATE TYPE DR.

NOTE 3: ENDS OF RCP SHALL BE MORTARED INTO CATCH BASIN A MAXIMUM OF 3"



TOP VIEW



FRONT VIEW

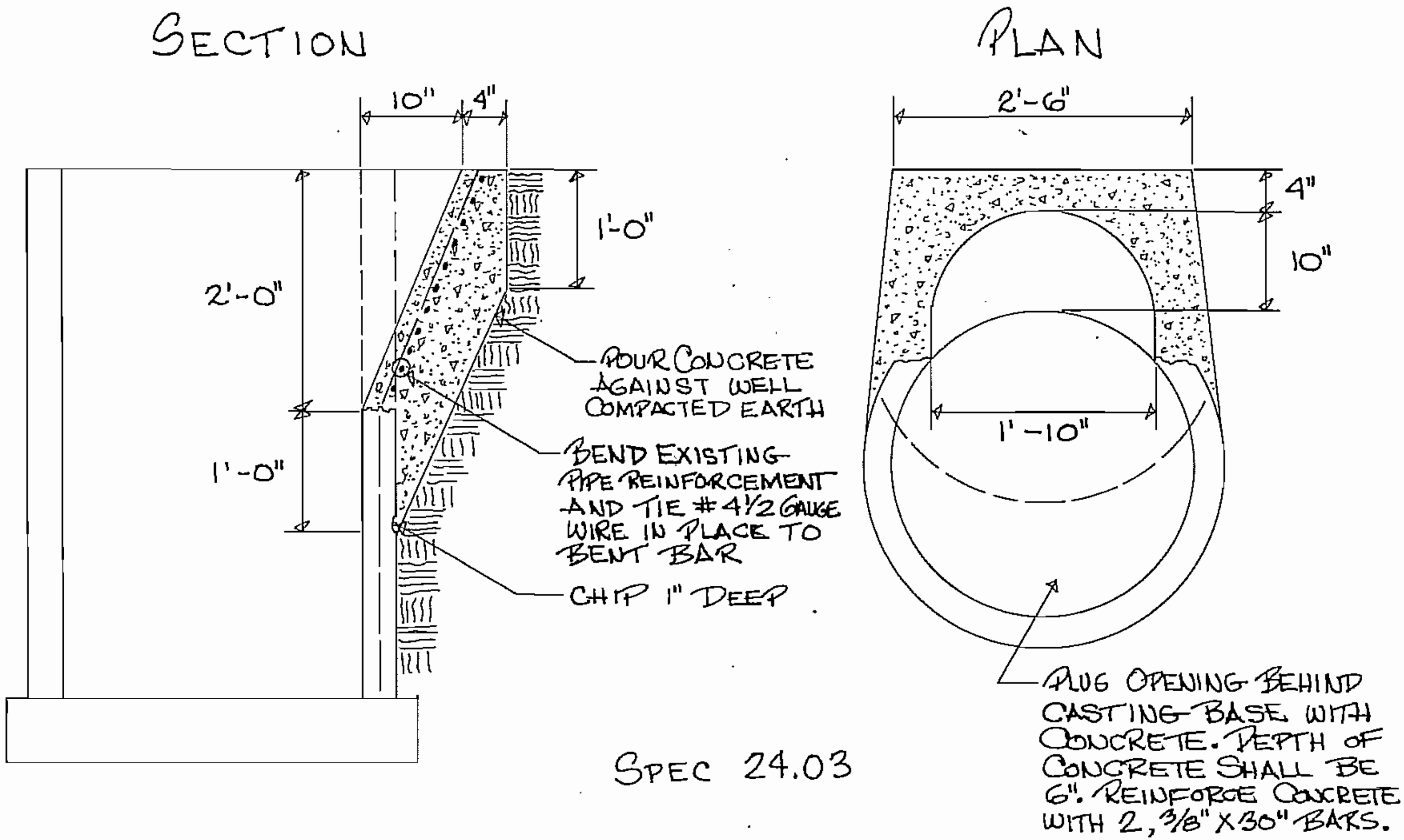
NOTE :
1. DOUBLE WRAP BARREL WITH 4 MIL POLY.
2. FILL INVERT TO DESIGN GRADE WITH 4 BAG MIX CONCRETE.

SPEC. 24.03

REV. 2/90 G.L.U.
REV. 2/87 G.L.U.
REV. 3/78 B.J.B.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
STANDARD CATCH BASIN AND CASTING DETAILS		
CITY ENGR. F.B.O	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: FEB. 75

65.01



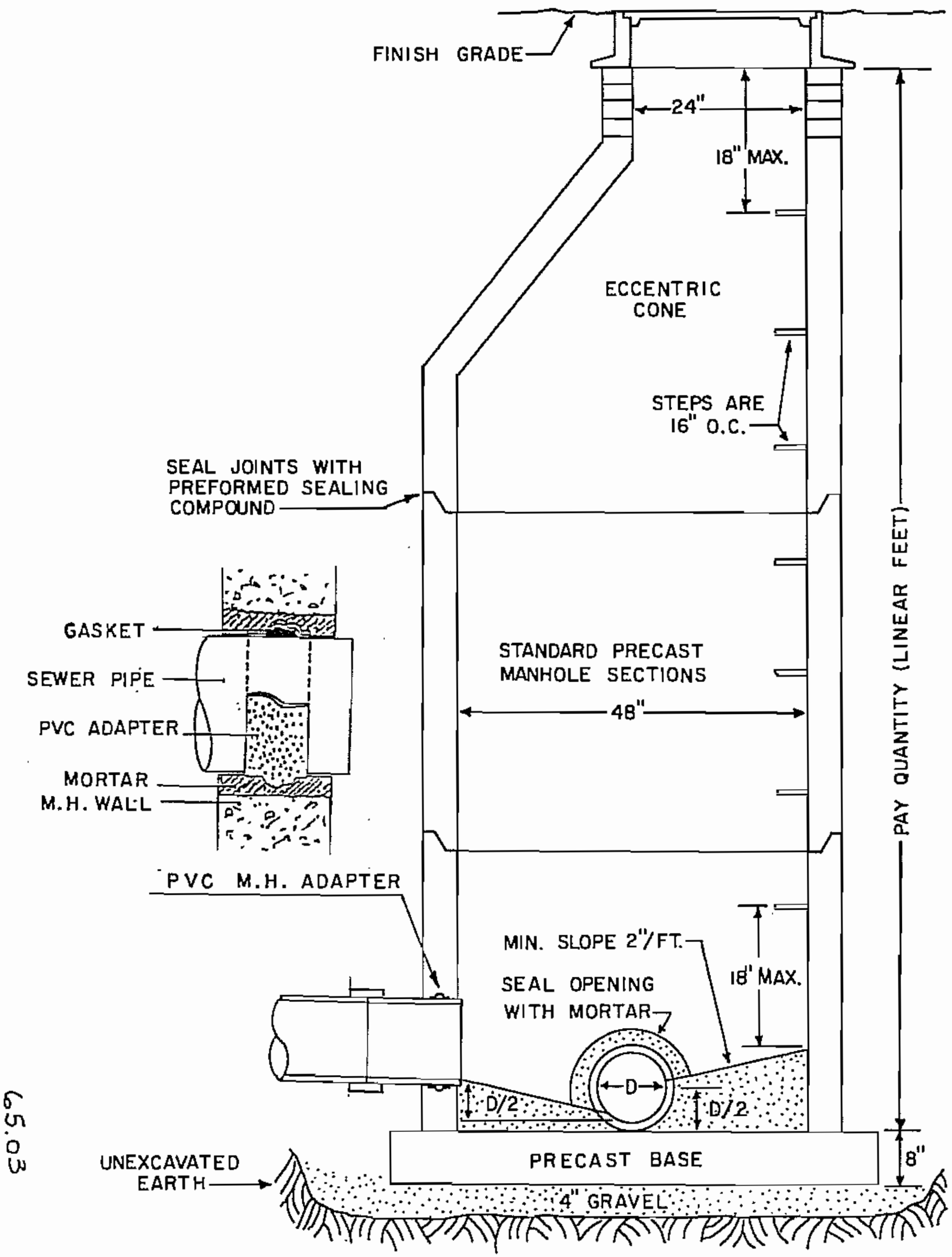
SPEC 24.03

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

CATCH BASIN CHUTE DETAIL

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: 3/4" = 1'-0"
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970

65.02



NOTES: BED FRAME IN MORTOR, INSTALL FOUR PRECAST TWO-INCH RINGS, AND PLASTER INSIDE AND OUT WITH MORTAR.

MANHOLE CASTINGS: NEENAH FOUNDRY NO. R-1733-0067 (LETTERED STORM SEWER) OR R-1733-0078 (LETTERED SANITARY SEWER) AS APPROPRIATE FOR USE. SANITARY SEWER LIDS SHALL BE SELF-SEALING LIDS WITH CONCEALED LIFT HOLES. STORM SEWER LIDS SHALL HAVE OPEN PICK HOLES. INSTALL R-1955-I CASTING IN LIEU OF 1733 WHEN SPECIFIED.

BACKFILL UNDER ALL PIPES WITH CONCRETE OR GROUT TO FIRST JOINT ON UNEXCAVATED GROUND: SIDES MAY BE FORMED (MINIMUM WIDTH - 12 INCHES).

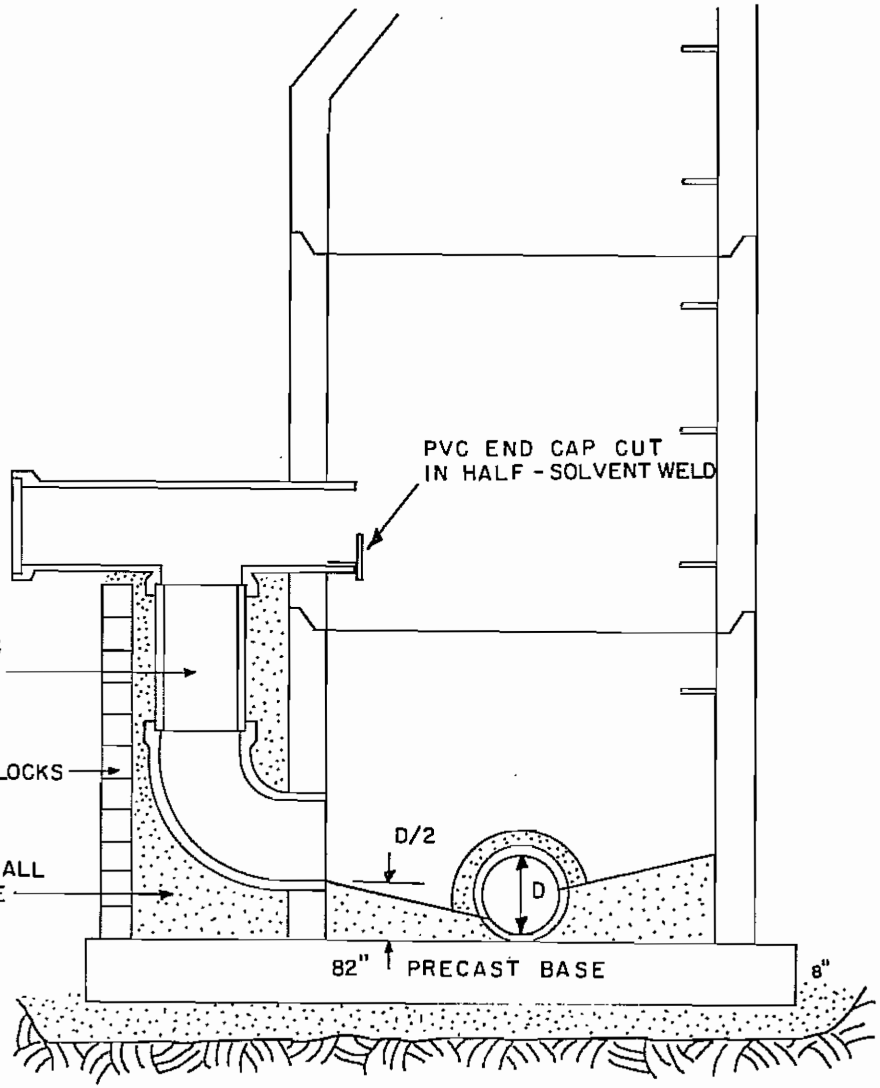
WHERE INFLUENT OR EFFLUENT LINES ARE 12 INCHES OR LESS, USE SHORT LENGTHS IN AND OUT OF MANHOLE SO THAT JOINTS FALL WITHIN SIX INCHES FROM OUTSIDE MANHOLE WALL.

RUN MAIN LINE PIPE THROUGH MANHOLE. FORM CONCRETE AROUND BOTTOM HALF OF PIPE. CUT OUT TOP HALF OF PIPE.

SPEC. 24.03

REV. 2/90 G.L.U.
REV. 2/22/85

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
STANDARD MANHOLE		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: FEB. "78"



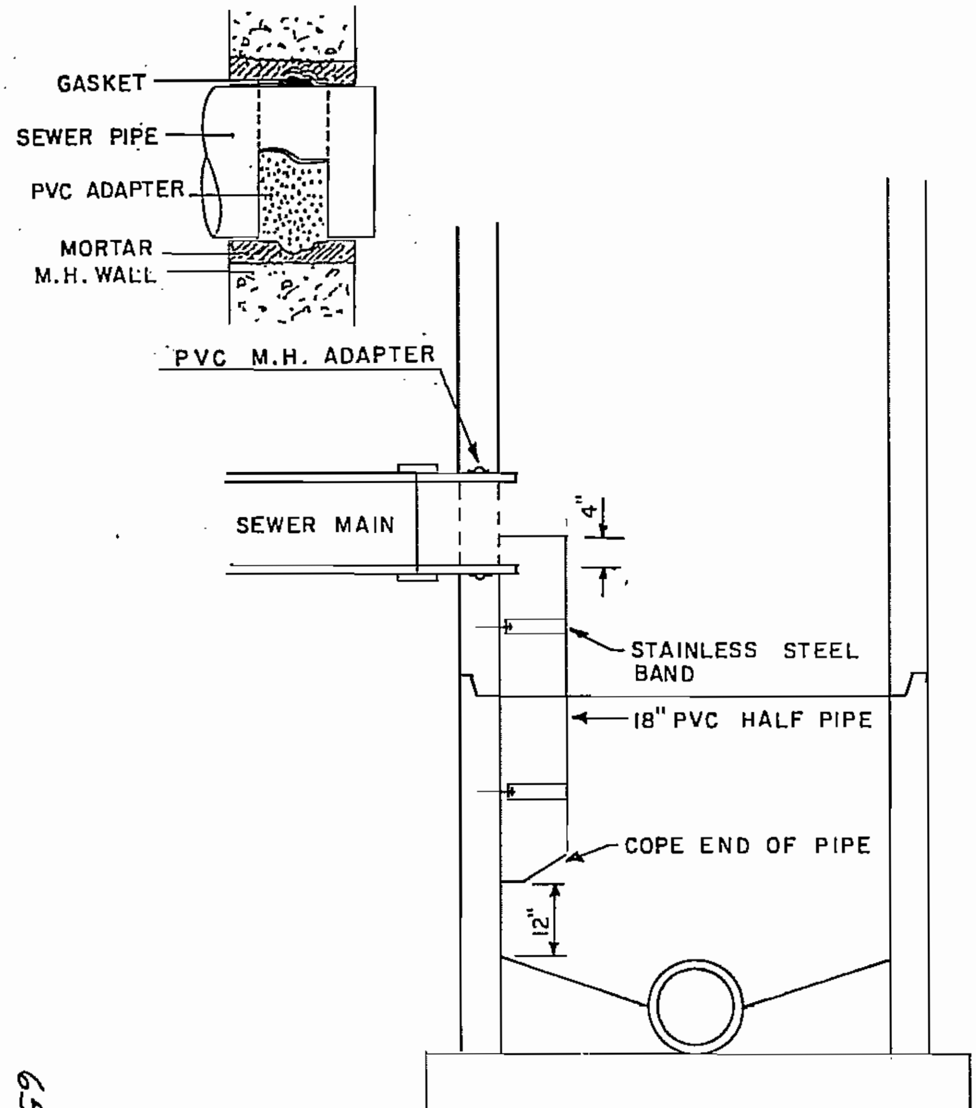
STANDARD DROP MANHOLE

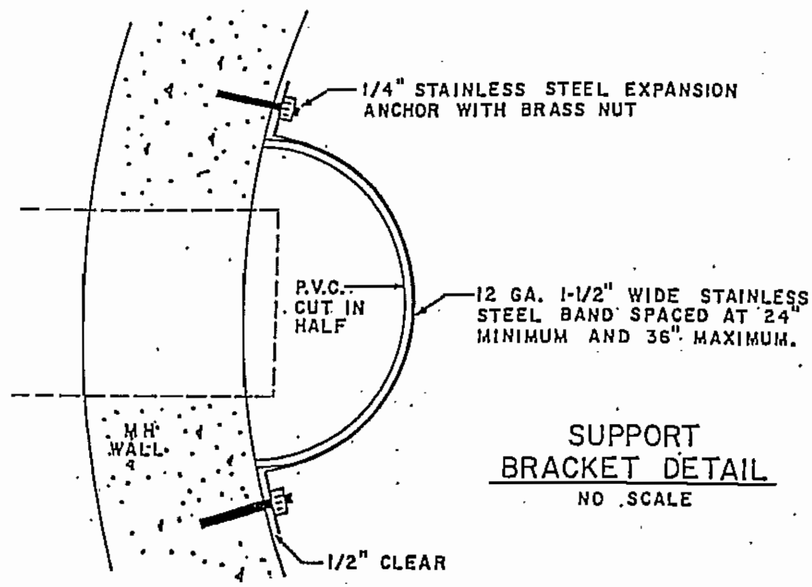
MANHOLE CONSTRUCTION SHALL MEET THE REQUIRMENTS OF PLATE 65.03

REV. 2/90 G.L.U.
REV. 2/20/87

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
DROP MANHOLE DETAILS		
CITY ENGR. F.B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/78

65.04

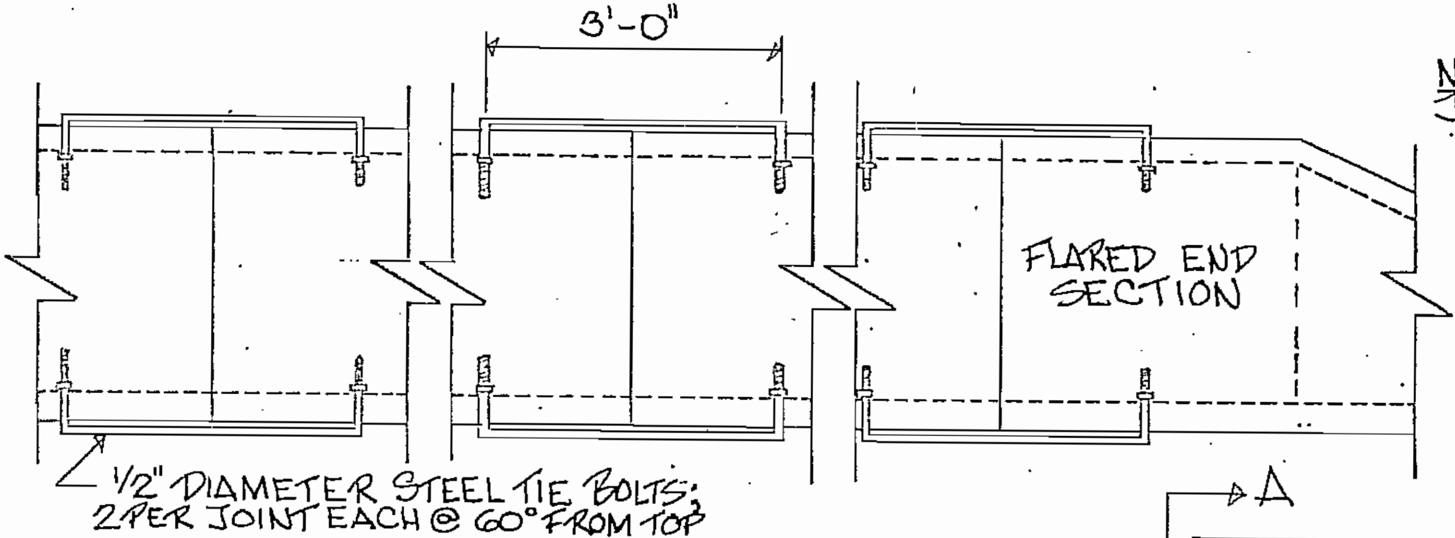




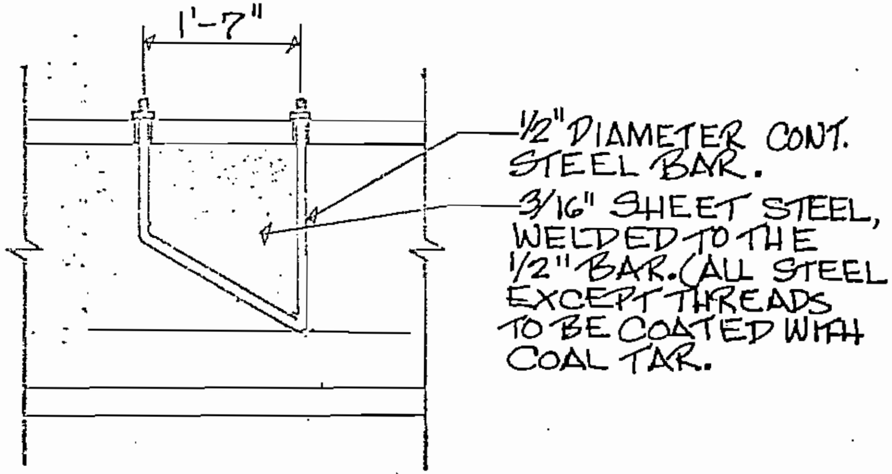
SUPPORT BRACKET DETAIL
NO SCALE

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
INTERNAL DROP M.H.		
CITY ENGR. F. B. O.	DRAWN BY: G. L. U.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 2/12/90

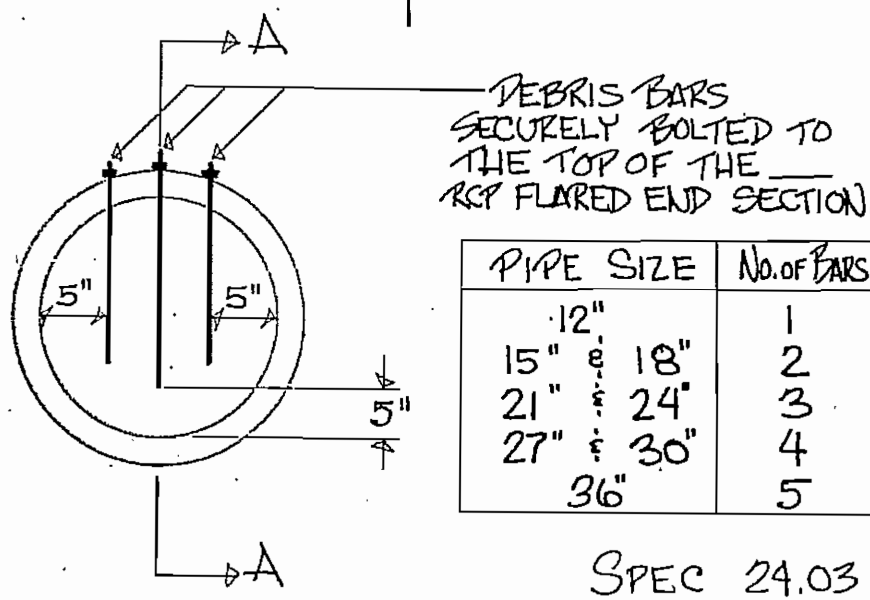
65.04-1



NOTE: LAST THREE JOINTS TO BE TIED.



SECTION A-A



PIPE SIZE	No. of BARS
12"	1
15" & 18"	2
21" & 24"	3
27" & 30"	4
36"	5

SPEC 24.03

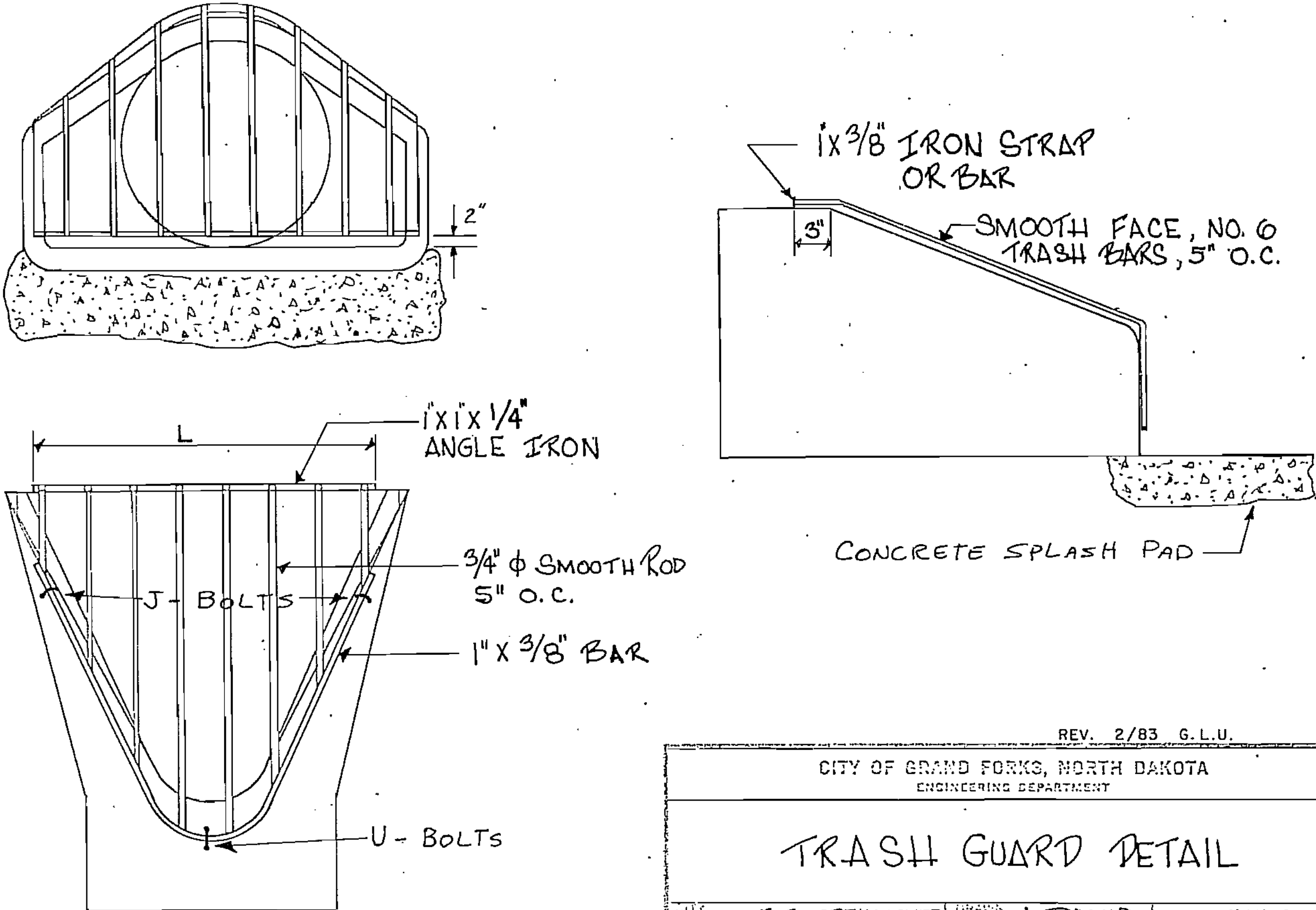
NOTE: TIE BARS & DEBRIS BARS ARE INCIDENTAL ITEMS

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

OUTFALL DETAIL SHEET

CITY ENGINEER: F. B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J. K. J.	DATE: APRIL 1, 1970

65.05



REV. 2/83 G.L.U.

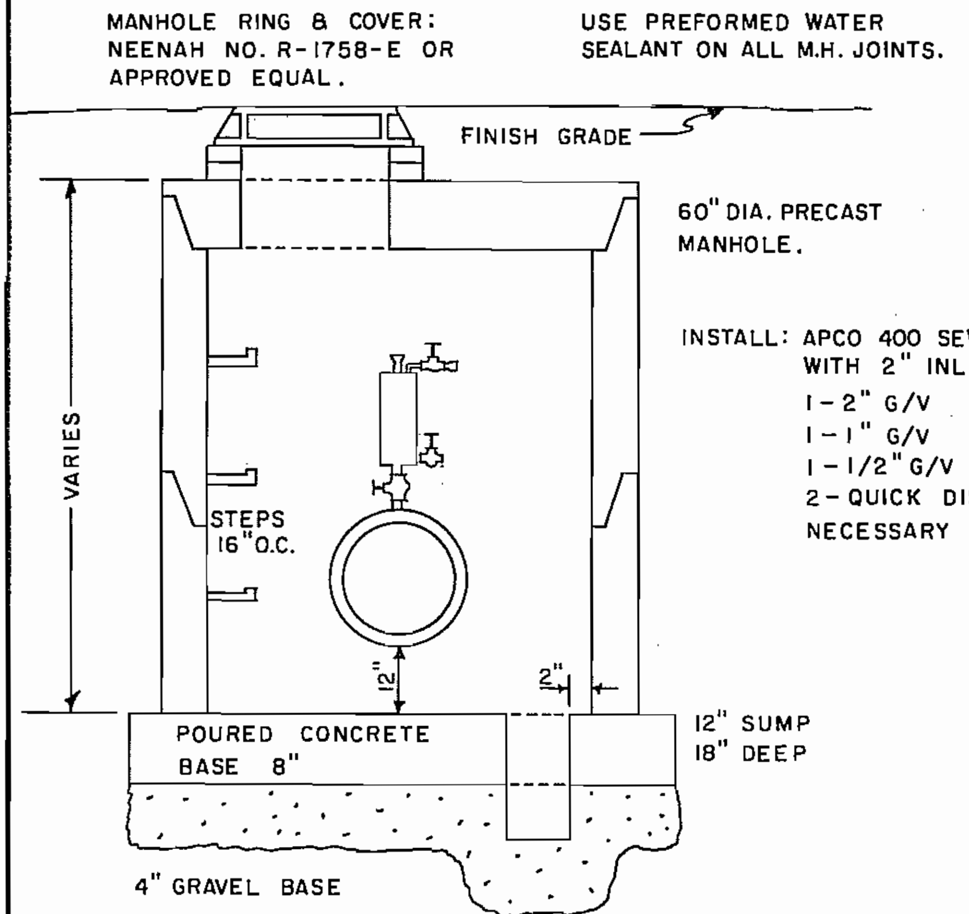
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

TRASH GUARD DETAIL

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970

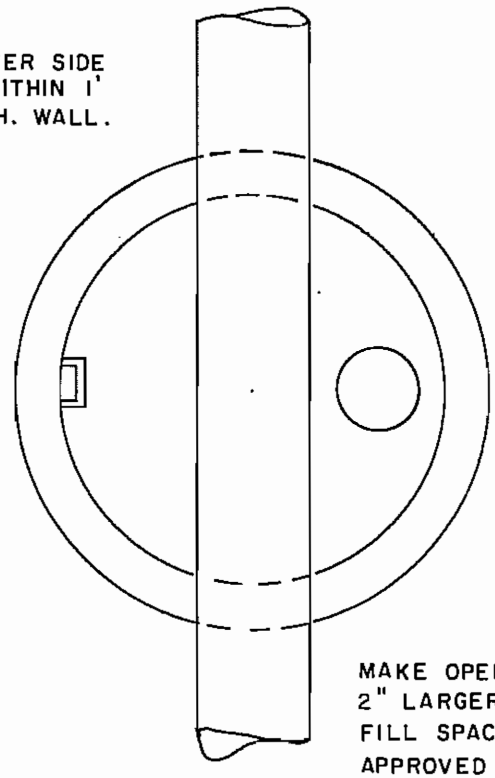
65.06

65.07



INSTALL: APCO 400 SEWAGE VALVE WITH 2" INLET.
1 - 2" G/V
1 - 1" G/V
1 - 1/2" G/V
2 - QUICK DISCONNECT CPLG'S
NECESSARY FITTINGS

FIRST JOINT ON EITHER SIDE OF M.H. SHALL BE WITHIN 1' OF THE OUTSIDE M.H. WALL.

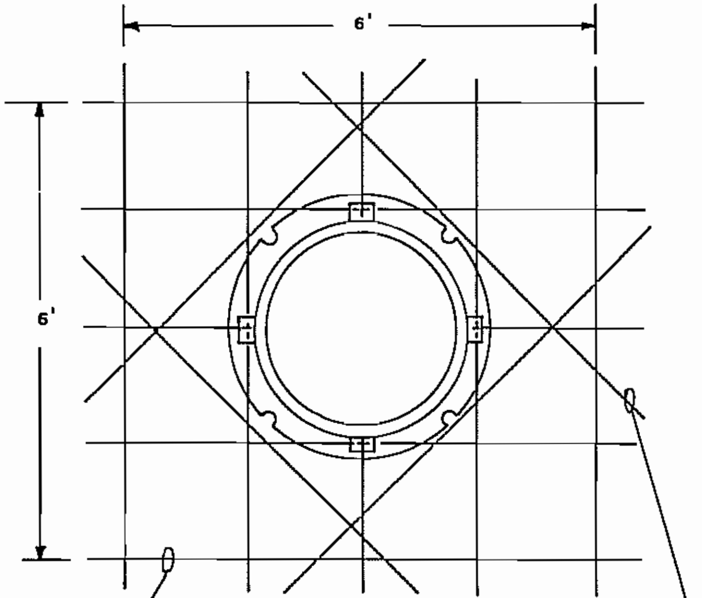


MAKE OPENING THRU M.H. 2" LARGER THAN PIPE O.D. FILL SPACE WITH AN APPROVED WATER SEALANT.

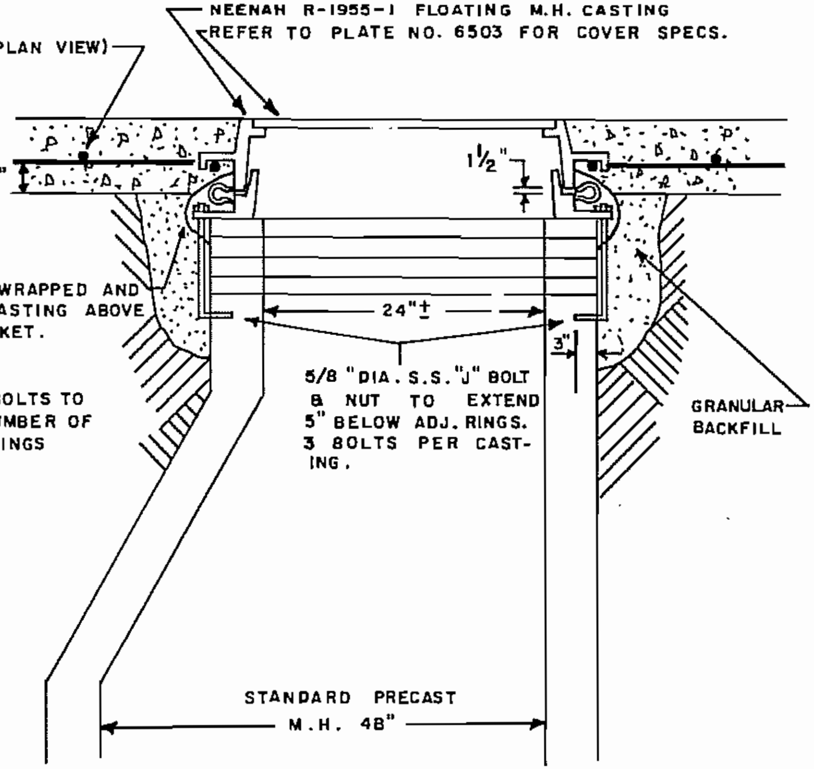
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

SEWAGE
AIR RELEASE VALVE & MANHOLE

CITY ENGR. F. B. O	DRAWN BY: G.L.U.	SCALE: NONE
APPROVED BY:	CHECKED BY:	DATE: 3/83



PLAN VIEW

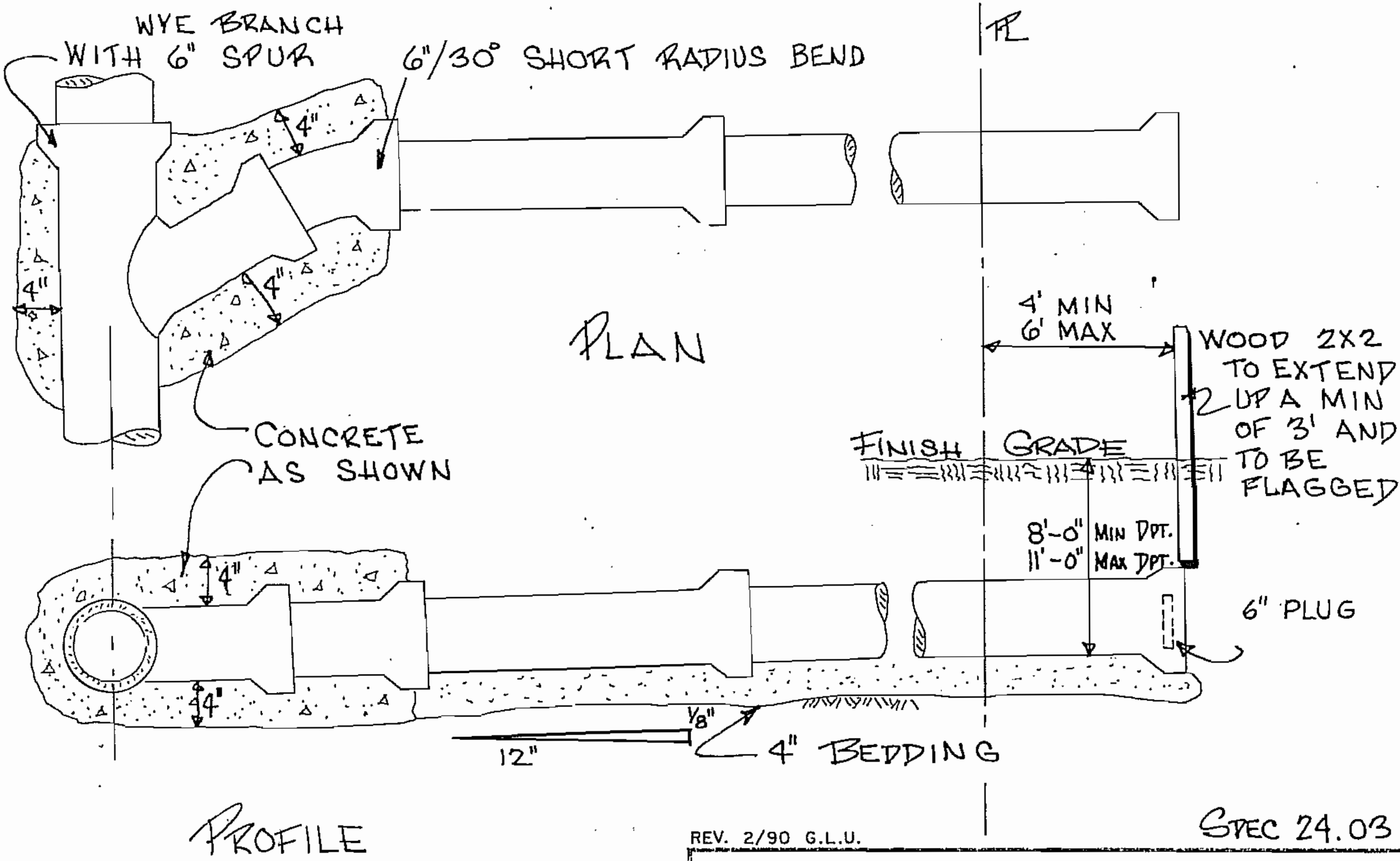


CROSS SECTION

REV 2/90 G.L.U.
REV. 2/20/87

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
STANDARD FLOATING M.H. CASTING		
CITY ENGR. F. B. O.	DRAWN BY G.L.U.	SCALE NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 3/20/86

65.08



REV. 2/90 G.L.U.

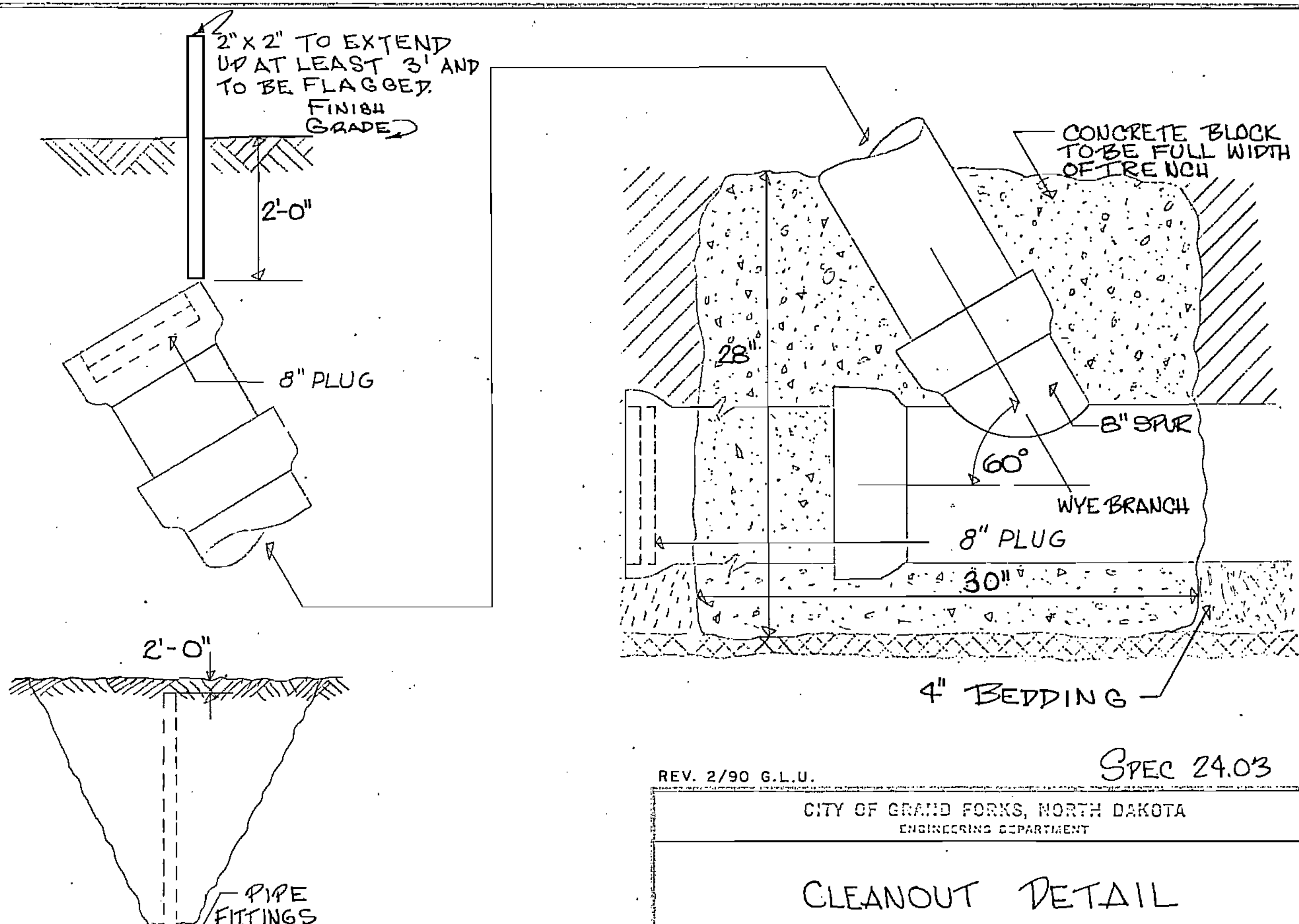
SPEC 24.03

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

SANITARY SEWER SERVICE LEAD

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J. K. J.	DATE: MAR 1, 1971

66.01



SPEC 24.03

REV. 2/90 G.L.U.

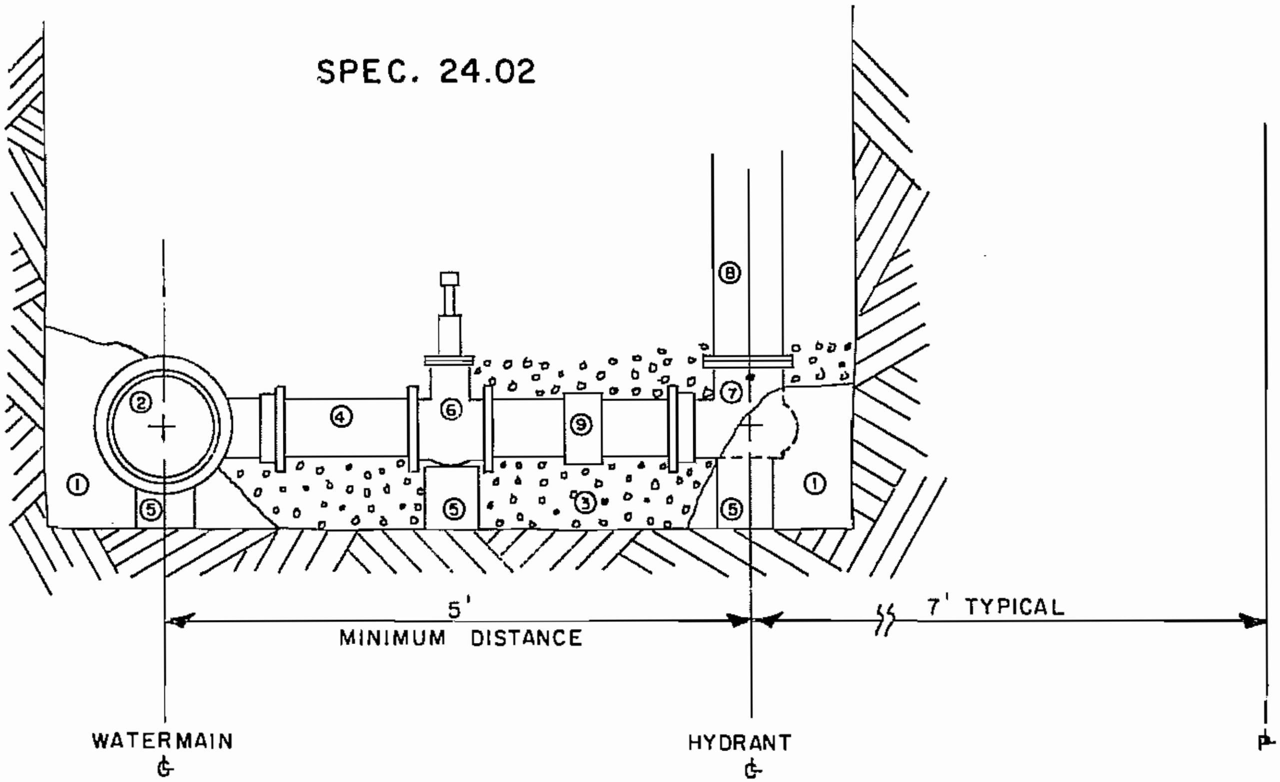
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

CLEANOUT DETAIL

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: J. K. J.	DATE: APRIL 1, 1970

66.02

SPEC. 24.02



KEY

① CONCRETE REACTION BACKING
② CAST IRON TEE
③ 3/4" – 1 1/2 ROCK
④ HYDRANT LEAD
⑤ CONCRETE BLOCK
⑥ GATE VALVE
⑦ HYDRANT WASTE OPENING
⑧ HYDRANT
⑨ JOINT BETWEEN G/V & HYD.

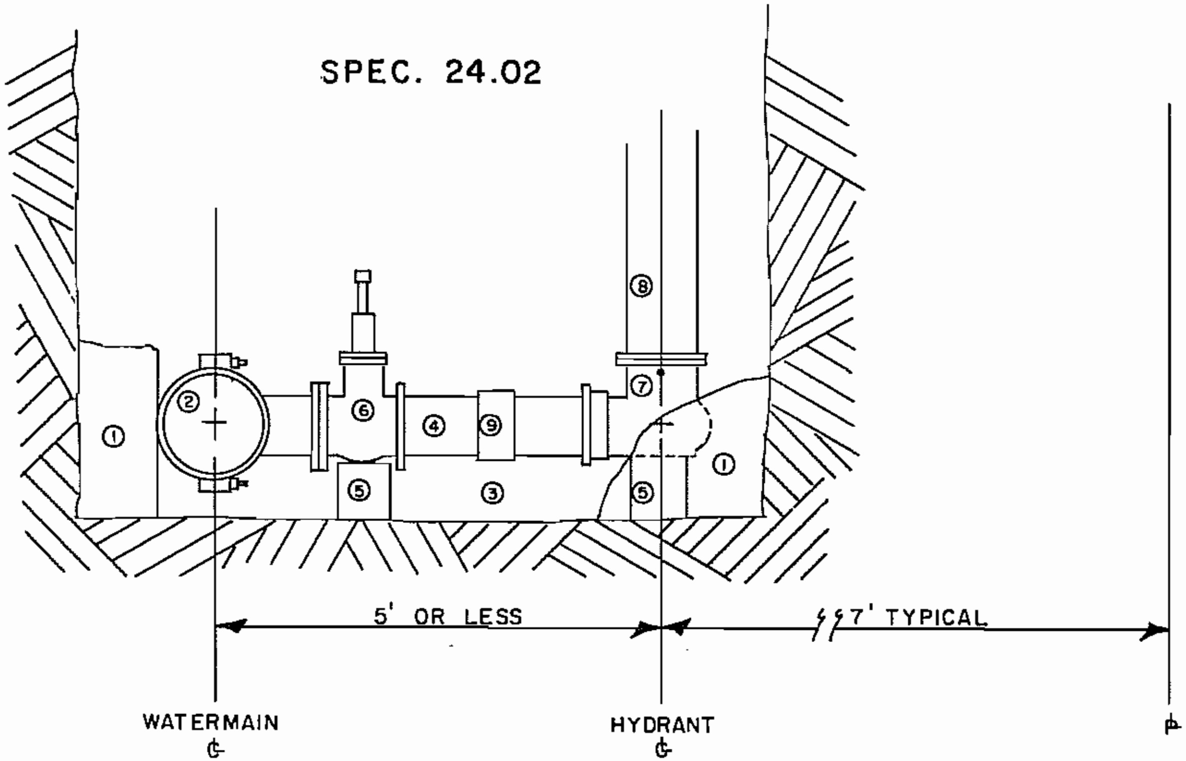
NOTES:

1. NECESSARY REACTION BACKING IS SHOWN ON THIS DRAWING.
2. 3/4"–1 1/2" SIZE 2 ROCK SHALL BE TO A LEVEL 6" ABOVE WASTE OPENING OR GREATER, WITH A MINIMUM 30" WIDE & 5' ALONG HYD. LEAD (MIN. QUANTITY 3/4 CU. YD.)
3. ALL HYDRANT LEAD SHALL BE 6" PVC C-900.
4. OVERALL LENGTH OF EACH SECTION OF 6" HYD. LEAD SHALL BE NOT LESS THAN 12".
5 WRAP HYDRANTS, UP TO GROUND LINE, WITH 2 LAYERS OF POLYETHYLENE TAPE ENDS & SEAMS.
6. TOP OF HYDRANT OPERATING NUT SHALL BE AT LEAST 40" ABOVE GROUND LINE.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
STANDARD HYDRANT SETTING DETAIL		
CITY ENGR F. B ORTHMEYER	DRAWN BY G.L.URNESS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: K. Vein	DATE: 2/14/85

67.01

SPEC. 24.02



KEY

1. CONCRETE REACTION BACKING
2. TAPPING TEE
3. 3/4" - 1 1/2" ROCK
4. HYDRANT LEAD
5. CONCRETE BLOCK
6. GATE VALVE
7. HYDRANT WASTE OPENING
8. HYDRANT
9. JOINT BETWEEN G/V & HYD.

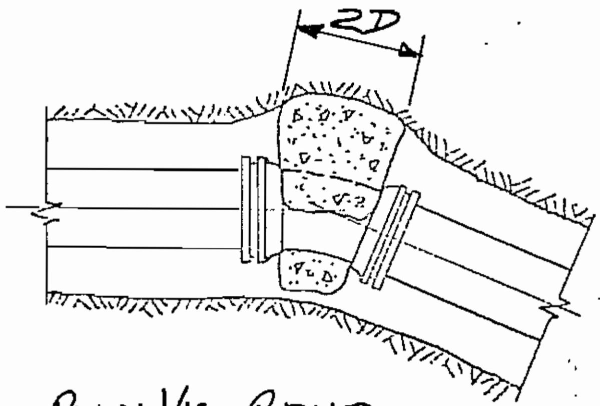
NOTES :

1. NECESSARY REACTION BACKING IS SHOWN ON THIS DRAWING. (FORMING REQUIRED BEHIND TAPPING TEE TO KEEP CONCRETE OFF BOLTS.
2. 3/4" - 1 1/2" SIZE 2 ROCK SHALL BE TO A LEVEL 6" ABOVE WASTE OR GREATER, WITH A MINIMUM 30" WIDE & ALL ALONG HYD. LEAD (3/4 CU. YD. MIN.)
3. ALL HYDRANT LEAD SHALL BE 6" PVC C-900.
4. OVERALL LENGTH OF EACH SECTION OF 6" HYD. LEAD SHALL BE NOT LESS THAN 12".
5. WRAP HYDRANTS, UP TO GROUND LINE, WITH 2 LAYERS OF POLYETHYLENE TAPE ENDS & SEAMS.
6. TOP OF HYDRANT OPERATING NUT SHALL BE AT LEAST 40" ABOVE GROUND LINE.
7. USE STAINLESS STEEL TAPPING SLEEVE SIMILAR TO FORD SST TAPPING SLEEVE (304 SS).

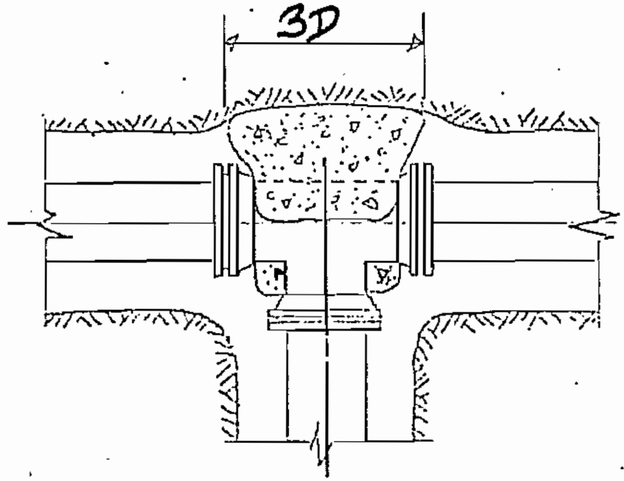
CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
STANDARD HYDRANT SETTING DETAIL USING TAPPING TEE		
CITY ENGR. F. B. ORTHMEYER	DRAWN BY: G.L. URNESS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: K. Vein	DATE: 2/19/85

67.01 A

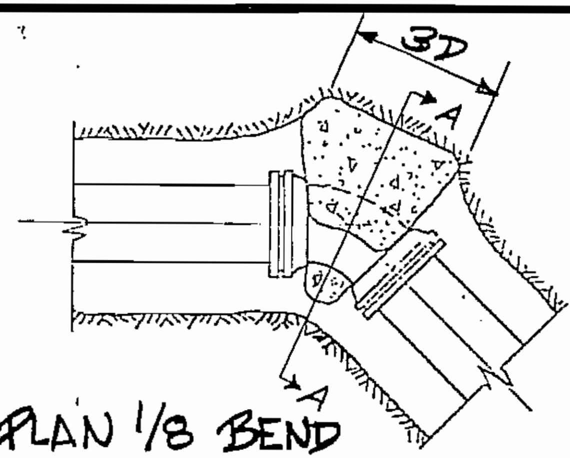
Spec 24.02
Spec 24.04



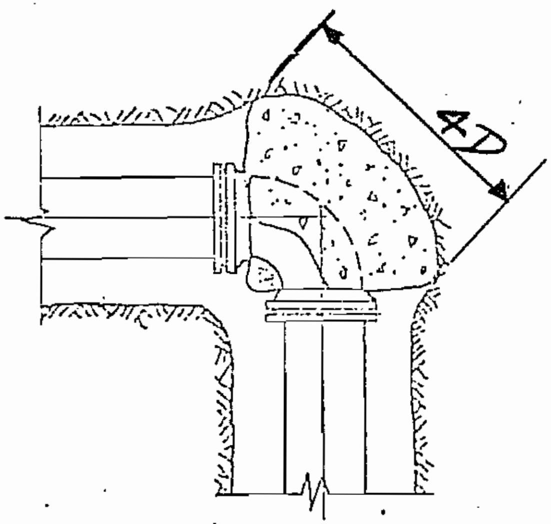
PLAN 1/16 BEND



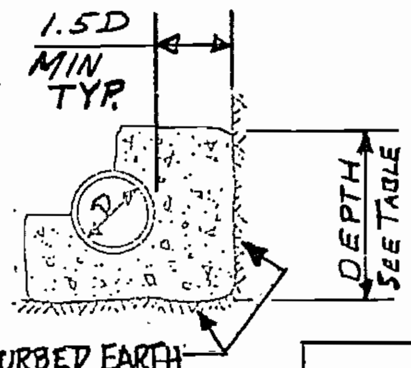
PLAN TEE OR PLUG



PLAN 1/8 BEND



PLAN 1/4 BEND



SECTION A-A

DEPTH OF BACKING, RATIO OF PIPE DIAM.	
FITTING	DEPTH
TEE OR PLUG	3D
1/4 BEND - 90°	3D
1/8 BEND - 45°	3D
1/16 BEND - 22½°	2D

NOTE: FOR FITTINGS OTHER THAN SHOWN OR UNUSUAL SOIL CONDITIONS COMPUTE SIZE & PLACEMENT OF REQD. BACKING.

REVISED February 1972

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

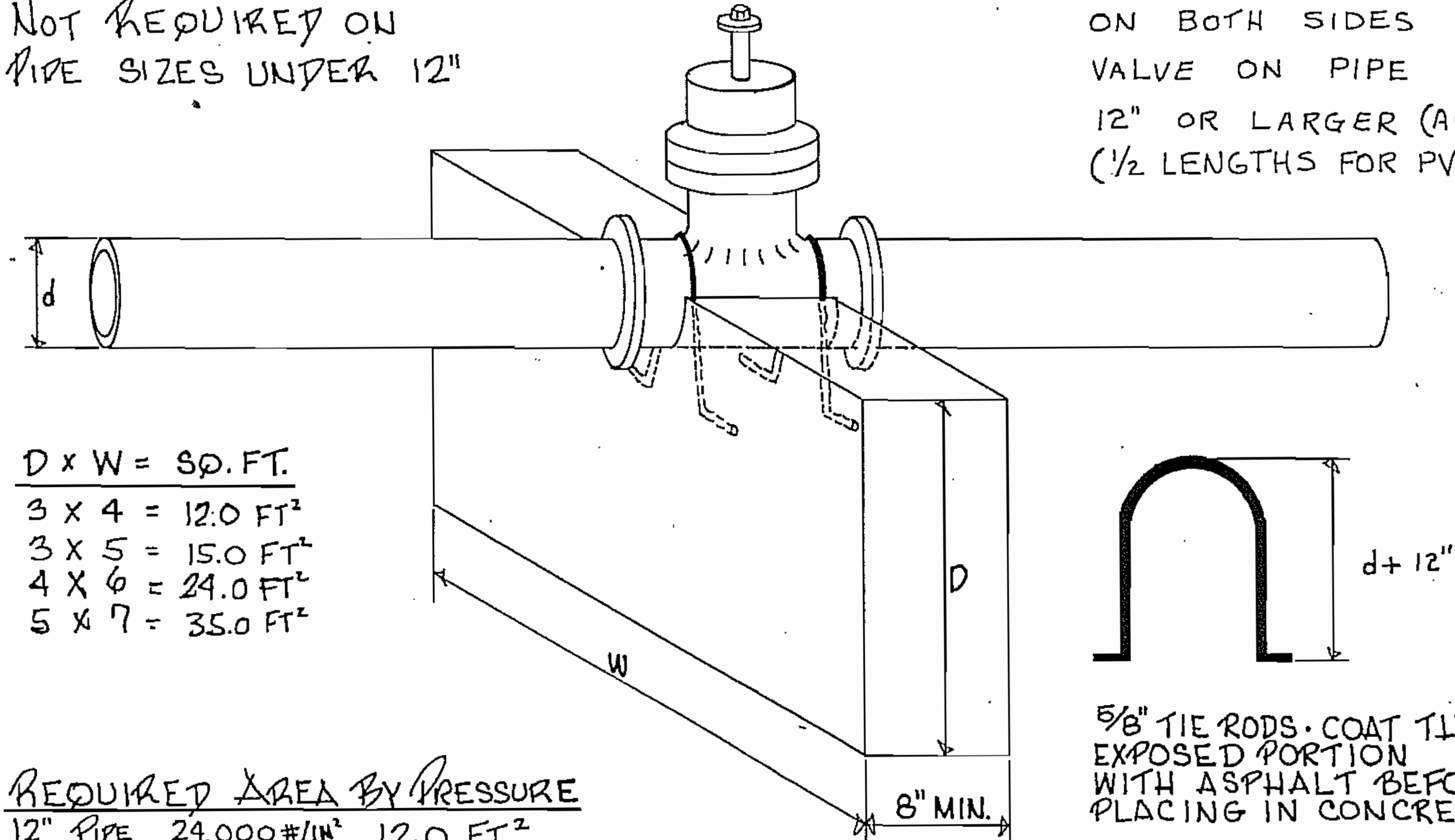
REACTION BACKING AT BENDS AND TEES

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970

67.02

NOTE: VALVE BLOCKING NOT REQUIRED ON PIPE SIZES UNDER 12"

NOTE: USE 3' 3" LENGTHS ON BOTH SIDES OF VALVE ON PIPE SIZES 12" OR LARGER (ACP ONLY) (1/2 LENGTHS FOR PVC + DUC.)



D x W =	SQ. FT.
3 x 4 =	12.0 FT²
3 x 5 =	15.0 FT²
4 x 6 =	24.0 FT²
5 x 7 =	35.0 FT²

5/8" TIE RODS. COAT THE EXPOSED PORTION WITH ASPHALT BEFORE PLACING IN CONCRETE.

REQUIRED AREA BY PRESSURE

12"	PIPE	24,000 #/IN²	12.0 FT²
16"	"	30,200 #/IN²	15.1 FT²
20"	"	47,100 #/IN²	23.6 FT²
24"	"	67,800 #/IN²	33.9 FT²

NOTE: BEARING PRESSURE OF SOIL USED ABOVE IS 2000 # PER SQ. FT.

REV. 2/90 G.L.U.
REVISED MARCH 74

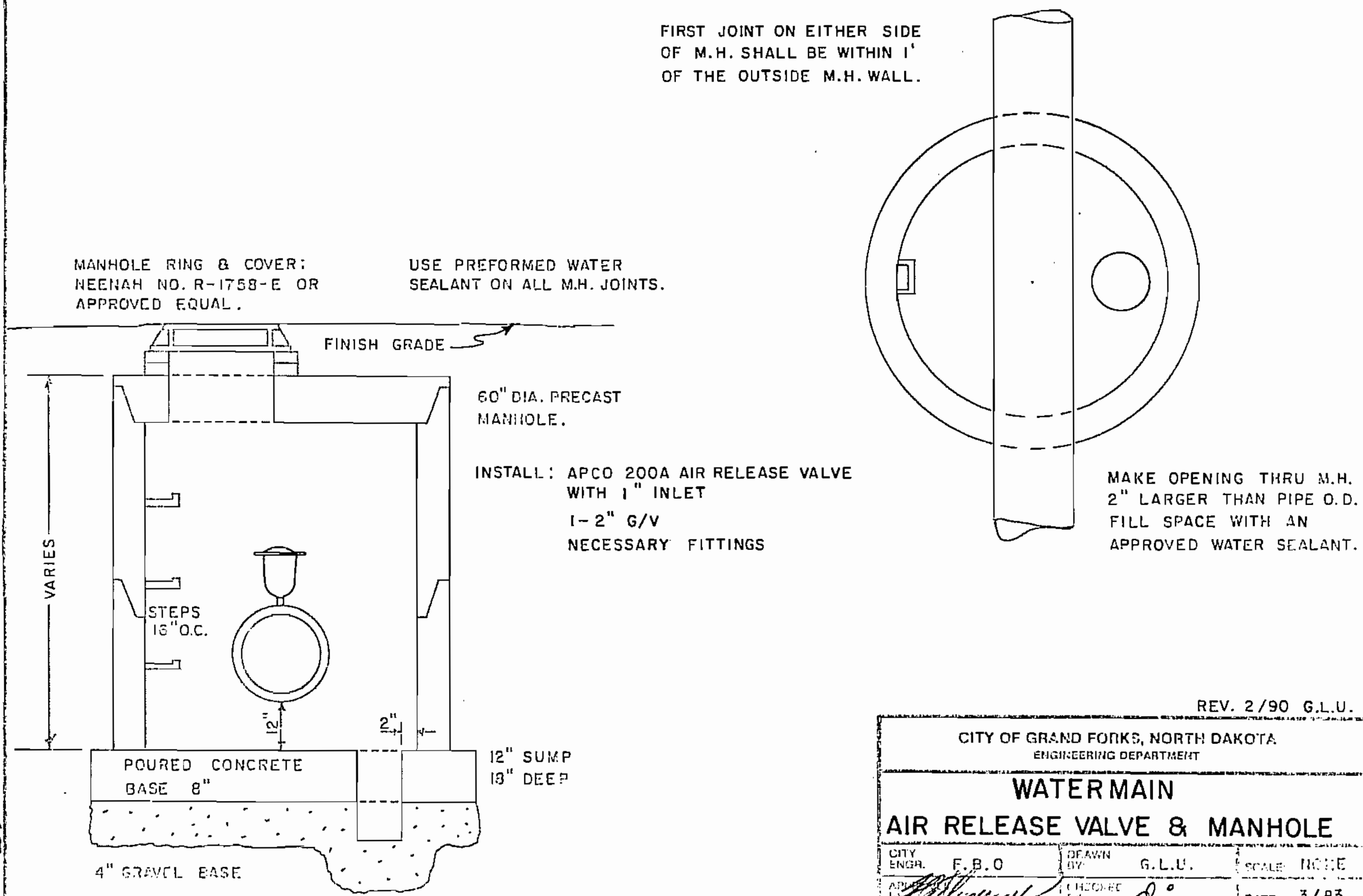
CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

VALVE BLOCKING DETAIL

CITY ENGINEER: F.B. ORTHMEYER	DRAWN BY: A. DAVIS	SCALE: NONE.
APPROVED BY: F.B. Orthmeyer	CHECKED BY: J.K.J.	DATE: APRIL 1, 1970

67.03

67.04

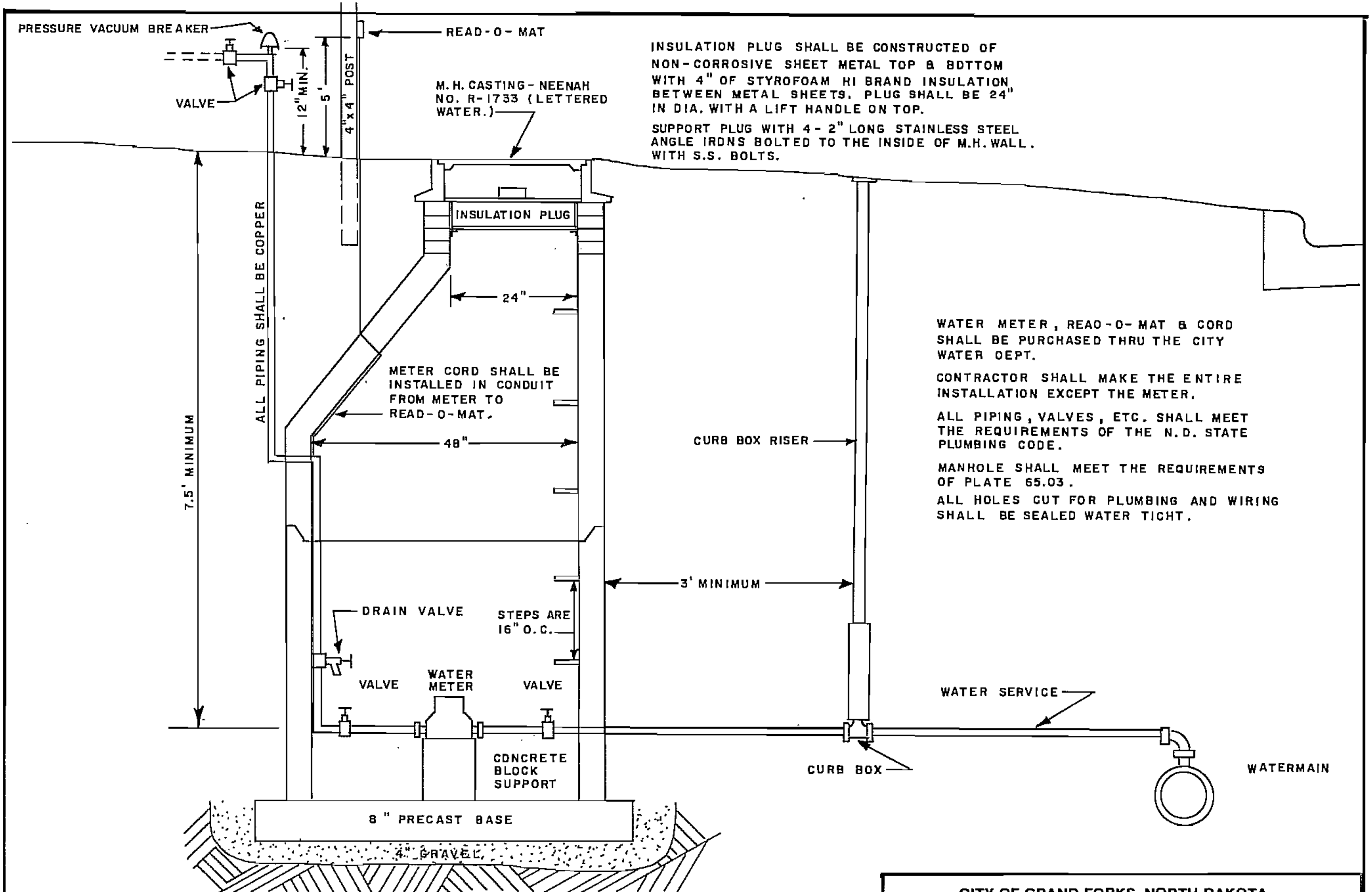


REV. 2/90 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

WATERMAIN
AIR RELEASE VALVE & MANHOLE

CITY ENGR. F.B.O	DRAWN BY G.L.U.	SCALE NONE
APPR. BY	CHECKED BY	DATE 3/83



INSULATION PLUG SHALL BE CONSTRUCTED OF NON-CORROSIVE SHEET METAL TOP & BOTTOM WITH 4" OF STYROFOAM HI BRAND INSULATION BETWEEN METAL SHEETS. PLUG SHALL BE 24" IN DIA. WITH A LIFT HANDLE ON TOP.

SUPPORT PLUG WITH 4 - 2" LONG STAINLESS STEEL ANGLE IRONS BOLTED TO THE INSIDE OF M.H. WALL. WITH S.S. BOLTS.

WATER METER, READ-O-MAT & CORD SHALL BE PURCHASED THRU THE CITY WATER DEPT.

CONTRACTOR SHALL MAKE THE ENTIRE INSTALLATION EXCEPT THE METER.

ALL PIPING, VALVES, ETC. SHALL MEET THE REQUIREMENTS OF THE N.D. STATE PLUMBING CODE.

MANHOLE SHALL MEET THE REQUIREMENTS OF PLATE 65.03.

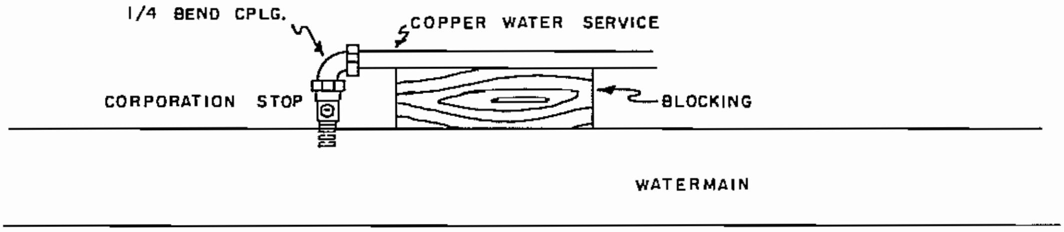
ALL HOLES CUT FOR PLUMBING AND WIRING SHALL BE SEALED WATER TIGHT.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

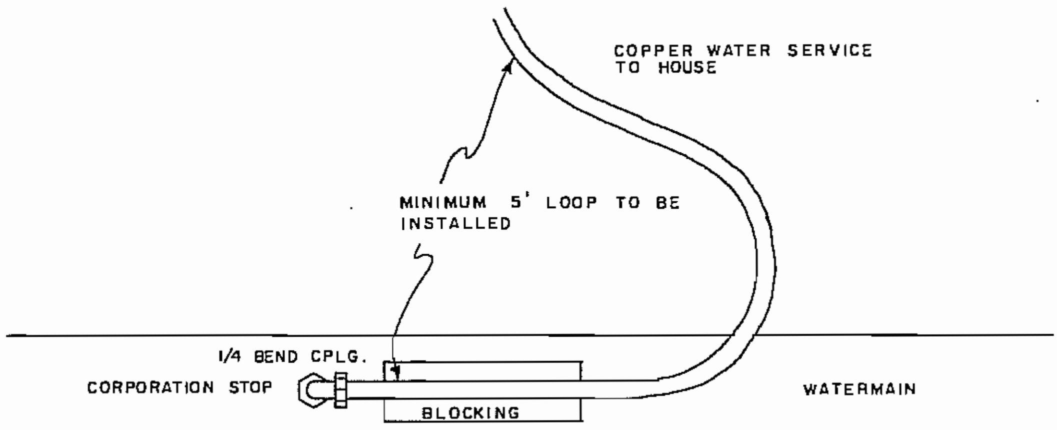
METER M.H. DETAIL

CITY ENGR. F.B.O.	DRAWN BY: G.L.URNESS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: K. Vein	DATE: 2/87

67.05



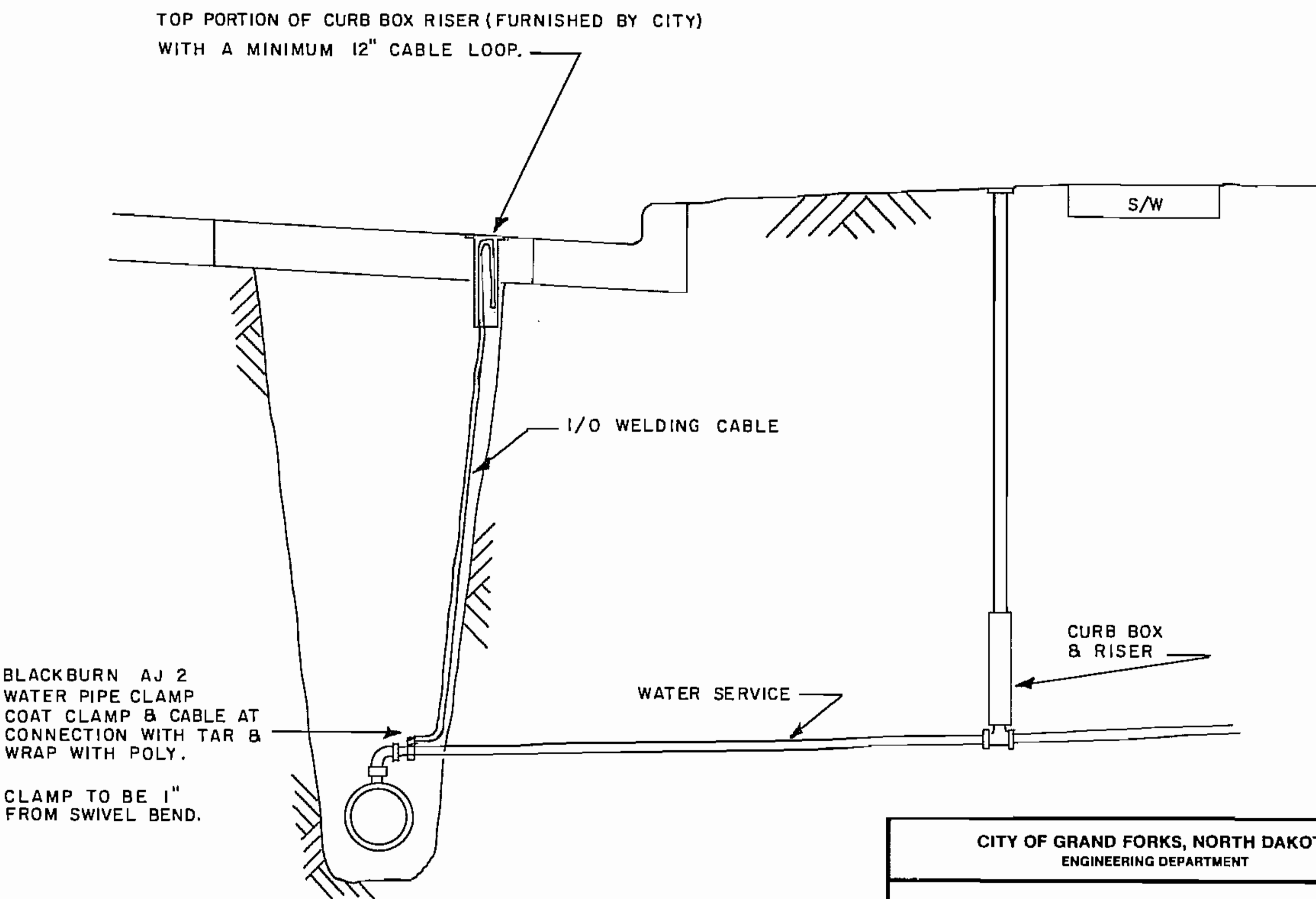
ELEVATION VIEW



PLAN VIEW

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
WATER SERVICE TO WATERMAIN HOOKUP DETAIL		
CITY ENGR. F. B. O.	DRAWN BY: G.L.U	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: K. Vein	DATE: 1/17/86

67.06



CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

GROUND ROD DETAIL

CITY ENGR F.B.O.	DRAWN BY: G.L.URNESS	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: K. Vein	DATE: 2 / 87

67.07

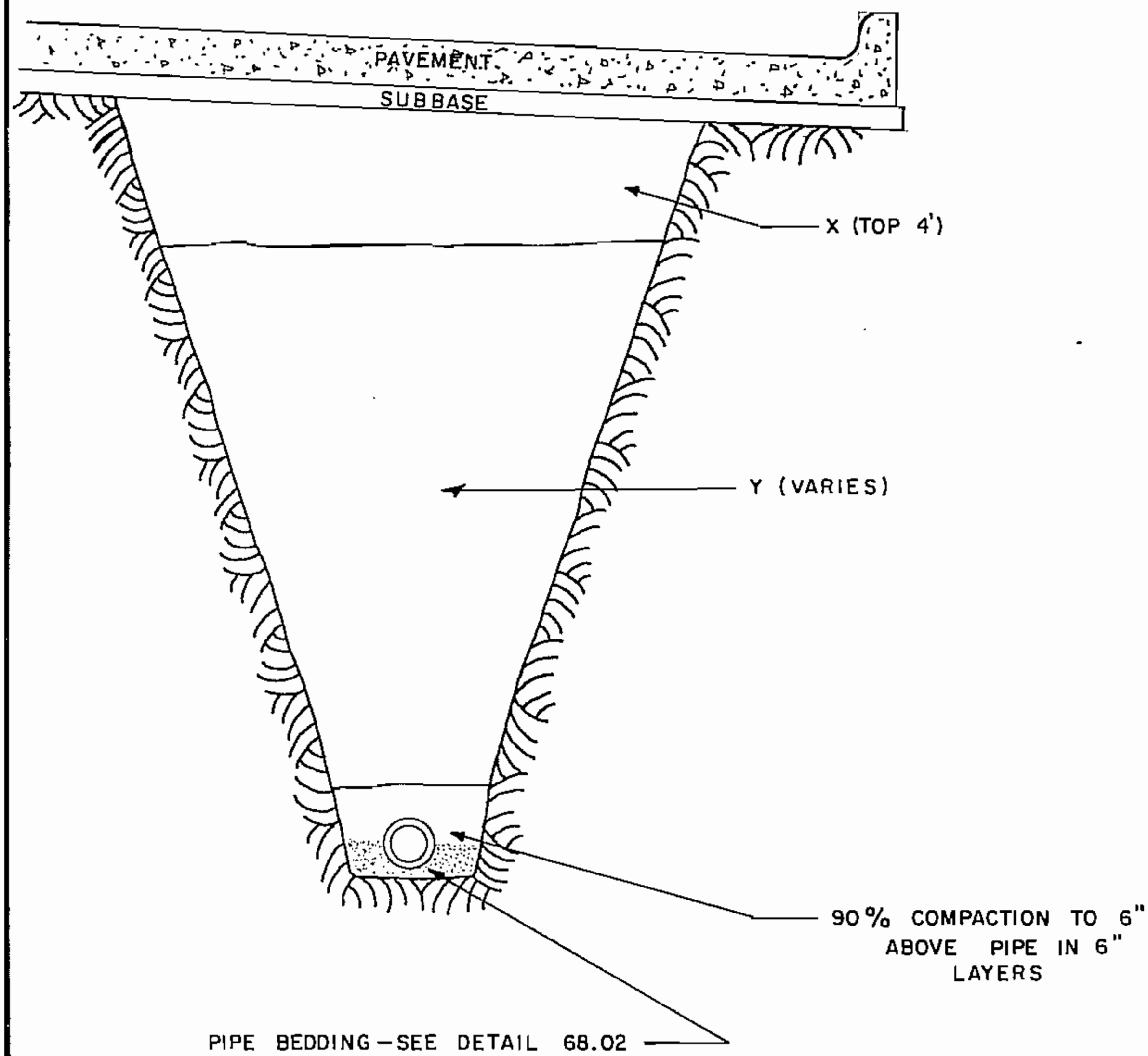


TABLE 21.07 — REQUIRED MIN. DENSITY

		BACKFILL CLASSES							
		AA*	A*	B	C	D	E	F	FF
DEPTH ZONE	X	100	100	100	95	90	85	80	NONE
	Y	100	90	90	90	85	80	80	NONE

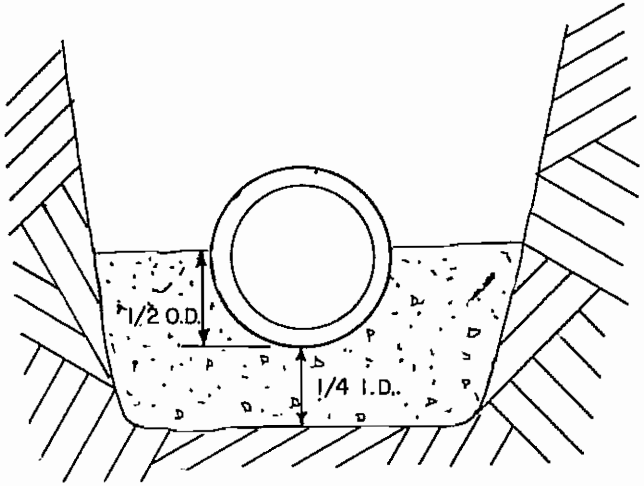
* ALL GRANULAR MATERIAL – SEE SPEC. 21.07

* ON ALL STREET CROSSINGS A 2 FT. CLAY CAP SHALL BE INSTALLED. CLAY SHALL BE COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR at 2 - 6% OVER OPTIMUM MOISTURE.

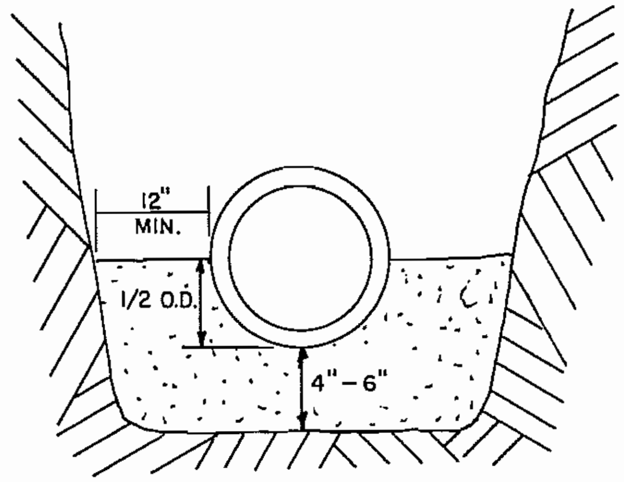
REV. 3/87 G.L.U.
REV. 2/83 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
— BACKFILL DETAILS —		
CITY ENGR. F.B. ORTHMEYER	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [signature]	DATE: 1/80

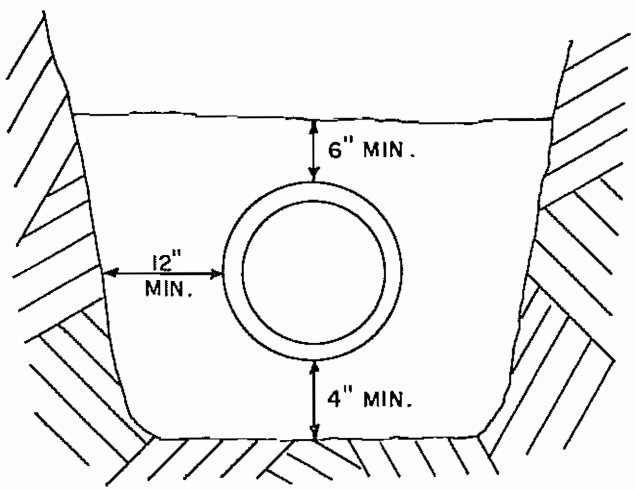
68.01



CLASS A BEDDING
CONCRETE OR DRY MIX



CLASS B BEDDING
CLASS 6 GRAVEL at 95% DENSITY

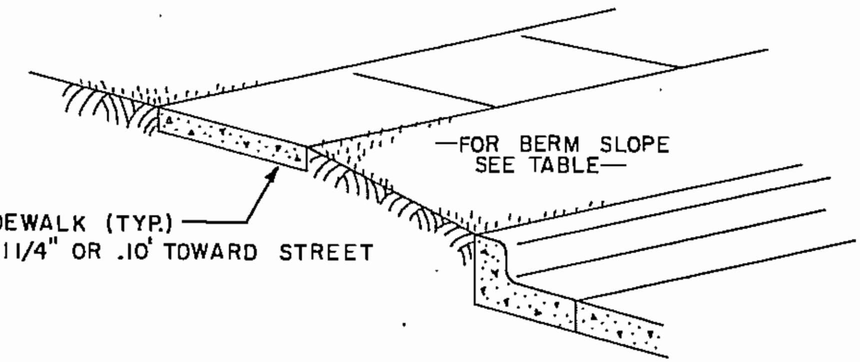


PVC PIPE BEDDING
SPECIALLY PREPARED BEDDING, CLASS 6 GRAVEL OR DRY MIX CONCRETE AT 95% DENSITY

REV. 2/20/87

CITY OF GRAND FORKS, NORTH DAKOTA ENGINEERING DEPARTMENT		
PIPE BEDDING DETAILS		
CITY ENGR. F.B.ORTHMEYER	DRAWN BY: G.L.URNESS	SCALE NONE
APPROVED BY:	CHECKED BY:	DATE: 2/21/85

68.02



NOTE: BERM WIDTH IN TABLE IS THE DISTANCE FROM BACK OF CURB TO THE SIDEWALK.

BERM WIDTH	MINIMUM RISE	MAXIMUM RISE
5.5'	.20'	.25'
8.5'	.30'	.60'
11.5'	.35'	.95'
14.5'	.40'	1.30'
15.5'	.40'	1.40'
17.5'	.45'	1.65'
18.5'	.50'	1.80'
20.5'	.50'	2.00'
23.5'	.55'	2.40'
26.5'	.60'	2.75'
29.5'	.65'	3.10'

SPEC. 21.10 BERMS & BOULEVARDS
SPEC. 25.09 SEEDING
SPEC. 25.10 SODDING

REV. 2/90 G.L.U.

CITY OF GRAND FORKS, NORTH DAKOTA
ENGINEERING DEPARTMENT

BERMS & BOULEVARDS

CITY ENGR. F. B.O.	DRAWN BY: B.J.B.	SCALE: NONE
APPROVED BY: [signature]	CHECKED BY: [initials]	DATE: 3/77

10.69