

**City of Green Bay  
Standard Specifications  
and  
Construction Standards**

**for  
Public Works Construction**



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City of Green Bay

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SECTION 101.

DEFINITIONS

AASHTO: American Association of State Highway and Transportation Officials.

ASTM: American Society of Testing and Materials

CALENDAR DAY: Every day shown on the calendar. Sundays and Holidays included.

CITY: By the term "City" is meant the City of Green Bay, a municipal corporation, organized and existing under and by virtue of the laws of the State of Wisconsin and situated in the County of Brown and State of Wisconsin.

CONTRACTOR: Whenever the word "Contractor" is used herein, it shall be understood to refer to the party or parties contracting to perform the work to be done under these general and detailed specifications, or to the legal representative of such party or parties.

ENGINEER: Whenever the word "Engineer" is used herein, it shall be understood to refer to the Director of Public Works and to his authorized representatives.

IMPROVEMENT AND SERVICE COMMITTEE: Whenever the words "Improvement and Service Committee" are used, it means the persons performing the duties of the Improvement and Service Committee for the said City of Green Bay, Wisconsin.

INSPECTOR: The authorized representative of the Engineer assigned to make detailed inspection of any or all portions of the work or materials thereof.

PLANS: The approved plans, profiles, typical cross sections, working drawings, and supplemental drawings, or exact reproduction thereof, which show the location, character, dimensions, and details of the work to be done.

PROJECT: The specific construction to be performed under the contract.

PROJECT AREA: The location of the construction to be performed under the contract.

SPECIAL PROVISIONS: Specifications adopted subsequent to the publication of these specifications which modify, supplement or otherwise depart from these specifications.

SPECIFICATIONS: The body of directions, provisions, and requirements contained herein, or in supplements thereto, together with written agreements and all documents of any description, made or to be made, pertaining to the method or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract.

SUBCONTRACTOR: Any individual, partnership, joint venture, or corporation to whom the Contractor, with written consent of the Engineer, sublets any part of the contract.

WORK DAY: A calendar day, except Saturdays, Sundays and State recognized legal holidays, on which weather and other conditions not under the control of the Contractor will permit construction operations to proceed with the normal working force.

SECTION 102.

BIDDING REQUIREMENTS AND CONDITIONS

A. BIDDERS RESPONSIBILITY

The work shall be let in accordance with the following sections of the Wisconsin State Statutes:

1. Section 62.15 regarding public works construction.
2. Section 779.15 regarding lien on contractors.
3. Section 66.293 regarding municipal wage scale.
4. Section 66.29(2) regarding proof of responsibility.

E. PREQUALIFICATION OF BIDDERS

In accordance with Wisconsin Statutes 66.29 (2) and (3), all bidders must submit to the Director of Public Works proof of responsibility on the form furnished by the Director of Public Works not less than five (5) days prior to the date of opening bids. Said proof of responsibility shall not be valid if filed prior to one year of the date of opening bids.

Whenever the Improvement and Service Committee is not satisfied with the sufficiency of the answers in the form, it may reject said bid, or disregard the same.

C. DISQUALIFICATION OF BIDDERS

Any one or more of the following causes may be considered as sufficient for rejection of the bid or bids and disqualification of the bidder from further bidding for such periods of time as shall be determined by the Improvement and Service Committee.

Developments subsequent to establishment of bidder's competence and qualifications which, in the opinion of the Improvement and Service Committee would reasonably be construed as affecting the responsibility of the bidder.

Conviction of a violation of a State or Federal law or regulation, or rule or regulation of a Federal Department, board or commission, relating to or reflecting on the competency of the bidder for performing construction work.

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

Evidence of collusion among bidders.

Lack of responsibility as shown by past work for the City.

Noncompliance with terms of previous or existing contracts.

Uncompleted work which, in the judgement of the Improvement and Service Committee, might hinder or prevent the prompt completion of additional work if awarded.

Uncompleted work on which the actual time used has exceeded the contract time set therefore, or on which work the performance or progress is not satisfactory in the judgement of the Improvement and Service Committee.

D. CONTENTS OF PROPOSAL

The proposal forms will state the location and limits of the proposed work, type of work, and hour and time proposal is to be opened. The time for completion of each alternate for each part of the contract is stipulated in the proposal as well as the amount of liquidated damages to be imposed upon the Contractor for failure to complete the contract in the prescribed time to reimburse the City for any expenses involved due to engineering, inspection, and inconvenience.

All papers bound with or attached to the proposal form are considered a part thereof and must not be detached or altered when the proposal is submitted. The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

E. PREPARATION OF THE PROPOSAL

The bidder shall submit his proposal on the form furnished by the City. The proposal shall be executed properly, and shall clearly specify a unit price in dollars and cents, both written and in numerals, for each item listed therein, and shall also show in numerals in the spaces provided for that purpose the products of the respective unit price and quantities, and the total amount of the bid obtained by adding the amounts of the several items.

In case of variation between written and numeral prices, the price written out shall govern. In case of conflict between a unit bid price and the corresponding extended amount, or in the absence of an extended amount, the unit bid price shall govern.

All writing shall be in ink or typewritten, except the signature of the bidder which shall be written with ink.

F. PROPOSAL GUARANTY

No proposal shall be considered unless accompanied by a bid deposit of the character and amount described in the Notice to Contractors.

G. DELIVERY OF PROPOSAL

The proposal shall be delivered in a sealed envelope and clearly marked "Proposal for \_\_\_\_\_", indicating definite contract or project, and addressed to the "Improvement and Service Committee, Green Bay, Wisconsin". No bid shall be withdrawn after opening of the bids without the consent of the City for a period of 30 days after the scheduled time for closing bid.

#### H. REJECTION OF PROPOSALS

Proposals may be rejected if they show any alterations of form, additions or amendments not called for, conditional or alternate bids unless called for, incomplete bids, erasures, or irregularities of any kind. Proposals in which the unit prices for some items are out of proportion to the prices for other items, or proposals in which unit prices are not submitted for each item of work listed may be rejected.

The right is reserved to reject any or all proposals, to waive technicalities, to readvertise for bids, or to proceed to do the work otherwise, if in the judgement of the Improvement and Service Committee the best interest of the City will be served thereby.

#### I. EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK

The bidder is required to examine carefully the work site, the proposal form, plans, specifications, special provisions and contract forms for the work contemplated. It will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered for performing the work as scheduled, and as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of the plans, specifications, special provisions and contract. The submission of the proposal shall be considered conclusive evidence that the bidder has made such examination and is satisfied as to all the conditions and contingencies.

When the plans or special provisions contain information relative to subsurface exploration, locations of underground structures, borings, soundings, water levels, elevations, profiles or other investigations, such information represents only the best knowledge of the Engineer and was obtained for design and estimating purposes only. It is made available to the bidder to provide him with the same information available to the Engineer, and is not intended as a substitute for personal investigation, interpretation and judgement of the bidder.

#### J. ESTIMATE OF QUANTITIES

An estimate of the quantity of work to be done under the specifications is stipulated in the proposal form. The quantities of work may be considered as approximate and for comparison of bids only. The City does not agree nor imply that the actual quantities involved in the work will correspond exactly therewith and shall not be liable for any misunderstanding as to the exact quantities, location, or conditions pertaining to the work.

SECTION 103.

AWARD AND EXECUTION OF THE CONTRACT

A. AWARD OF CONTRACT

The contract shall be deemed as having been awarded when notice of Council action thereon shall have been duly delivered to the successful bidder. As each part of the proposal may constitute the improvement of separate streets, or parts, the work outlined in the proposal may be awarded as a whole or in part or parts, according to the best interests of the City.

B. EXECUTION OF CONTRACT AND BOND

Within ten (10) days after notification of award, the Contractor shall contact the City Clerk and properly execute, on the forms provided, the contract and the 100% Performance Bond.

C. FAILURE TO EXECUTE CONTRACT

Failure on the part of the successful bidder to execute a contract and an acceptable performance bond, within ten (10) days after the date of notice of the award of the contract will, at the discretion of the Improvement and Service Committee, be just cause for the annulment of the award and for forfeiture of the proposal guaranty to the City, not as a penalty but in payment of liquidated damages sustained as a result of such failure.

D. REQUIREMENT OF PERFORMANCE BOND

This contract shall not become operative unless the Contractor on or before the time of signing the contract shall have furnished a surety bond in an amount at least equal to 100 percent of the contract price as security for all the faithful performances of this contract and for the payment of all persons performing labor and furnishing material in connection with the contract.

SECTION 104.

SCOPE OF WORK

A. INTENT OF PLANS AND SPECIFICATIONS

The intent of the plans and specifications is to provide for the construction complete in every detail of a complete improvement which the Contractor proposes to do in full compliance with the plans, specifications, and all other contract documents. The

Contractor shall perform all items of work stipulated in the proposal and all other altered or extra work in accordance with the lines, grades, typical sections and dimensions furnished and shall furnish, unless otherwise provided, all materials, tools, equipment, supplies, transportation and labor necessary for the production and completion of the work in the most expeditious and workmanlike manner. If the Contractor does not fully understand the plans and specifications or the intent concerning any part of the work, he shall satisfy himself by making the necessary inquiries of the Engineer before bidding. Such interpretation shall be given in writing as an addendum and shall be furnished to all contractors.

#### B. INTERFERENCE WITH UTILITIES

The Contractor shall meet the requirements of Wisconsin Statute 66.047. Whenever any mains, conduits, or services are encountered in the line of the work, they will be relocated or removed by the owner of said utilities. The cost of said relocation or removal shall be at the expense of the Utility involved.

Every effort has been made by the City to show underground utilities on the plan; this shall not relieve in any degree the Contractor's responsibility or obligation with regard to utilities not shown on plans.

No extra compensation will be paid for unavoidable delays caused by the interference of existing underground structures.

#### C. MODIFICATIONS

The Contractor shall modify the work whenever so ordered by the Engineer and such modifications shall not affect the validity of the contract. Modifications may involve increases or decreases in the amount of the work for which appropriate contract price adjustments will be made.

Except for minor changes which involve no contract price adjustment and with the exception of adjustments of estimated quantities for unit price work or materials to conform to actual pay quantities, all modifications shall be made under the authority of duly executed change orders.

The City reserves the right to omit any items in the proposal from the work and shall not be liable for any damage due to the loss of earnings for said omission and it shall not be a waiver of any conditions of the contract documents.

D. EXTRA WORK

If a modification increases the amount of the work, and the added work or any part thereof is of a type and character which can properly and fairly be classified under one or more unit price items of the Proposal, then the added work or part thereof shall be paid for according to the amount actually done and at the applicable unit price. Otherwise, such work shall be paid for as hereinafter provided.

Claims for extra work will not be paid unless the work covered by such claims is authorized in writing by the Engineer. The Contractor shall not have the right to prosecute or maintain either an arbitration proceeding or an action in court to recover for extra work unless the claim is based upon a written order from the Engineer. Payments for extra work will be based on agreed lump sums or on agreed unit prices whenever the Engineer and Contractor agree upon such prices before the extra work is started; otherwise payments for extra work will be based on actual field cost plus the specified percentage allowance.

For the purpose of determining whether proposed extra work will be authorized, or for determining the payment method of extra work, the Contractor shall submit to the Engineer, upon request, a detailed cost estimate for proposed extra work. The estimate shall show itemized quantities and charges for all elements of direct cost. Charges for the Contractor's and Subcontractor's extra profit, extra general superintendence, extra field office expense, and extra overheads shall be shown as a percentage addition to the total estimated net cost. Unless otherwise agreed upon by the Contractor and Engineer, the total of such percentage additions shall be fifteen (15) percent for the extra work by either the Contractor and/or his Subcontractor.

When payment for extra work is based on actual field cost, the Contractor will be paid the actual field cost plus an allowance of fifteen (15) percent if the extra work is performed by the Contractor or his Subcontractor. The allowance will be paid as full compensation for both the Contractor's and Subcontractor's extra profit, extra general superintendence, extra field office expense, extra overheads, and all other elements of extra cost not defined herein as actual field cost.

The actual field cost shall include only those extra costs for labor and material expended in direct performance of the extra work and may include:

1. The actual payroll cost of all workmen such as laborers, mechanics, craftsmen and foremen.
2. The Contractor's and/or Subcontractor's net cost for materials and supplies.
3. The rental charge for vehicles and construction equipment.

4. The transportation charges for equipment.
5. The charges for extra power, fuel, lubricants, water and special services.
6. The charges for extra payroll taxes, bond premiums, and insurance premiums.

The form in which actual field costs records are kept, the construction methods and the type and quantity of equipment used shall be acceptable to the Engineer.

Construction equipment which the Contractor has on the job site and which is of a type and size suitable for use in performing the extra work shall be used. The hourly rental charges for equipment shall apply to only the actual time the equipment is used in performing the extra work.

When extra work requires the use of equipment which the Contractor does not have on the job site, the Contractor shall obtain the concurrence of the Engineer before renting or otherwise acquiring additional equipment.

#### E. MAINTENANCE OF INGRESS AND EGRESS

Where the work on any project abuts any business establishment, the Contractor shall maintain ingress and egress to said business establishment as far as is practical. The work on any project shall be carried on in such a manner as to interfere as little as possible with both pedestrians and vehicular ingress and egress. In all events, the Contractor shall maintain a safe and satisfactory passage for pedestrians along and across the works, installing temporary walks where necessary in the opinion of the Engineer. The Contractor shall also install temporary roadways where considered necessary by the Engineer.

#### F. FINAL CLEANUP

Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the project area all surplus and discarded materials, rubbish and temporary structures and leave the project area in a neat presentable condition. The Contractor shall restore, at his own cost and expense, all work completed under other previous contracts which has been damaged by his operations, in general conformity with the specifications for the item or items involved. Final cleanup shall be considered subsidiary and incidental to the other items of the contract, and no separate or additional compensation will be made therefore. Work days shall be charged against the Contractor until all cleanup is complete and to the satisfaction of the Engineer.

SECTION 105.

CONTROL OF WORK

A. AUTHORITY OF ENGINEER

All work shall be done under the supervision of the Engineer and to his satisfaction. He shall decide all questions which arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rate of progress of the work, interpretation of the plans and specifications, acceptable fulfillments of the contract, compensation, and dispute and mutual rights between Contractors under the specifications. He shall determine the amount and quantity of work performed and materials furnished and his decision and estimate shall be final. His estimate in such event shall be a condition precedent to the right of the Contractor to receive money due him under the contract. The Engineer shall have executive authority to enforce and make effective such decisions and orders as the Contractor fails to carry out promptly, and in case of failure on the part of the Contractor to execute work ordered by the Engineer, the Engineer may, at the expiration of a period of 48 hours after giving notice in writing to the Contractor, proceed to execute such work as may be deemed necessary and the cost thereof shall be deducted from compensation due or which may become due the Contractor under the contract.

All decisions of the Engineer shall, when so requested, be rendered in writing. They shall be final and conclusive in all matters unless within ten (10) days after such decision the Contractor applies in writing to the Improvement and Service Committee for a review of such decision.

When an application for review of the Engineer's decision is presented, said Committee shall, within ten (10) days thereafter, give opportunity for the Contractor to appear before it and the Engineer, and present evidence bearing upon such decision, and any claims for a modification or reversal thereof.

Said Committee shall render its decision within ten (10) days after such appearance and its decision shall be final unless the Contractor shall, within ten (10) days after receiving the decision, give notice in writing of his intention to file suit in court for the final determination of the matter.

B. CONFORMITY WITH PLANS AND SPECIFICATIONS

All work performed and all materials furnished shall be in conformity with the lines, grades, cross sections, dimensions and material requirements shown on the plans or indicated in the specifications. It shall be finished to produce quality work and appearance within the limits of precision expected of good construction.

The lines, grade, typical sections, and dimensions shown on the plans are subject to adjustment by the Engineer during construction, but any deviation of a character not contemplated or provided for in the plans or specifications that may be required to successfully complete the project will be determined by the Engineer and authorized by him in writing.

In the event the Engineer finds the materials or the finished product in which the materials are used not within reasonable close conformity with the plans and specifications through no willful neglect or omission by the Contractor but that reasonably acceptable work has been produced, he shall then make a determination if the work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification which may provide for appropriate adjustment in the contract price for which such work or materials as he deems necessary to conform to his determination based on engineering judgement.

In the event the Engineer finds the materials or the finished product in which the materials are used or the work performed are not in reasonably close conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

#### C. COORDINATION OF CONTRACT DOCUMENTS

The following component parts and all supplemental documents are essential parts of the contract and requirements occurring in one is as binding as though occurring in all.

1. Addenda
2. Notice to Contractors
3. Instructions to Bidders
4. Special Provisions
5. Proposal
6. Plans
7. Contract
8. Construction Standard and Standard Specification
9. Performance Bond

In the event that any provision in any of the above component parts conflicts with any provision in any other of the component parts, the provision in the component part first enumerated above shall govern any other component part which follows it numerically, except as may be otherwise specifically stated. Unless obviously incorrect, calculated dimensions will govern over scaled dimension.

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications, and the Engineer shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the plans and specifications.

D. COOPERATION BY CONTRACTOR

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer, his inspectors, and with other contractors and/or utilities on or near the work in every way possible.

The City reserves the right at any time to contract for and perform other or additional work on or near the work covered by any contract. The Contractor shall arrange and conduct his work so as not to interfere with or hinder the progress or completion of the work being performed by other contractors and to join his work to that of others in a proper manner, and in accordance with the spirit of the plans and specifications, and to perform his work in proper sequence in relation to that of other work, all as may be directed by the Engineer.

The Contractor shall be held responsible for any damage done by him or his agents to the work performed by another contractor. Each Contractor shall conduct his operations and maintain the work in such condition that adequate drainage shall be in effect at all times.

In case of a dispute arising between two or more Contractors engaged on the same improvement or in different improvements as to the respective rights of each under the specifications, the Engineer shall be the referee and his decision shall be final and binding on all parties concerned and shall not be cause for any extra compensation to any of the parties involved.

E. MAINTENANCE OF FIELD OFFICE

The Contractor shall supply the Department of Public Works with a list of responsible people who can be reached in case of emergency and the Contractor shall supply a field office in the City of Green Bay if his main office is located farther than ten miles from the City limits.

F. SETTING LINE AND GRADE

The alignment and grade of the construction work shall be staked by the Engineer or his authorized representative and shall not be changed without his approval. Said alignment and grade shall be set on stakes parallel with the work or marked on the sidewalk. It shall be the duty of the Contractor to transfer the grades and alignment from the stakes or sidewalk markings to subgrade and forms in a manner and method approved of by the Engineer. The Contractor shall preserve all stakes, markings, benchmarks, etc. set for establishing the line of work. Careless destruction of these alignment and grade markings shall be replaced at the expense of the Contractor. Each part of the work shall be executed in the order designated by the Engineer.

#### G. INSPECTION AND TESTING

All materials and each part or detail of the work shall be subject at all times to inspection by the Engineer or his authorized representatives. Such inspection may include mill, plant, field or shop inspection. The Engineer or his representatives shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. The presence or absence of an inspector shall not relieve in any degree the responsibility or obligation of the Contractor.

If materials do not prove uniform and satisfactory, they shall be rejected, said rejection being based solely on the tests prescribed on the materials involved. They shall be stored in such a manner as to preserve their quality. Samples of materials shall be taken in accordance with standard practices and as often as the Engineer deems advisable or necessary. The Contractor shall afford such facilities as the Engineer may require and shall furnish the samples without charge.

The Contractor shall, if the Engineer requests, remove or uncover such portion of the finished work as the Engineer may direct before the final acceptance of the same. After the examination, the Contractor shall restore said portion of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the expenses of uncovering or removing and replacing of the parts removed shall be paid for as Extra Work, but should the work so exposed or examined prove unacceptable, the expenses of uncovering or removing and the replacing of the same in accordance with the specifications shall be borne by the Contractor.

#### H. REMOVAL OF DEFECTIVE MATERIALS AND WORKMANSHIP

All materials furnished and work done will be inspected by the Engineer, and if not in accordance with these specifications, they will be rejected and shall immediately be removed from the premises and other materials furnished and work done in accordance herewith. If the Contractor refuses to remove the work and materials when ordered, the Engineer shall have the right and authority to stop the Contractor at his work at once and the Engineer shall cause the faulty work and materials to be removed and corrected at the cost and expense of the Contractor. Such expense shall be deducted from the monies then due or to become due to the Contract. If, however, the Engineer shall fail or neglect to correct any faulty or defective material or work as outlined above, the Contractor shall not be relieved of correcting said material or work and the right of final acceptance or condemnation of the work shall not be waived in any manner by reason of said failure or neglect on the part of the Engineer.

## I. GUARANTEE

Unless otherwise stated in the special provisions, the Contractor shall guarantee the work performed under this contract for a period of one year from the date of final acceptance by the Common Council against defects in workmanship or materials. If any defect should appear during the guarantee period, the Contractor shall make required replacement or acceptable repairs of the defective work at his own expense. This expense includes total and complete restoration of any disturbed surface to original or better than original condition which existed before the repairs or replacement, regardless of improvements on lands where the repairs or replacement is required.

## SECTION 106.

### LEGAL REQUIREMENTS & PUBLIC RESPONSIBILITY

#### A. LAWS TO BE OBSERVED

The Contractor shall at all times observe and comply with all Federal and State laws and administrative rules, local laws, ordinances and regulations which in any manner affect the conduct of the work, and the hiring of labor and all orders or decrees of bodies or tribunals having jurisdiction or authority over the work. No plea of misunderstanding or ignorance thereof will be considered. He shall indemnify and save harmless the City and all of its officers, agents, and employees 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, subcontractors or agents. The Contractor shall procure all permits and licenses and pay all charges and fees and give all notices necessary and incident to the lawful prosecution of the work.

#### B. PATENTED PROCESSES

It is understood and agreed that, without exception, the contract prices bid in the proposal are to include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work and the Contractor shall indemnify and save harmless the City and all its agents from any and all claims from infringement by reason of said use.

#### C. SAFETY, HEALTH AND SANITATION

The Contractor shall comply with all Federal, State and local laws governing safety, health and sanitation, and shall provide all safeguards, safety devices and protective equipment and take any other needed actions, on his own responsibility or as the Engineer may determine, reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

D. PUBLIC PROTECTION AND SAFETY

The Contractor shall notify the Engineer, Police Department, Fire Department, and all involved utilities and railroad companies at the earliest possible date of the starting of any construction so that arrangements may be made, if necessary, for closing the street and providing satisfactory detours, ingress, and egress. The Contractor shall conduct the work at all times in such a manner as to insure the least obstruction to traffic. The convenience of the general public and of the residents along the street shall be provided in a satisfactory manner as outlined in Subsection 104-E, MAINTENANCE OF INGRESS AND EGRESS.

The Contractor shall avoid as far as possible the maintenance of any condition which might be deemed at law to be an "attractive nuisance." Where such condition is unavoidable or where apparent or potential hazards occur incident to his conduct of the work he shall maintain a proper watch or provide other reasonable safeguards.

The Contractor and his surety shall be responsible for all damage, bodily injury, or death arising through his negligence either in maintaining an attractive nuisance or otherwise.

E. BARRICADES AND WARNING SIGNS

All work sites shall be signed and barricaded in accordance with the "Manual of Traffic Controls for Street Construction and Maintenance Operations for the City of Green Bay". No more than one lane of any street shall be closed to traffic at any time without prior approval of the Engineer. No equipment or materials shall be stopped, loaded or stored in a location which will hinder, distract, or impede a safe and suitable traffic operation on lanes of the roadway required to be kept open to traffic unless otherwise approved by the Engineer. The Contractor shall be liable for damages for failure to erect and maintain suitable barricades, signs and lights.

F. PROTECTION AND RESTORATION OF PROPERTY

The Contractor shall use every reasonable precaution to prevent the damage or destruction of private property such as poles, trees, shrubbery, crops and fences adjacent to or interfering with the work; all overhead structures such as wire, cables, etc.; and all underground structures such as water or gas shut-off boxes, water meters, pipes, conduits, etc. within or outside of the right-of-way.

The Contractor shall notify the owners of all corporate or private property which interferes with the work advising them of the nature of the interference, and shall arrange with them for the disposition of such property. The Contractor shall furnish the Engineer upon request with copies of all such notifications and final agreements.

The Contractor shall be responsible for the damage or destruction of property resulting from neglect, misconduct, or omission in his manner or method of execution or non-execution of the work, or caused by defective work or the use of unacceptable materials, and shall restore such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding, or replacing it as may be directed, or he shall otherwise make good such damage or destruction in an acceptable manner. If he fails to do so, the Engineer may, after the expiration of a period of 48 hours after giving notice to him in writing, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his contract.

#### G. USE OF FIRE HYDRANTS

To use fire hydrants, the Contractor must obtain permission from the Green Bay Water Department prior to using any specific hydrant. For more than one use of a hydrant, notice shall be given to the Green Bay Water Department at least once a week, indicating the date, hydrant, and amount of water used for each incident. Proper hook-up connections shall be acquired from the Green Bay Water Department to be used whenever a hydrant is utilized. All costs associated with the use of fire hydrants shall be the responsibility of the Contractor.

#### H. DUST CONTROL

The Contractor shall make every effort to keep the amount of dust to a minimum. The manner of dust control shall be approved by the Engineer.

#### I. MAIL BOXES

Where requested by the U.S. Post Office during construction, mail boxes shall be temporarily relocated by the Contractor as directed by the Engineer and later reinstalled at their permanent site. The cost of this work shall be considered incidental and included in the contract.

J. CONTRACTOR'S RESPONSIBILITY FOR WORK

The work shall be under the charge and care of the Contractor until final acceptance by the City Council. The Contractor shall assume all responsibility for injury or damage to the work by action of the elements or from any other cause whatsoever, and shall rebuild, repair, restore, and make good, at his expense, all injuries or damages to the work, except that when the project is placed in operation by order of the Engineer, the provisions of this article shall not apply to damage caused by such operation and not due to the Contractor's fault or negligence.

In case of suspension of work from any cause whatever, the Contractor prior to suspension shall take such precautions as may be necessary to prevent damage to the project, provide for normal drainage and shall erect any necessary temporary barricades, signs or other facilities, at his expense, as directed by the Engineer.

K. INSURANCE REQUIREMENTS

General: No Contractor shall commence work on any Contract until he has obtained all insurance required under this section and such insurance has been approved by the City. Nor shall any Contractor allow any Subcontractor to commence work on his Subcontract until the same insurance has been obtained by the Subcontractor and approved by the City. Each and every Contractor and Subcontractor shall maintain all required insurance under this section during the life of the Contract and for not less than one year thereafter.

Certificates of Insurance: Certificates of Insurance on all policies specified shall be filed with the City Insurance Department which shall include a thirty (30) day prior written notice of material change or cancellation to the City and which will clearly state that contractual liability insurance is provided and, if applicable to work under this contract, explosion, collapse and underground coverage.

Types of Insurance:

1. Workers' Compensation Insurance to meet Wisconsin Statutory requirements.
2. Comprehensive General and Automobile Liability Insurance limits of liability applicable to general and automobile insurance shall be not less than:

Bodily Injury and Property Damage Liability  
\$1,000,000 each occurrence  
\$1,000,000 aggregate or \$1,000,000 Single Limit

Comprehensive Automobile Liability to include all owned, non-owned and hired automobiles.

Comprehensive General Liability to include premises and operations, Contractor's protective liability, Products Liability including Completed Operations coverage and Contractual Liability.

If applicable to work under this contract, the Contractor shall provide proper endorsements to cover property damage liability normally excluded under insurance code numbers bearing the symbols "X" and/or "C" and/or "U".

### 3. Broad Form Property Damage.

Indemnification: The Contractor shall indemnify and hold harmless the City, its officers, agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the work, provided that any such claim, damage loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, and (b) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

In any and all claims against the City, its officers, agents and employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this section shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under Workers' Compensation Acts, disability benefit acts or other employee benefit acts.

Builders' Risk Insurance: (This does not apply to additions and/or alterations on existing structures.)

Unless otherwise provided, the City shall purchase and maintain fire insurance, extended coverage, vandalism and malicious mischief upon the entire structure on which the work of this contract is to be done equal to 100% of the insurable value. (Builders' Risk-Completed Value)

The City may at its discretion, purchase All Risk Builders' Risk Coverage.

The City, Contractor and Subcontractor waive all rights of subrogation against each other for damages caused by fire and other perils covered by insurance provided for under the terms of the Contract, except such rights as they may have to the proceeds

of the insurance held by the City as trustee. The Loss, if any, is to be made adjustable with and payable to the City as trustee for the insured Contractor and Subcontractor as their interests may appear, except in such cases as may require payment of all or a proportion of said insurance to be made to the Mortgagee as his interest may appear.

No insurance required under the Contract shall be carried with an insurer not authorized to do business in Wisconsin by the Wisconsin State Insurance Department. The City reserves the right to disapprove any insurance company.

L. PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the provisions of this contract or in exercising any power of authority granted to them thereby, there shall be no personal liability upon the City, its agents and employees, it being understood that in such matters they act as agents and representatives of the City. Any right of action by the Contractor against the City, or its agents or employees, is hereby expressly waived.

M. WAGE REQUIREMENTS

In accordance with Section 66.293, Wisconsin Statutes, and Section 4.12 Code of General Ordinances of the City of Green Bay, the City Council has established by resolution a minimum rate of wage scale to be paid by the Contractor to employees upon any project of public works. A copy of said wage scale is on file in the office of the City Clerk.

The Contractor shall file with the Department of Public Works a weekly payroll report of all employees engaged upon the project within seven (7) days of the closing of each week that work is performed on the project using forms furnished by the City Clerk. Upon completion of the project, the Contractor shall file with the City Clerk a certification that he has complied with the rate of wage scale. In accordance with Section 66.293(3)(f) of the Wisconsin Statutes, Contractors shall post in a conspicuous and easily accessible place at the site of the project a copy of the wage rate determination. Municipal wage rate enforcement shall be as provided in Section 66.293 (3)(m) Wisconsin Statutes.

N. EQUAL EMPLOYMENT OPPORTUNITY

The Contractor shall not discriminate against employees and applicants for employment because of their race, color, religion, sex, or national origin.

SECTION 107.

PROSECUTION AND PROGRESS

A. SUBLETTING OR ASSIGNMENT OF CONTRACT

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or any portion thereof, or of his right, title, or interest therein, without written consent of the Engineer.

Consent to sublet any portion of the contract shall not be construed to relieve the Contractor of any responsibility for the fulfillment of the contract or to release the Contractor of his liability under the contract and bond.

Requests for permission to sublet any portion of the contract shall be in writing and accompanied by a showing that the organization which will perform the work is particularly experienced and equipped for such work. The Engineer may also require that each request be accompanied by a copy of the proposed subcontract. Any subsequent change in the terms of the subcontract shall be subject to separate approval.

Work by a Subcontractor shall not proceed until the request for permission to sublet such work is approved. If the Contractor proposes to have work performed by a person or firm other than a Subcontractor, he shall inform the Engineer in writing, if required, of the specific arrangement under which the work will be performed, so that it may be established whether or not such arrangement constitutes subcontracting.

B. NOTICE TO ENGINEER OF INTENT TO BEGIN WORK

The Contractor shall not begin work on any part of the contract until after receiving notice from the City. The Contractor shall then give written notice to the Engineer at least 48 hours in advance of the date he intends to commence operations. The Engineer shall, however, have full and complete authority to designate the time of beginning work on any part of the contract and to schedule the operations of the Contractor in such a manner as to cause a minimum of inconvenience to the general public.

C. LIMITATION OF OPERATIONS

A Contractor shall conduct the work so as to create a minimum amount of inconvenience to vehicular and pedestrian traffic. The Engineer may require the Contractor to finish part of the contract on which work is in progress before work is started on any additional part.

D. WEATHER CONDITIONS

In the event work is prosecuted during adverse weather conditions, the Contractor will be required to exercise precautions necessary to produce satisfactory work, and shall protect the finished work from the elements. It is agreed and understood that the cost thereof has been included in the unit prices bid for the various items of work in the contract and that no extra compensation will be allowed, therefore.

E. SUPERINTENDENT OF WORKS

The Contractor shall employ a chief foreman or superintendent on the works experienced and sufficiently capable to satisfactorily superintend all operations and to schedule both operations and the flow of material to the works. There shall also be employed on the works an ample force of men sufficiently trained and experienced in various phases of operations to conduct the work expeditiously and in a workmanlike manner.

F. COMPETENT WORKMEN

All employees on the work involved under these specifications shall be able and competent. The Engineer may demand the dismissal of any person employed by the Contractor or Subcontractor on or about the work who shall misconduct himself or be incompetent or neglect or refuse to comply with the directions given and shall not be re-employed without the written consent of the Engineer. The Engineer may suspend the work until such orders are complied with.

G. METHODS AND EQUIPMENT

The Contractor shall provide and furnish the machinery, equipment and tools necessary to perform the work. These shall be in such condition and of such capacity as will produce work of satisfactory quality and complete it within the contract time.

Equipment shall be such that no injury to the roadway, pavement, structures, adjacent property, or other streets will result from its use, and it shall conform to the requirements set forth in detail under specific items or classes of work.

Failure on the part of the Contractor to provide adequate equipment, maintained in proper working order, may be sufficient cause for suspension of specific operations until compliance is attained or may constitute cause for default of contract.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the contract, the Contractor is free to use any methods or equipment that he demonstrates to the satisfaction of the Engineer will accomplish the contract work in conformity with the requirements of the contract.

When the contract specifies the use of certain methods and equipment for the work, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than those specified in the contract, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing construction work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining construction with the specified methods and equipment. The Contractor shall remove the deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the construction items involved nor in contract time as a result of authorizing a change of methods or equipment under these provisions.

#### H. SUSPENSION OF WORK

The Engineer shall have the authority to order the partial or complete suspension of operations for such period or periods as he may deem necessary, in the interest of public safety and convenience, or due to unsuitable weather and such other conditions as are considered unfavorable for prosecution of satisfactory work, or for such time as is necessary due to failure on the part of the Contractor to carry out orders given or to perform any or all provisions of the contract. Authorizations or orders to suspend work shall be in writing. Unless specifically provided, no additional compensation or additional contract time will be allowed due to such suspension of operations.

#### I. CONTRACT TIME

Time for completion of each part of the work under this contract will be specified in each part of the proposal as a specific number of calendar days, including Sundays and Holidays. It is agreed and understood that the completion of the work within the time as specified is an integral part of the contract. The starting date of the contract will be the date the Contractor begins work on that particular part of the contract, but in no event will it be later than the date the Engineer requests the Contractor to begin work on that particular part of the Contract by written notification.

Contract time may be extended in an amount as mutually agreed by the Contractor and the Engineer providing the Contractor requests said extension in writing at least ten (10) days prior to the expiration of the contract time for that part of the contract. Contract time will be extended only to avert extreme hardship on the Contractor and providing the best interests of the City of Green Bay are served by said extension.

J. FAILURE TO COMPLETE WORK IN TIME

Failure of the Contractor to complete any part of the work as outlined in the proposal, in the time specified therein or within such extra time as may have been allowed by extensions of contract time by the Engineer, shall result in the deduction of a sum of money as stipulated in the proposal from any monies due or that may become due to the Contractor. Said sum shall be considered and treated not as a penalty but as a fixed, agreed, and liquidated damages due to the City of Green Bay from the Contractor by reason of inconvenience to the public, added cost of engineering and supervision and other items which have caused an expenditure of public funds resulting from failure to complete the work within the time specified in the proposal.

Permitting the Contractor to continue working after the expiration of the time fixed for its completion or after the date of time extension shall in no way act as a waiver on the part of the City of Green Bay for any of its rights under the contract.

K. DEFAULT ON CONTRACT

The Improvement and Service Committee of the City of Green Bay shall have the right and power to make final determination as to the proper performance of this contract. In the event the Contractor fails to perform the work in accordance with these specifications or in any way defaults therein or shall discontinue the prosecution of the work, the Improvement and Service Committee may take charge of the work and complete the same or cause it to be completed at the charge, cost, and expense of the Contractor and Surety and in such event, the owner may take possession of and utilize in the completion of the work such materials, applicances, and plant as may be on the site of the work and necessary for its completion.

SECTION 108.

MEASUREMENT AND PAYMENT

A. MEASUREMENT OF QUANTITIES

All work completed under the contract will be measured by the Engineer according to the United States standard measure. The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to a good engineering practice.

The completed work will be measured for final payment by the Engineer, as specified for the various items elsewhere in these specifications, to determine the quantities of such items of work performed, except when contract change orders have been executed providing for other methods of measurement. The Contractor will be paid for the actual amount of work performed in accordance with the contract, as shown by the final measurements or upon the basis of plan quantities.

B. SCOPE OF PAYMENT

The Contractor shall accept the compensation, as herein provided, in full payment for furnishing all materials, labor, tools, and equipment necessary for performing all work contemplated and embraced under the contract; also for loss or damage arising from the nature of the work or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the Engineer; and for all insurance, compensation and 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 any infringement of patent, trademark, or copyright; and for completing the work according to the contract.

The payment of any current estimate prior to final acceptance of the work by the City shall in no way constitute an acknowledgement of the acceptance of the work nor in any way prejudice or affect the obligation of the Contractor, at his expense, to repair, correct, renew or replace any defects or imperfections in the construction or in the strength or quality of the materials used in or about the construction of the work under contract and its appurtenances, or any damage due or attributable to such defects, which defects, imperfections or damage shall have been discovered on or before the final inspection or acceptance of the work. The Engineer shall be the sole judge of such defects, imperfections or damage and the Contractor shall be liable to the City for failure to correct the same as provided herein.

In accordance with Section 779.15 of the Wisconsin Statutes no monies, payable under the contract, or any part thereof, except the estimate for the first month or period, shall become due and payable if the City so elects, until the Contractor shall satisfy the City that he has fully settled or paid for all materials and equipment used in or upon the work and labor done in connection therewith, and the City, if it so elects, may pay any or all such bills, wholly or in part, and deduct the amount or amounts so paid from any partial or final estimate, excepting the first estimate.

#### C. PARTIAL PAYMENTS

Partial payments based on the value of the work performed or materials furnished, at contract or agreed unit or lump sum prices, will be made to the Contractor as the work progresses, except that partial payments will not be made as long as the Contractor fails to comply with any order given him by the Engineer in accordance with the contract.

At least once each month, provided that a payment of \$10,000.00 or more becomes due, which amount may at the Engineer's discretion be reduced, the Engineer will make an estimate of the quantities of work performed and the value thereof at contract or agreed unit or lump sum prices.

The quantities included shall be computed to reflect the approximate amount of work completed, or substantially completed under each of the pertinent contract items to the date of the estimate less, in each case, an allowance adequate to cover contingencies and costs still to be incurred incident to finishing, maintaining, repairing and restoring the work, and to cover possible variations between the contract and final quantities in instances where contract quantities are used as a basis for the estimate.

From the total amount of the estimate determined as provided above, the retainage shall be an amount equal to 10% of said estimate until 50% of the work has been completed. At 50% completion, further partial payments shall be made in full to the Contractor and no additional amounts may be retained unless the Engineer certifies that the job is not proceeding satisfactorily, but amounts previously retained shall not be paid to the Contractor until after the completion of the entire contract and final acceptance of the work.

Should any defective work or material be discovered, or should a reasonable doubt arise as to the integrity of any part of the work completed previous to the final acceptance and payment, there will be deducted from the first estimate rendered after the discovery of such work an amount equal in value to the defective or questioned work, and this work will not be included in a subsequent estimate until the defects have been remedied or the causes for doubt removed.

All material and work covered by partial payments made thereupon become the property of the City, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the City to require the fulfillment of all terms of the contract.

D. ACCEPTANCE AND FINAL PAYMENT

When the project has been completed and accepted by the Engineer, the Engineer will prepare the final estimate of the quantities of the various classes of work performed. After review and acceptance of the estimate by the Contractor, and after acceptance of the project by the City Council, the Contractor will be paid the entire sum found to be due after deducting all previous payments and all amounts to be deducted under the provisions of the contract.

All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

PART II

PART II  
BUILDING DEMOLITION

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## SECTION 201.

### RAZING AND REMOVAL OF BUILDINGS

#### A. GENERAL

This work shall consist of razing and removing of buildings, disposing of resulting materials, and the filling of basements and excavated areas.

The Contractor must obtain the necessary razing permits from the City of Green Bay Building Inspection Department prior to the commencement of demolition work.

#### B. CONSTRUCTION METHODS

Utility Piping: All utility piping, basement drains, sewers and the like shall be cut off at the building line and permanently bulkheaded by a method approved by the Engineer. No moving or razing operations may begin until all bulkheads are approved by the Engineer or City Plumbing Supervisor.

Breaking Down: In the buildings that have common walls with occupied buildings or with buildings not included in the contract, the exterior walls, interior partitions, and other supports shall be removed floor-by-floor. If a building is free-standing or has common walls with vacant buildings that are part of the contract, then the entire building may be razed at one time. At no time shall all horizontal support from exterior walls or partitions be removed so as to permit the walls to stand unsupported.

All exterior walls, interior bearing walls, ground level floors, and partitions shall be completely removed. All basement floors shall be broken up into pieces having an area not greater than four square feet. All foundation walls shall be removed to a point three feet below the sidewalk grade or the existing ground grade, whichever is the lowest. All existing concrete walkways, steps, and entrance slabs within the property limits shall be removed.

The Contractor shall take the necessary precautions to protect all common walls of occupied buildings and of buildings not part of the contract. The Contractor is responsible for any damage to these common walls.

Streets, alleys, and private property shall be adequately protected by erecting proper fences, scaffolds, planking, guard rails, and toe-boards, to prevent the falling of debris on sidewalks or streets. All protective devices shall be approved by the Engineer, and shall be in place prior to the razing of any building.

Hazardous Waste: Any material encountered that is classified as hazardous waste by the Wisconsin Department of Natural Resources must be separated, contained, and disposed of according to applicable State and Federal regulations.

Air Quality: In the demolition process, the Contractor must pay particular attention to asbestos, and must control its emission into the air according to guidelines set forth in the Wisconsin Administrative Code, including but not limited to Chapter NR 154. The Contractor shall make every effort to keep construction dust to a minimum as required by the Wisconsin Administrative Code and directed by the Engineer. In accordance with Chapter NR 154 of the Wisconsin Administrative Code, the Contractor must notify the Wisconsin Department of Natural Resources of his intention to demolish the buildings 20 days prior to commencement of the demolition. In all phases of the demolition, the Contractor must follow the Wisconsin Administrative Code.

Disposable Material: All demolition waste and all salvageable material, other than that stated specifically to remain the property of the City, is the property of the Contractor and must be removed from the premises. Excessive accumulation of either salvageable material or demolition waste will not be permitted. All materials shall be disposed of by the Contractor in consistency with ordinances of the City of Green Bay and Brown County, and with regulations set forth in the State of Wisconsin Administrative Code.

Filling Basements and Excavated Areas: All loose material and debris shall be removed from the basement and other excavated areas. Unfilled basements and other excavated areas shall be immediately barricaded and fenced off in a manner acceptable to the City. Upon ascertaining that all openings, pipelines, drains, etc., have been properly capped, the basements and all excavated areas shall be filled as soon as possible to within 8 inches of the existing grade with granular material meeting the following gradation: 98% shall pass the 3-inch screen and not less than 25% shall pass the No. 4 sieve. That portion of the material which passes the No. 4 sieve shall conform to the following requirements:

<u>SIEVE SIZE</u>	<u>PERCENTAGE BY WEIGHT PASSING</u>
No. 4	100
No. 40	Not more than 75
No. 100	Not more than 15
No. 200	Not more than 8

The backfill shall be placed in layers of 12 inches or less and shall be compacted with mechanical compaction equipment to not less than 95% of maximum density established in accordance with ASTM Designation D 1557-70 (Modified Proctor). The final 8 inches of fill over excavated areas shall be 3/4" Crushed Aggregate Base Course meeting the requirements of Section 401 CRUSHED AGGREGATE BASE COURSE.

C. BASIS OF PAYMENT

The contract lump sum price for razing and removal of the building or buildings shall be payment in full for razing, removing, salvaging when required, disposing of surplus material, filling basements and excavated areas, and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

## PART III

PART III  
EARTHWORK

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SECTION 301

STUMP REMOVAL

A. GENERAL

Stump removal shall consist of removing and disposing of stumps where designated on the plan or directed by the Engineer.

B. CONSTRUCTION METHODS

All tree stumps unless otherwise designated by the Engineer, shall be completely removed by excavation under proposed concrete sidewalk, concrete curb and gutter, all types of pavement, permanent structures, and at such other places as directed by the Engineer. Tree stumps under other areas in the right-of-way may be removed with stump cutting machinery to a depth of at least 12 inches below the original ground area in fill areas, and at least 12 inches below the subgrade in cut areas. Where removal of stumps could damage lawns, sidewalks, etc., the stumps shall be removed with stump cutting machinery.

All stumps and stump chips shall be removed from the site and disposed of in a manner and in a place subject to the approval of the Engineer.

C. MEASUREMENT AND PAYMENT

The quantity of Stump Removal will be measured per inch diameter of tree as specified under Tree Removal of these specifications. Stumps not measured for Tree Removal shall be measured in like-manner at cut-off. Only stumps with circumference of nine (9) inches or more will be measured for payment.

The contract unit price for Stump Removal, per inch diameter, shall be payment in full for furnishing all labor and equipment for all stump removal actually required and performed, and the handling and disposal of all debris resulting from stump removal.

SECTION 302.

TREE REMOVAL

A. GENERAL

Tree removal shall consist of cutting and disposing of trees where designated on the plan or directed by the Engineer.

Trees under three inches in diameter, shrubs, brush and other vegetation where designated on the plan or directed by the Engineer shall be removed at the Contractor's expense.

B. CONSTRUCTION METHODS

All desirable and structurally sound trees, saplings, or shrubs suitable for shade or street beautification purposes shall be saved unless otherwise ordered by the Engineer. Trees, saplings, and shrubs designated to be left in place shall not be damaged or injured by the Contractor. The absence of specific orders to remove trees, saplings, or shrubs shall be considered as orders to save the trees, saplings, or shrubs. Trimming of limbs of trees or saplings or trimming of shrubs shall not be done without the approval of the Engineer.

In felling trees, the Contractor assumes all liability for damage to any existing structures, telephone or power lines, etc. It is advisable that the Contractor work with the concerned utilities in such cases. In any case where trees cannot be felled without danger to traffic or injury to other trees, structures, or property, they shall be cut in sections from the top down.

Trees, brush, shrubs and vegetation shall be cut as nearly flush with the ground surface as is reasonably possible by means of tools ordinarily used for such operations.

Brush shall be processed through chippers. Trunks, stumps and chips shall be disposed of as directed by the Engineer.

C. MEASUREMENT AND PAYMENT

The quantity of Tree Removal will be measured per inch diameter of tree approximately four (4) feet above the existing ground level and the diameter of the tree shall be 1/3 of the measured circumference. The measurement for circumference and determination of diameter will be to the nearest full inch. Only trees, the circumference of which is nine (9) inches or more, will be measured for payment.

The contract unit price for Tree Removal, per inch diameter, shall be payment in full for furnishing all labor and equipment for all tree removal actually required and performed and the handling and disposal of all debris resulting from tree removal.

## SECTION 303.

### REMOVAL OF CONCRETE PAVEMENT AND CURB AND GUTTER

#### A. GENERAL

This work shall consist of removing, wholly or in part, pavements and curb and gutter, whether specified or subsequently found necessary and required. This work shall also consist of salvaging and disposing of the resulting materials and backfilling the resulting excavations.

Pavement Removal shall consist of the removal of Portland Cement Concrete pavement or base (reinforced and non-reinforced) including all bituminous surfaces superimposed thereon.

#### B. CONSTRUCTION METHODS

All existing pavements and curb and gutter, with all attached parts and connections shown on the plans to be removed, or that interfere with new construction, shall be entirely removed within the limits shown unless otherwise provided. Removal of integral curb shall be considered incidental and included in the removal of concrete pavement.

In removing pavement or curb and gutter where portions of the existing pavement or curb and gutter are to be left in the surface of the finished work, the pavement or curb and gutter shall be removed to an existing joint, or saw cut and chipped to a true line with a face perpendicular to the surface of the existing pavement and curb and gutter. Sufficient removal shall be made to provide for proper grades and connections in the new work. Saw cuts shall have a minimum depth of three (3) inches. Where sawcuts are made a foot away from the back of curb to remove the curb, the Contractor shall excavate behind the curb prior to breaking away the concrete, so as to allow for a cleaner break along the sawcut.

When a portion of the existing pavement or curb and gutter is to be retained, care shall be taken during construction operations so as not to impair the value of the retained portion. All operations necessary for the removal of any existing pavement or curb and gutter, which might endanger the new construction, shall be completed, prior to the construction of the new work. Reinforcing bars which are to be left in place so as to project into new work as dowels or ties shall not be injured during removal of concrete.

#### C. MEASUREMENT AND PAYMENT

Removal of curb and gutter will be measured by length in lineal feet, taken along the flow line of the gutter.

Removal of pavement will be measured by area in square yards.

Where removing curb and gutter is required in conjunction with removing pavement, removal of these structures will all be classed as removing pavement and will be included and measured by area in square yards of removing pavement.

The contract unit price for removing concrete pavement and for removing curb and gutter shall be payment in full for backfilling; and for furnishing all labor, tools, equipment and incidentals necessary to complete the item of work in accordance with the requirements of the contract.

## SECTION 304.

### EXCAVATION

#### A. CLASSIFICATION AND DESCRIPTION

Excavation: Excavation shall consist of the loosening, loading, hauling and disposal of all material of every description encountered in the performance of the work other than specific materials which have been classified and bid upon. The work shall include the removal and disposal of sidewalks, concrete and bituminous driveways, surface and base courses and unsuitable materials, the trimming and finishing of the roadway, and maintaining such work in a finished condition until acceptance.

Special Excavation: Special excavation shall consist of the loosening, loading, hauling and disposal of all material of every description encountered in the performance of the work. The work shall include the removal and disposal of concrete pavement and curb and gutter and all materials included in excavation as well as the trimming and finishing of the roadway, and maintaining such work in a finished condition until acceptance.

#### B. CONSTRUCTION METHODS

All excavation as shown on the proposal and plans shall be done by the Contractor to the line and grade established by the Engineer. The finished grade in the terrace shall be a straight line between the top of the curb and the top of the outside edge of the sidewalk. In cases where the sidewalk is not installed, the grade in the terrace shall be interpreted as being at a slope of 1/4 inch to the foot from the top of the curb to the property line or as designated by the Engineer.

All topsoil able to support vegetation shall be stripped from the improvement area and stockpiled for future use and used as designated by the Engineer. This work shall be done at no additional cost to the City.

Concrete curb and gutter, concrete sidewalk, concrete driveway aprons and pavements damaged or dislocated in line or elevation or both by the Contractor in his operations of excavating, filling, rolling, and grading shall be replaced by the Contractor immediately at his expense. The Contractor shall operate his equipment in such a manner that equipment tires or tracks do not discolor, mark, and damage existing curb and gutter, sidewalks, or pavements. The Contractor shall take all necessary precautions to protect existing trees in the terrace.

The Engineer reserves the right to order additional undercutting when conditions of the subsoil require such extra work. Payment for additional excavation shall be made on the basis of the unit price bid per cubic yard of Excavation or Excavation Below Subgrade when included in the contract. Subbase which has been undercut by the Contractor without being ordered by the Engineer shall be returned to correct grade with approved material as directed by the Engineer at no expense to the City.

In excavating driveways, sidewalks or other bituminous and/or concrete areas, the pavement shall be removed to a joint or sawcut as directed by the Engineer. The required sawcuts shall be made to a minimum depth of three (3) inches. For pavements less than three (3) inches in depth, the required sawcuts shall be for the full depth of the pavement. All sawcuts, whether shown on the plans or directed by the Engineer, shall be considered incidental to the contract.

All suitable material removed from excavation may be used in the construction of the terraces, as far as is practical, and at such other places as shown on the plans. When directed by the Engineer, the Contractor shall segregate and use approved salvageable material as fill under concrete sidewalks and pavement. This work shall be done at no additional cost to the City.

The surplus excavated material shall remain the property of the City of Green Bay and shall be hauled to and dumped and spread at a point of disposal designated by the Engineer.

Cost of disposal shall be included in the unit price bid per cubic yard of Excavation. Where the length of haul to a point of disposal designated by the Engineer is farther than five (5) miles from the project site, the Contractor shall receive compensation at a negotiated price based on labor and vehicle operations costs.

When an abutting property owner within project limits wishes fill, it shall be supplied to him, subject to the approval of the Engineer, at no cost to the property owner. No material shall be deposited on private property unless the property owner has obtained a permit from the Engineer. If the City of Green Bay does not have use of the surplus material, it shall be disposed of by the Contractor.

During construction, the roadway, ditches and channels shall be maintained in a well drained condition at all times by keeping the excavation areas and embankments sloped to the approximate section of the ultimate earth grade or by pumping, if necessary. If it is necessary, in the prosecution of the work, to interrupt existing surface drainage, sewers, or underdrainage, temporary drainage shall be provided until permanent drainage is completed. The construction of all temporary drainage installations shall be considered as incidental to the construction of the work. The Contractor shall be responsible for and take all reasonable and necessary precautions to preserve and protect all existing tile drains, sewers, and other sub-surface drains, or parts thereof, which in the judgement of the Engineer, may be continued in service without change. He shall repair at his own expense any and all damage to such facilities resulting from negligence or carelessness on the part of his operations.

C. MEASUREMENT AND PAYMENT

Excavation shall be measured in cubic yards in its original position, computed by the method of average end areas, with no correction for curvature. The volume of additional excavation, including undercut, when not measured in its original position, shall be calculated from the aggregate used to replace it. A conversion factor of 1.7 tons equals one cubic yard will be used to compare aggregate weight and volume measurements.

The contract price for Excavation, Special Excavation, or Excavation Below Subgrade, shall be payment in full for all equipment, tools, labor and incidentals necessary to complete the work of excavation and disposal of materials as specified.

SECTION 305.

FILL

A. DESCRIPTION

This item shall consist of furnishing and placing materials in accordance with these specifications and as shown on the proposal and plans. The work shall be done to the line and grade established by the Engineer.

B. MATERIALS

Fill shall be constructed from earth material satisfactory for such purposes. The material for fill shall be free from boulders, stumps, masonry, debris or other unacceptable materials. No soil containing sod or appreciable amounts of organic matter or humus shall be used in the fill.

Sand-Gravel fill shall mean pit run sand-gravel or crushed gravel material, consisting of material of which 98% will pass a three inch screen and no more than 5% by weight will pass a No. 200 screen. The material shall be evenly graded, free from debris and organic material. Crushed stone not meeting the above gradation requirements may be substituted provided 100% of the material will pass a three inch sieve.

#### C. COMPACTION

All fill material shall be deposited, spread and leveled in layers not exceeding six (6) inches in thickness before compaction. Each layer shall be compacted to at least 95 percent of modified Proctor (AASHTO Designation: T 180-61). The required compaction shall be attained for each layer before any material for a succeeding layer is placed thereon.

The compaction shall be performed by means of tamping rollers, pneumatic rollers, vibratory rollers, or other types of equipment which will produce the required results in the materials encountered and be subject to the approval of the Engineer. Tandem or three wheel rollers, if used on the project, must weigh at least ten (10) ton. Hauling and leveling equipment shall be routed and distributed over each layer of fill in such a manner as to make use of the compaction afforded thereby.

The compaction shall not be performed when the moisture content of the materials is such as to cause excessive displacement or distortion under the compacted equipment. Where such conditions exist, the Contractor shall be required to add moisture or remove moisture by aeration to produce the moisture content necessary for the required compaction of the materials.

#### D. MEASUREMENT AND PAYMENT

Material excavated from the roadway and used as fill shall be considered incidental and included in the price of Excavation.

Sand-Gravel Fill shall be measured in cubic yards based on tickets received by the Engineer for each load of Sand-Gravel Fill. Payment for Sand-Gravel Fill will not be made for any amount of Sand-Gravel Fill not substantiated for by a ticket received by the Engineer.

Tickets for Sand-Gravel Fill delivered to the City of Green Bay project shall be accepted only from trucks whose volume is clearly marked on the box. The City reserves the right to measure the truck box to check the volume so marked.

Delivery tickets shall show the date and location where used. These delivery tickets shall be given to the Inspector daily, or if the Inspector is not available, the delivery tickets shall be given to the Engineering Division office within two work days after the material is delivered to the project area. Failure to provide these tickets in a timely manner may be cause to deny payment for the material.

The quantity of Sand-Gravel Fill, measured as provided above, will be paid for at the contract unit price per cubic yard (Truck Measure) for Sand-Gravel Fill, complete in place, which price shall be full compensation for furnishing, hauling, placing and compacting the specified material, including all equipment tools, labor and incidentals necessary to complete the work as specified.

#### SECTION 306.

##### MILLING AND SALVAGING BITUMINOUS PAVEMENT

###### A. DESCRIPTION

This work shall consist of removing and salvaging existing bituminous pavement by milling at the location and to a depth of 1 1/2 inches to 2 inches or as directed by the Engineer, together with hauling and stockpiling the salvaged material where directed by the Engineer.

###### B. EQUIPMENT

The milling machine shall be self-propelled and especially designed and constructed for milling pavements. It shall mill without tearing or gouging the underlying surface. The machine shall consist of a cutting drum with carbide or diamond tip teeth. The teeth shall be spaced on the drum to mill an acceptable surface finish. The drum shall be shrouded to prevent discharge of any loosened material into adjacent work areas or live traffic lanes. An acceptable dust control system shall be required.

The machine shall be equipped with electronic devices which will provide accurate depth, grade and slope control.

###### C. CONSTRUCTION METHODS

The milling operation shall be performed in a manner to preclude damage to the remaining pavement, and which results in a reasonably uniform plane surface free of excessively large scarification marks and having the uniform transverse slope required on the plans or directed by the Engineer.

The sequence of the milling operations shall be such that no exposed longitudinal joints two inches or more in depth shall remain during non-working hours and that one lane on the roadway will be maintained for traffic at all times during actual construction operations, in accordance with the provisions of the Manual of Traffic Controls for Street Construction and Maintenance Operations for the City of Green Bay.

The Contractor shall construct the stockpile in a manner which will minimize compaction, contamination and segregation of, and moisture in the stockpiled material.

D. MEASUREMENT AND PAYMENT

Milling and salvaging bituminous pavement shall be measured by area in square yards of bituminous pavement milled and salvaged in place. The measurements for milling and salvaging bituminous pavement shall include the area occupied by castings.

The yardage completed and accepted, measured as provided above shall be paid at the contract unit price per square yard for milling and salvaging bituminous pavement, which price shall be full compensation for milling, salvaging and stockpiling bituminous pavement and for all labor, equipment, tools and incidentals necessary for completing the work.

PART IV

PART IV  
BASE COURSES

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SECTION 401.

CRUSHED AGGREGATE BASE COURSE

A. DESCRIPTION

This item shall consist of a dense compacted base course composed of one or more courses or layers of crushed aggregate, either crushed gravel or crushed stone, fine aggregate and binder or filler blended as necessary to produce an intimate mixture of the required gradation and stability, constructed on the prepared foundation in accordance with the specifications and in reasonably close conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer.

B. MATERIALS

The aggregates shall consist of hard durable particles of crushed stone or crushed gravel and a filler of natural sand, stone sand or other finely divided mineral matter. The composite material shall be substantially free from vegetable matter, shale and lumps or balls of clay and shall conform to the pertinent gradation requirements.

The determination of the acceptability of the aggregates will be made by field evaluation or laboratory test. The Engineer reserves the right to prohibit the use of crushed aggregate from any source, plant, pit, quarry or deposit where the character of the material or method of operation is such as to make improbable the furnishing of aggregates conforming to the requirements of the specifications, unless satisfactory evidence is shown that material conforming to specification requirements is produced.

Unless otherwise specified in the contract, the aggregate shall have a percentage of wear of not more than fifty (50) as determined by AASHTO Designation: T96. The aggregate, including any blended filler, shall have a liquid limit of not more than 25 and a plastic index of not more than 6. At least forty-five (45) percent, by count, of the number of particles of aggregate retained on the No. 4 sieve shall have at least one fractured face. When the fraction of aggregates retained on the No. 4 sieve is subjected to five (5) cycles of the sodium sulphate soundness test, AASHTO Designation: T104, the weighted loss shall not exceed eighteen (18) percent by weight. Sampling and testing shall be in accordance with AASHTO standard methods.

The Contractor shall provide the City a sieve analysis of the aggregates prepared by an independent testing laboratory. The Contractor shall notify the City whenever an aggregate source is changed and provide a sieve analysis of the aggregate from the new source.

If filler in addition to that naturally present in the base course material is necessary for meeting the gradation requirements or for satisfactory binding of the material, it shall be uniformly blended with the base course material at the screening plant or on the road. The material obtained for such purpose shall be obtained from sources approved by the Engineer, shall be free from agglomerations or lumps, and shall contain not more than 15 percent of material retained on a No. 4 sieve.

The aggregates shall be well graded between the limits specified and conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percentage by Weight Passing</u>		
	<u>3/4 Inch</u>	<u>1 1/2 Inch</u>	<u>3 Inch</u>
3 Inch			90 - 100
2 Inch			35 - 60
1 1/2 Inch		100	
1 Inch	100		15 - 35
3/4 Inch			0 - 20
3/8 Inch	40 - 75	30 - 65	
No. 4	25 - 60	25 - 55	
No. 200	3 - 12	2 - 12	

The gradation and depth of each layer of crushed aggregate base course shall be as shown on the typical sections or as directed by the Engineer.

#### C. EQUIPMENT

Equipment and tools necessary for performing and maintaining all parts of the work, satisfactory as to design, capacity and mechanical condition for the purpose intended, must be on the job before the work is started. Any equipment which is not maintained in full working order, or which as used by the Contractor is inadequate to obtain the result prescribed, shall be repaired, improved, replaced, or supplemented to obtain the progress and workmanship contemplated by the contract.

#### D. CONSTRUCTION METHODS

This work shall be constructed in the manner and in accordance with Subsection 304.5, Construction Methods, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract.

The foundation shall be so prepared and constructed that it will have uniform density throughout. It shall be brought to the required alignment and cross section with equipment and methods adapted for the purpose. Upon completion of the shaping and compacting operations, the foundation shall be smooth, at required density, and at the proper elevation and contour to receive the course to be constructed on it.

Base material shall not be placed on a foundation that is soft or spongy or one that is covered by ice or snow. Base material shall not be placed on a dry or dusty foundation where the existing condition would cause rapid dissipation of moisture from the base material and hinder or preclude its proper compaction. Such dry foundations shall have water applied to them and shall be reworked or recompacted if necessary.

Crushed aggregate base course shall not be installed until curbs and gutters and other concrete structures have cured sufficiently to withstand hauling and placing operations. No crushed stone shall be placed between the curbs until the curbs have been adequately backfilled.

The Contractor shall minimize the dispersion of dust from the base course during construction and maintenance operations, until acceptance of the base course, by the application of water or other approved dust control materials as provided in the contract or ordered by the Engineer.

#### E. MEASUREMENT AND PAYMENT

Crushed aggregated base course shall be measured as provided in the contract by the ton. The quantity to be measured for payment shall be the amount of material required and incorporated in the work.

Delivery tickets shall show the date and location where used. These delivery tickets shall be given to the Inspector daily, or if the Inspector is not available, the delivery tickets shall be given to the Engineering Division office within two work days after the material is delivered to the project area. Failure to provide these tickets in a timely manner may cause to deny payment for the material.

Aggregates, measured by the ton, which contain total moisture in excess of seven percent, unless stockpiled, aerated or dried to reduce the moisture content to seven percent or less before being weighed, shall have moisture content in excess of seven percent deducted from the measured weight. Determination of the moisture content of the aggregates shall be based on and expressed as a percent of the dry weight of the aggregates.

The quantity of aggregate measured as provided above will be paid for at the contract unit price per ton for Crushed Aggregate Base Course, complete in place, which price shall be full compensation for furnishing, placing, watering, drying, compacting, and maintaining the crushed aggregate base course; for preparing foundation; for stockpiling, if required; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

## SECTION 402.

### CONCRETE BASE

#### A. GENERAL

This work shall consist of a foundation of Portland Cement concrete with or without reinforcement, constructed in one course on the prepared foundation, in accordance with the specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

The requirements and provisions of Section 503. CONCRETE PAVEMENT, shall, except as herein modified and amended, be applicable to this work.

Concrete used in this work shall conform to the requirements of Grade B as specified under SECTION 601. PORTLAND CEMENT CONCRETE.

#### B. CONSTRUCTION METHODS

Unless otherwise specified, transverse joints other than construction joints will not be required.

Sealing of joints in concrete base will not be required.

C. MEASUREMENT AND PAYMENT

Concrete Base shall be measured in place, and the area computed in square yard. The contract unit of Concrete Base, per square yard, shall be full compensation for furnishing, hauling, preparing, placing, curing and protecting all materials, including cement, joints, dowels, tie bars and spacer bars; for preparing foundation, unless otherwise provided; and for all labor, tools, equipment and incidentals necessary for constructing the item complete.

PART V

PART V  
PAVEMENTS

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SECTION 501.

BITUMINOUS PAVEMENTS

A. GENERAL

This work shall consist of the preparation of mixture for bituminous binder and surface courses and the construction of said courses for new streets, and the resurfacing and patching of old streets in accordance with the requirements specified herein and in conformity with the lines, grades, thicknesses, and typical cross-sections shown on the plans, specified by the contract or directed by the Engineer.

B. BITUMINOUS PLANT AND EQUIPMENT

The bituminous plant and equipment shall comply with the requirements of Subsection 405.4, Equipment, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the Contract.

Projects of 10,000 ton or more of bituminous mixture have to meet the same and only the same requirements and specifications of small projects with regard to bituminous plants and equipment.

C. PREPARATION OF MIXES

The preparation of all types of central plant mixed bituminous binder and surface courses and pavements shall comply with the requirements of the following Sections and Subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways; Latest Edition, except as modified herein or in the Special Provisions of the contract:

401. Materials for Bituminous Mixtures and  
Surface Treatments

407.3.4 Mineral Filler

407.5.3 Preparation of Asphalt Cement

Binder course mixtures shall be delivered at a temperature not lower than 225° F.; surface course mixtures shall be delivered at a temperature not lower than 250° F. Loads which do not meet the minimum temperature specifications will not be allowed for use nor will they be allowed to be reheated and returned to the site. The aggregate for bituminous surfaces and pavements, including mineral filler when and as required for the specific type, shall conform to the following gradation and physical requirements as shown on the following chart "Aggregates for Bituminous Mixtures".

AGGREGATES FOR BITUMINOUS MIXTURES

Percentage by Weight Passing

<u>Gradation Number</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Sieve Size				
1"	100			
3/4"	95-100			
1/2"	-----	100	100	
3/8"	65- 90	90-100	85-100	100
No. 4	-----	-----	65- 80	85-100
No. 8	30- 55	55- 80	50- 65	80- 95
No. 16	-----	40- 60	37- 52	70- 89
No. 30	-----	25- 45	22- 45	55- 80
No. 50	8- 28	15- 30	18- 35	30- 60
No. 100	-----	-----	10- 20	10- 35
No. 200	3- 12	4- 12	3- 10	4- 14

PHYSICAL REQUIREMENTS

Soundness-AASHO 7-104 Five Cycles Loss, percent-Max.	18	12	12	12
Wear-AASHO T-96 Loss, percent-Max.	50	50	45	45
Fracture Count, Ref. No. 4 Percent, Min.	50	50	50	50
Elongated Pieces Ratio, Max.	5	5	5	5
Plasticity Index, Max.	3	3	3	3

<u>GRADATION NUMBER</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Asphalt Content	4-7	4.5-8.5	4-8	5-11
Stability-ASTM D-1559 Pounds, Min.	1200	1200	1500	1500
Flow, 0.01" Max.	18	18	16	16
Void Content, percent	2-6	2-6	2-6	2-6

The Contractor shall provide a mix design for the Engineer's approval on each type of mix to be used, prior to the first paving operation on each contract. The mix design shall be done by an independent testing laboratory using the Marshall Method of mix design at the Contractor's expense. The Contractor shall notify the City whenever an aggregate source is changed and provide a new mix design by an independent testing laboratory using the Marshall Method of mix design.

After the mix design is established and approved by the Engineer, all mixtures furnished for the work shall conform thereto within the following percentage tolerances unless otherwise approved by the Engineer:

Aggregates passing No. 4 and larger sieves:	<u>+7%</u>
Aggregates passing No. 8 to No. 100 sieves (Inclusive):	<u>+4%</u>
Aggregates passing the No. 200 sieve:	<u>+2%</u>
Bituminous Material:	<u>+0.4%</u>

During the mixing period, the dried and heated aggregates shall be separated into sizes, stored in separate bin compartments and recombined in the proper proportions in the proportioning unit and mixer.

Aggregates of Gradation No. 1 shall be separated into three or more sizes. Aggregates of Gradation No. 2 and Gradation No. 3 shall be separated into at least two sizes and at the Contractor's option may be separated into three sizes.

Except for the bin containing the minus No. 8 material, no other bin shall contain in excess of 15 percent of material passing a No. 8 sieve, as determined on the basis of a dry sieve analysis. Continued variation in excess of this limitation shall be corrected by increasing the amount of screening area or by reducing the rate of plant production.

When mineral filler is required in the mixture and Filler Type I is used, it shall be added to the dried and heated aggregates through a separate bin and feed calibrated for volume measurements (volumetric plants) or by discharging into the weigh hopper (batch plants). When Filler Types II and III are used, they shall be added to the aggregates before entering the drier through a separate bin and feed in a uniform and controlled flow.

The aggregates shall be dried and heated to such temperatures, not in excess of 375°F., that the mixture when discharged from the mixer will be within 15°F., plus, or minus, of the temperature specified for the mixture.

The bituminous materials to be used in bituminous concrete binder or surface courses shall be asphalt Type AC in the penetration grade of 25-100 unless otherwise designated by the Engineer.

D. CONSTRUCTION METHODS

Preparation of Foundation and Prime Coat: This work shall be constructed in the manner and in accordance with the following Subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract:

- 211.4.5 Foundation for Bituminous Surfacing
- 402.3 Equipment
- 402.4.4 Heating and Applying for Bituminous Material

On new construction projects, the foundation is to be prepared for treatment by the Contractor constructing the base course. When the roadway passes over soils which are not suitable such as organic deposits, rubble, bark, leaves, etc., such soils shall be removed and replaced with select compacted materials.

The Contractor shall be required to apply prime coat or tack coat to all existing surfaces to be patched or resurfaced. On new construction projects, the Contractor will be required to apply prime or tack coat at the edge of the pan of concrete curb and gutter, where the bituminous base, binder, or surface course is to be feathered, where new paving abuts existing pavement, and where designated by the Engineer. The prime coat shall be applied at a temperature within the range of 70° to 140° F.

The application of the prime coat shall not precede the work of placing the subsequent surface course to such an extent that the primed surface will be injured during such interim. Bituminous material shall be applied only during daylight hours and when the air temperature is 40° F. or more, and when the previously prepared surface is dry and reasonably free of loose dirt, dust or other foreign matter. It shall not be applied when the weather or roadbed conditions are unfavorable or when it appears probable that the material may be exposed to rains during the penetration period.

The applied bituminous material shall be of a class, type and grade approved by the Engineer. The rate at which the prime or tack coat is to be applied is also to be approved by the Engineer.

The cost of furnishing and applying the tack coat or prime coat shall be considered incidental and included in the price of the bituminous base, binder, or surface course mixture.

#### Bituminous Concrete Pavements

This work shall be constructed in the manner and in accordance with the following subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract:

- 405.5.6 Preparation of Mineral Aggregate
- 405.5.7 Preparation and Holding of Bituminous Mixtures
- 405.5.8 Transportation and Delivery of Mixtures
- 405.5.9 Correcting Sags and Depressions
- 405.5.10 Spreading and Finishing
- 405.5.15 Joints
- 405.5.16 Surface Requirements

The work shall be constructed in the manner and in accordance with the methods herein prescribed, and to the width and section shown on the plans or specified in the contract.

Unless otherwise provided in the contract, float or loose aggregate existing on the roadbed and not incorporated in the work shall be removed from the roadbed and disposed of by the Contractor in a manner satisfactory to the Engineer.

Bituminous mixture shall be laid only on a prepared, firm, and compacted base or foundation course, which is substantially surface-dry and free of loose and foreign material.

Bituminous mixture which, in the judgement of the Engineer, is not sufficiently mixed or is defective in any manner, shall be rejected.

Bituminous mixture shall not be placed over frozen subgrade or base or where the roadbed underlying the foundation or base is temporarily unstable from the effects of frost heaving, pumping or rutting under the action of equipment on a saturated subgrade, or any other reason.

Bituminous mixture shall not be placed when it is raining or snowing and any mixture exposed to rain or snow before final rolling which has, in the judgement of the Engineer, been adversely affected thereby, shall be removed and replaced at the Contractor's expense.

Bituminous mixture shall not be placed when the air temperature, approximately three feet above ground at the site of the work, in the shade and away from the effects of artificial heat, is less than 35° F., except that binder and base course mixtures may be placed at a lesser temperature when approved by the Engineer.

The Contractor shall notify the Green Bay Department of Public Works when paving or milling operations shall take place. Said notice of paving or milling operations shall be given at least 24 hours prior to the beginning or resumption of paving or milling operations.

The Contractor shall be responsible for and maintain the work during the several stages of construction and until the acceptance thereof. Such maintenance shall include protection and repair of the foundation, prime coat, base, and surface. Any rich or bleeding areas and any breaks, ravel spots, or other unsatisfactory areas shall be corrected during such maintenance period.

After the spreading and strike-off and while still hot, the course shall be compacted thoroughly and uniformly by rolling. The Contractor shall compact both the base and surface courses to a density equal to or greater than 95% of the maximum laboratory density obtained in the Marshall Method of mix design.

The bituminous mixtures in which penetration grade asphalt cements are used shall receive an initial rolling as soon as practicable after being spread, and rolling of such mixtures shall be substantially completed before they have cooled to a temperature of 180° F. However, where initial rolling causes undue displacement, hair-cracking or checking, the time of rolling shall be adjusted by the Engineer to mitigate those conditions. The rolling of mixtures made with liquid asphalts of types RC, MC and SC shall be delayed to permit escape of excess volatiles, but not long enough to preclude satisfactory compaction. The final rolling shall always be done with a tandem or a three-axle tandem roller.

For compaction of mixtures in which penetration grade asphalts are used, a minimum of two rollers for each paver shall be used where the quantity of mixture placed per hour exceeds approximately 30 tons, except as hereinafter provided for paving in tandem. In the case of binder and surface course mixtures, additional rolling equipment shall be provided, as required, to obtain the minimum density specified; furthermore for surface course mixtures placed after September 1, steel wheel or vibratory rollers shall be supplemented with a self-propelled pneumatic-tired roller.

When two pavers are operated in tandem and are separated by less than 300 feet, a minimum of three rollers may be used provided a degree of density satisfactory to the Engineer is obtained in base courses, and the minimum required density is obtained in binder or surface courses.

For the compaction of mixtures incorporating other types of bituminous material the roller requirements may be computed on a basis of 60 to 80 tons per hour per roller, dependent on the characteristics of the mixture, the type of bituminous material used and the general prevailing temperatures, and providing that the number of rollers determined on that basis will be sufficient to attain the required compaction and smoothness of surface. If not, additional rolling equipment shall be furnished or the rate of the placing and spreading operations reduced to the degree necessary to secure the required rolling and compaction of the material.

Each roller, while the work is under way, shall be kept as nearly as practical in continuous operation and the speed shall at all times be slow enough to avoid undue displacement of the mixture. When pneumatic-tired rollers are used, they shall be operated continuously at a rate of speed which will not cause damage to the mat and which will provide the maximum number of coverages possible while the temperature of the mat is conducive to densification and surface sealing. Rollers shall be operated with the drive roll or wheels nearest the paver.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road center line, each trip overlapping one half the roller width, progressing to the crown of the road. When paving in tandem or abutting a previously placed lane, the longitudinal joint shall be rolled first followed by the regular rolling procedure. On super-elevated curves the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the center line.

The entire surface shall be rolled until the compaction specified is achieved and until roller marks are eliminated to the extent practicable. Any displacement occurring as a result of the reversing of the direction of the roller, or from any other cause, shall be corrected at once. To prevent adhesion of the mixture to the roller the wheels shall be kept properly moistened but excess water will not be permitted. Care shall be exercised in rolling so as not to disturb the line and grade elevation of edges of the bituminous surfacing.

Along forms, curbs, headers and walls and at other places not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers or with mechanical tampers giving equivalent compression. On depressed areas, a trench roller or other equipment approved by the Engineer shall be employed.

All rolling shall be accomplished during daylight unless artificial light, satisfactory to the Engineer, is provided.

The surface of the mixture after compaction shall be smooth and true to the established crown and grade. Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture, which shall be immediately compacted to conform with the surrounding area. Any area showing an excess of bituminous material shall be removed and replaced.

The Contractor shall protect all sections of newly placed and compacted mixture from traffic until they have cooled and hardened to the satisfaction of the Engineer. The Contractor shall furnish, install and maintain barricades and fencing to protect the surface prime coated and the pavement laid from traffic. Barricades and fencing may be removed only with the Engineer's approval and permission. Barricades and fencing shall be designed and installed so as not to mark or otherwise injure the completed pavement. If flares are used for warning lights on the project, they shall be removed from the bituminous pavement (either new or existing) for filling and maintenance.

#### G. MEASUREMENT AND PAYMENT

Bituminous surface, binder, and base course mixtures of the type or types included in the contract, shall be measured for payment by the ton of mixed aggregate and bituminous material. The quantity measured for payment shall be the amount of material delivered to and incorporated in the accepted work. Deductions shall be made for any quantities which are wasted or are not actually incorporated in the work in accordance with the contract.

Delivery tickets shall show the date and location where used. These delivery tickets shall be given to the Inspector daily, or if the Inspector is not available, the delivery tickets shall be given to the Engineering Office within two work days after the material is delivered to the project area. Failure to provide these tickets in a timely manner may be cause to deny payment for the material.

The quantity of bituminous surface, binder, and base course mixture of the type or types included in the contract, measured as provided above, will be paid for at the contract unit price per ton, which price shall be full compensation for furnishing and placing the prime coat; for furnishing, producing, crushing, screening, loading, transporting, placing, and compacting the surface or base course mixtures; for the maintenance of the work until completion and acceptance; and for all materials, labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 502.

RECYCLED BITUMINOUS PAVEMENT

A. GENERAL

This work shall consist of the preparation of mixture for bituminous binder and surface courses and the construction of said courses for new streets, and the resurfacing and patching of old streets using recycled bituminous mix and in accordance with the requirements specified herein and in conformity with the lines, grades, thicknesses, and typical cross-sections shown on the plans, specified by the contract or directed by the Engineer.

Recycled bituminous mix may be used only when indicated in the contract. When recycled bituminous mix is allowed to be used, the recycled bituminous pavement shall meet all pertinent requirements of SECTION 501, BITUMINOUS PAVEMENTS, except as modified in this section.

B. MATERIALS

The recycled bituminous surface shall be composed of an intimate mixture of salvaged bituminous pavement material, aggregate and bituminous material.

In the event that the aggregate or the mineral component of the salvaged bituminous pavement material proposed for use or both are substantially of crushed quarry or ledge rock, natural sand shall be blended with the crushed stone in such proportions as necessary to provide a workability of the finished mixture satisfactory to the Engineer.

Salvaged bituminous pavement materials shall consist of materials salvaged from bituminous pavements. The salvaged bituminous pavement material shall have been crushed, milled or otherwise processed so that 100 percent of such material shall pass a 1 1/2-inch screen.

The aggregate shall conform to the gradations specified in the contract. Determination of compliance with requirements for gradation shall be based on tests made on representative samples of the cold feed aggregate.

The amount of bituminous material incorporated in the mixture shall be that percentage by weight of the composite mixture, designated in the mix design, plus or minus 0.4 percent. The bituminous material to be used in the work shall be asphalt Type AC with a grade designation of 200-300.

The percentage of bituminous material actually being incorporated in the mixture shall be determined on the basis of total weight of mixture produced during a period of time selected by the Engineer and the total weight of bituminous material used during that period. The determination of compliance with tolerance limits for bitumen content of the mixture shall be based on a spot check of bitumen consumption for a number of loads of produced mixture.

C. EQUIPMENT

Plants used to produce recycled bituminous surface mixtures shall be capable of proportioning by weight the salvaged bituminous pavement material, aggregate and bituminous material in a sequence acceptable to the Engineer. The salvaged bituminous pavement feeding system shall be equipped with a 1 1/2-inch screen.

D. PREPARATION OF MIXES

The salvaged bituminous pavement material, aggregate and bituminous material shall be combined by weight to produce an acceptable mixture. The salvaged bituminous pavement material may constitute as much as 55 percent by weight of the total produced recycled bituminous surface mixture.

The Contractor shall establish for the Engineer's approval within the above range, the percentage of salvaged bituminous pavement material to be used in the recycled bituminous surface mixture, and the Contractor shall produce the mixture at the selected percentage unless otherwise directed by the Engineer. The selected percentage shall be determined as well as the mix design by an independent testing laboratory at the Contractor's expense.

The aggregate and the salvaged material shall be heated to produce a mixture which, when it is discharged from the mixer, is within 15 degrees F, plus or minus, of the temperature specified for the mixture. The aggregate temperature shall be controlled to avoid damaging the salvaged material. The aggregate temperature shall not exceed 550 degrees F. when a batch plant is used for mixing.

The bituminous material shall be heated and fed into the mixer at a temperature which is within 25 degrees F, plus or minus, of the required temperature for the mixture.

SECTION 503.

CONCRETE PAVEMENT

A. DESCRIPTION

This work shall consist of a pavement of Portland Cement concrete, with or without reinforcement as shown on the plans, constructed on the prepared foundation in accordance with the specifications and in reasonably close conformity with the line, grades, thickness and typical cross section shown on the plans or established by the Engineer.

Unless otherwise provided in the special provisions, either slip-form or form methods may be used for pavements.

When so shown on the plans or required in the special provisions, High-Early-Strength Concrete or a 7 bag mix shall be used for the construction of the work.

B. MATERIALS

Concrete: Concrete for the work shall conform to all pertinent requirements specified under SECTION 601, PORTLAND CEMENT CONCRETE.

This work shall be constructed with Grade A Air-Entrained Concrete or Grade A-WR Air-Entrained Concrete.

Reinforcement: Level bars, tie bars, and all steel reinforcement shall conform to the details shown on the plans and the requirements specified in Section 505, Steel Reinforcement, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition.

Expansion Joint Filler: The expansion joint filler shall be non-extruding and have the same shape and dimensions as the section in which it is installed. The filler shall be of the cork type or of bituminous filler type. Materials for the filler shall meet the requirements of AASHTO Specification M-153, Type III.

Hot-Poured Elastic Type Joint Sealer: This material shall conform to the requirements of the Specification for Concrete Joint Sealer, Hot-Poured Elastic Type, AASHTO Designation M-173.

### C. EQUIPMENT

The equipment shall comply with the requirements of Subsection 409.3, Equipment, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract.

The mechanical longitudinal float, for use on concrete pavement, shall not be required.

### D. FOUNDATION

Immediately before placing the concrete, a satisfactory and approved planing device shall be passed over the foundation to assure accurate and exact compliance of the contour of the foundation to the plans. Immediately thereafter, the foundation shall be dampened sufficiently to prevent withdrawal of water from concrete into the foundation. The Engineer may suspend paving operations until a satisfactory condition of foundation is achieved.

### E. CONSTRUCTION METHODS

The construction methods shall comply with the requirements of the following subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract:

- 409.5.5 Placing Concrete
- 409.5.6 Reinforcement
- 409.5.7 Longitudinal Joints
- 409.5.8 Transverse Joints
- 409.5.9 Consolidation and Finishing
- 409.5.10.2 Impervious Coating Method

Form Setting: The Contractor shall take his own grade for setting forms from the stakes or sidewalk markings as established by the Engineer. String line grade shall be set not less than 200 feet in advance of the forms. The forms shall be completely cleaned of all mortar before they are placed. The foundation under the forms shall be firm and cut true to grade so that the form when set upon it will be firmly in contact for its whole length and at the desired grade. Conformity of the alignment and

grade elevation of forms shall be checked with the required alignment and grade elevation of the proposed work and necessary corrections shall be made by the Contractor prior to placing the concrete. Where any form has been disturbed, it shall be reset and rechecked. Forms shall be set a reasonable distance in advance of the paving operations to permit satisfactory alignment both vertically and horizontally to the satisfaction of the Engineer.

Flexible or curved forms of proper radius shall be used for curves of 150 foot radius or less. These forms may be of wood or metal and shall be of ample strength to produce completed work conforming to the alignment, grade and surface tolerance required. The variation of forms from a true plane of top of form shall be not greater than 1/8 inch, and from a true plane of face of form not greater than 1/4 inch, in ten feet. The method of placing and staking shall be subject to approval of the Engineer.

Forms shall not be removed from the concrete pavement until it has set for at least six hours, except that individual sections may be removed sooner when required to permit sawing transverse joints. They shall be removed in a manner to preclude scarring of or damage to the pavement.

Cold Weather Construction: Concrete shall not be placed on a frozen subgrade. Concrete shall not be placed when the air temperature is below 32° F. unless approved by the Engineer. Concrete may be placed when the air temperature is 32° F. and rising.

The mixed concrete when placed in the forms shall, unless otherwise directed, have a temperature of not less than 50° F. nor more than 80° F. Heating of the cement, or the adding of calcium chloride or other chemicals to the mix will not be permitted.

Aggregates which contain frozen lumps shall not be used unless heated. The aggregates shall be heated by steam or by other means in a manner which will heat the mass uniformly and preclude the possible occurrence of overheated areas. Mixing water shall be heated in such a manner that its temperature is maintained under control. Neither the aggregates nor the mixing water shall be heated to a temperature in excess of 100° F. when placed together with the cement in the mixer. If either the aggregates or water is heated to a temperature in excess of 100° F., the water and aggregates shall be premixed in such a way that the resulting temperature of the combined water and aggregates is not in excess of 100° F. before the cement is added to the batch. Cold aggregates, which are not frozen and do not contain frost, may be used with water heated in excess of 100° F. provided the water and aggregates are first premixed as specified above before the cement is added to the batch.

When the air temperature is below 32° F. or is predicted to fall below 32° F., and during the period from November 1st to April 1st, the concrete pavement shall be covered with either a double layer of burlap or one layer of burlap and one layer of polyethylene sheeting. Additional covering, hay or straw may be required as directed by the Engineer. The temperature of the concrete will be checked regularly by the Engineer.

Said covering shall remain in place until at least seven days but not more than 14 days shall have expired from the date of placement of the concrete. Where a seven bag mix or high early strength concrete is used, cover shall be maintained for a minimum of four days.

Where removal of coverings is necessary to saw joints or to perform other required work, such removal shall be done as directed by the Engineer and for the minimum time required.

In lieu of curing by the Impervious Coating Method, all concrete pavements constructed during the period beginning October 1st and ending April 1st shall have applied approved curing compounds of linseed-oil membrane forming emulsions or emulsifiable concentrates for curing and protection of concrete surfaces as soon as possible after the surface water sheen has disappeared from the fresh concrete. The curing compounds shall be applied with approved equipment and at the rate of 200 square feet per gallon of emulsion or at a rate designated by the Engineer.

Regardless of the precautions taken, the Contractor shall be responsible for the protection of the concrete placed, and any concrete damaged by freezing or frost action during the first seven days following its placement shall be removed and replaced by the Contractor at his expense.

Protection of Concrete: The Contractor shall erect and maintain suitable barricades and employ such watchmen as may be necessary to exclude traffic from newly constructed pavement for a period as hereinafter prescribed. Any part of the pavement damaged by traffic or otherwise damaged prior to its acceptance shall be

repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer. The Contractor shall protect the pavement against both public traffic and the traffic caused by his own employees and agents. The Contractor shall have available materials for protecting the unhardened concrete against damage by rain. When rain is imminent, the unhardened concrete shall be immediately covered with paper, plastic film or other suitable material, and planks or forms placed along slip-formed pavement edges.

The Engineer reserves the right to determine the time when the pavement shall be opened to traffic either on the basis of test cylinders or minimum time periods.

When the opening of the pavement to traffic is controlled by cylinder tests, the pavement may be opened when the tests of cylinders show a compressive strength of the concrete of not less than 2,700 lbs. per square inch.

Integral Curb: Where integral curb is indicated on the plans, immediately after the consolidation and shaping of the pavement by the finishing machine, suitable approved steel forms shall be placed and securely locked on the top of the regular pavement form. They shall be accurately aligned and securely locked into place to prevent any displacement in the process of constructing the curb. After this back curb form has been satisfactorily aligned, a suitable and approved face form shall be accurately secured in position to form the contour of the face of the curb. Face forms will be such that they will be supported through the back form and pavement form and shall not be dependent for grade or alignment on the fresh concrete of the slab. The concrete mix as specified herein shall then be thoroughly tamped within the forms. The face surface of the curb shall be thoroughly troweled and brushed and the back edge and edges adjacent to expansion joints shall be rounded with an edger of 1/4 inch radius.

The Contractor may, with the approval of the Engineer, elect to use a machine for placing, forming and consolidating curb. If a machine is used, the resulting curb shall be of such quality as to equal or exceed that produced by the method herein before described.

The curb and gutter shall be tested with a ten foot straight edge and any variations from the testing edge greater than 1/8 inch shall be corrected by an approved grinding tool.

Expansion joints in the pavement shall extend through the integral curb and be filled and sealed with approved material.

Finishing and Cleanup: As soon as practical after the setting up of the concrete, all joints shall be filled and sealed with an approved joint sealer herein prescribed. The joints shall first be stripped clean and free of all dust and dirt and loose particles. Sealer shall not be placed when there is water in the cracks or joints. The terrace or boulevard section lying in the rear of the curb shall then be finished as outlined herein. In conducting terracing operations, the Contractor shall keep equipment off the slab until not less than seven days have elapsed after paving.

The Contractor shall notify the City of Green Bay Department of Public Works 48 hours in advance of the opening of the street. The Contractor shall not remove the barricades until the street has been signed and swept by the City Department of Public Works.

F. MEASUREMENT AND PAYMENT

Concrete pavement shall be measured by area in square yards and the yardage to be paid for shall be the number of square yards of concrete pavement completed and accepted, measured complete in place. Where integral curb is used, the width shall be measured from back of curb. The length will be the actual length measured along the riding surface. The cost of integral curb shall be considered incidental and included in the price of concrete pavement. The measurements for concrete pavement shall include the area occupied by castings.

The yardage completed and accepted, measured as provided above shall be paid for at the contract unit price per square yard for concrete pavement, which price shall be full compensation for furnishing, hauling, preparing, placing, curing and protecting of all materials, including cement, concrete masonry, joints and joint materials, dowels, tie bars and spacer bars; for preparing foundation, unless otherwise provided; and for all labor, equipment, tools and incidentals necessary for constructing the pavement complete.

## PART VI

PART VI  
CONCRETE AND CONCRETE STRUCTURES

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SECTION 601.

PORTLAND CEMENT CONCRETE

A. DESCRIPTION

Portland Cement Concrete shall consist of a mixture of cement, fine aggregate, coarse aggregate and water proportioned, mixed, placed, and protected in accordance with the requirements hereinafter set forth.

B. MATERIALS

The materials used in this work shall conform with the requirements of Subsection 501.3, Materials, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract.

C. COMPOSITION

The composition of Portland Cement Concrete shall comply with the requirements of the following Subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special Provisions of the contract:

- 501.4 Classes and Grades of Concrete
- 501.5 Composition of Concrete

From the master limits of the job mix, adjusted as necessary for the specific gravities of the aggregate furnished, the Contractor will determine the job mix, using the quantity of percentage of fine aggregate within the range shown thereof which, without exceeding the maximum quantity of water permitted, will yield a mix possessing the necessary workability. The job mix shall be submitted to the Engineer for approval and any adjustments to the job mix shall be made only with the Engineer's approval. The Contractor shall notify the Engineer of any change in the source of material.

Portland Cement Concrete shall develop the following minimum compressive strengths at 28 days unless otherwise designated in the Special Provisions or by the Engineer.

Concrete GradeCompressive Strength at 28 Days  
(pounds per square inch)

A	3,000
A-W/R	3,000
B	2,500
C	3,500
D	3,500

## D. MIXING

The mixing of Portland Cement Concrete shall comply with the requirements of the following Subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or in the Special

501.6	Handling Materials
501.7	Proportioning
501.8	Ready-Mixed Concrete
501.9	Site-Mixed Concrete
501.10	Concrete Consistency
501.11	Placing
409.5.4	Consistency

Delivery tickets shall be required for all ready-mixed concrete unless otherwise waived by the Engineer. Each ticket shall include the amount of cement, amount of water (gallons per yard) and the batching time of the mix, any additive (ounces per yard), if used. Delivery tickets shall show the date and location where used. These delivery tickets shall be given to the Inspector daily, or if the Inspector is not available, the delivery tickets shall be given to the Engineering Division office within two work days after the material is delivered to the project area. Failure to provide these tickets in a timely manner may be cause to deny payment for the material.

The maximum slump permitted for Portland Cement Concrete may be increased only with the approval of the Engineer.

## E. TESTING

For the purpose of making tests to determine the compressive strength of the concrete, the Engineer reserves the right to cast the number of cylinders that he may require. The sampling, making, curing and testing of the concrete cylinders shall be performed by or be under the supervision of the Engineer.

SECTION 602.

CONCRETE MASONRY STRUCTURES

A. DESCRIPTION

The work shall consist of constructing concrete structures, including but not restricted to pumping stations, manholes, bridges, box culverts, ditch checks, headwalls, and retaining walls with or without reinforcement, of the required design and dimensions, placed on the prepared foundation or base, all as shown on the plans and provided by the contract.

B. MATERIALS

All requirements under SECTION 501, PORTLAND CEMENT CONCRETE, shall apply to concrete used in the construction of concrete masonry structures unless modified in the plans or Special Provisions of the contract.

Steel Reinforcement to be furnished and used in the construction of concrete masonry structures shall comply with the requirements of Section 505, Steel Reinforcement, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified in the plans or in the special provisions of the contract.

All other materials shall be as specified in the plans or in the special provisions of the contract. Only materials approved by the Engineer shall be used in concrete masonry structures.

C. CONSTRUCTION METHODS

The construction methods shall comply with the requirements of the following Subsections of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein, in the plans, or in the special provisions of the contract:

502.3.3	Falsework
502.3.4	Forms
502.3.5	Removal of Forms and Falsework
502.3.6	Handling and Placing Concrete
502.3.7	Joints
502.3.8	Surface Finish of Concrete
502.3.9	Curing
502.3.11	Application of Loads to Concrete Masonry
501.12.3	Protection for Structural Masonry
502.3.15	Clean-Up

The construction methods used shall be in accordance with the requirements set forth in the specifications for the several parts of the completed structure. It is understood that the work to be done includes everything which might reasonably be considered necessary for a complete and workmanlike job in accordance with the plans and contract.

If weep holes through abutments or retaining walls are called for on the plans or are required to provide outlets for backfill drainage, they shall be formed in such a manner as to obtain a smooth circular opening and straight gradient through the wall. Unless otherwise shown on the plans, they shall not be less than three inches, nor more than four inches, in diameter, with a gradient of one inch per foot, spaced not closer than six feet, nor more than ten feet apart and placed so that the bottom of the weep holes at the face of the wall is approximately six inches above ground line or at the low water elevation.

In the construction of concrete masonry box culverts, unless otherwise provided, the curtain walls, base slab and side walls of the barrel to an approximate height of six inches shall be placed as a monolith and allowed to set before the remainder of the culvert is constructed. The side walls and top slab of box culverts shall be constructed as a monolith unless otherwise provided. An interval of not less than one hour nor more than three hours shall elapse between the placing of the concrete in the side walls and that in the top slab.

The falsework of culverts with a span of four feet or less shall not be removed until five days after pouring, exclusive of days in which the concrete has been subjected to a temperature of below 40° F. In the case of High-Early-Strength Concrete, the above five days described period may be reduced to three days.

No superimposed load shall be allowed on any culvert for a period of at least 14 days or until test cylinders show the strength of the masonry to be at least 3,000 pounds per square inch.

#### D. MEASUREMENT AND PAYMENT

Measurement and payment of the various items entering into the construction of concrete structures will be made in accordance to provisions of the contract for those items and in terms of the units provided therein for such items. All work included within the scope of the contract but not listed as bid items in the proposal shall be considered as work incidental and subsidiary to the several bid items and will not be measured for payment.

Only accepted work will be measured for payment, and the computation of the quantities thereof will be based on the dimensions shown on the plans or ordered by the Engineer.

Concrete masonry for culverts, retaining walls, and endwalls shall be measured by the cubic yard in place and the quantity thereof to be paid for shall be the summation of cubic yards of such concrete masonry incorporated in the work in accordance with the contract. No measurements or payment, unless otherwise provided, will be made of excavation, reinforcement, work or material for forms, falsework, cofferdams, pumping, bracing or other incidentals necessary to complete the work as required herein.

### SECTION 603.

#### CONCRETE CURB AND GUTTER

##### A. DESCRIPTION

This work shall consist of constructing concrete curb and gutter, with reinforcement, of the dimensions and design as indicated, placed in one course on the prepared foundation or base, at the locations and to the required lines and grades; all as shown on the plans and provided by the contract.

##### B. MATERIALS

All pertinent requirements under SECTION 601 PORTLAND CEMENT CONCRETE shall apply to concrete used in the construction of concrete curb and gutter. Concrete used in the work shall be Grade A Air-Entrained or A-WR Air-Entrained.

The material requirements of reinforcement, joint filler, and curing compound shall be as specified under Section 503 Concrete Pavement.

##### C. EQUIPMENT

Equipment and tools necessary for performing all parts of the work shall be satisfactory as to design, capacity and mechanical condition for the purposes intended, and any equipment which is not maintained in full working order, or which as used by the Contractor is inadequate to obtain the results prescribed, shall be repaired, improved, replaced, or supplemented to obtain the progress and workmanship contemplated by the contract.

##### D. CONSTRUCTION METHODS

The subgrade shall be accurately shaped to conform with the bottom contour of the curb and gutter section as shown on the plans. All soft or unsuitable material shall be removed and replaced with sand-gravel fill and the foundation or material underlying the proposed curb and gutter shall be mechanically

compacted thoroughly and finished to a firm, true surface. Except when required or ordered by the Engineer, if the subbase has been undercut by the Contractor, then he shall, at no expense to the City, return the subbase under the curb and gutter to the correct grade with compacted sand-gravel fill. The foundation shall be thoroughly moistened immediately prior to placing of the concrete.

Forms shall be metal and shall be of approved sections and of sufficient strength to resist springing or other displacement during the process of depositing concrete. Wooden forms may be used only with the Engineer's approval on short radius curves and in special cases where accessibility is limited. The forms shall be of the full depth of the required curb and gutter section and shall be of such design as to permit secure fastening. Face forms, if used, shall be so constructed and shaped that their lower edge conforms to the lines and radius indicated by the cross section as shown on the plans. Flexible or curved forms of proper radius shall be used for curves of 150 foot radius or less. All forms shall be cleaned thoroughly and oiled before the concrete is placed against them. Bent or twisted forms shall not be permitted.

The contractor may, with the approval of the Engineer, elect to use a machine for placing, forming and consolidating curb and gutter. If a machine is used, the resulting curb and gutter shall be of such quality as to equal or exceed that produced by methods herein before described.

The concrete shall be deposited to the proper depth, tamped, and spaded or mechanically vibrated sufficiently to bring the mortar to the surface, after which it shall be thoroughly floated, steel-troweled and brushed, and the back edge and edges adjacent to expansion joints shall be edged and rounded with an edger of 1/4 inch radius. Any honeycombed areas occurring along forms on back of curbs or edges of gutters shall be pointed with mortar immediately following the removal of the forms. The Contractor shall install a header at the end of each pour.

All joints shall be constructed as and in the locations shown on the plans or typical sections or as designated by the Engineer. Reinforcement bars shall be placed as shown in the Construction Standards, typical sections or as designated by the Engineer.

The curb and pan of the gutter shall be tested with a ten foot straightedge and any variations from the testing edge greater than 1/8 inch shall be corrected by an approved grinding tool. Variations from the true grade in the flow line of the gutter will not be tolerated.

Curing of the concrete shall be as specified under SECTION 503 CONCRETE PAVEMENT or by any method approved by the Engineer.

E. MEASUREMENT AND PAYMENT

Curb and gutter, completed in accordance with the terms of the contract, will be measured by length in lineal feet, along the flow line of the gutter and such measurement shall be continuous along such line extended across driveway and alley entrance returns. No deduction in length will be made for drainage structures installed in the curbing such as catch basins, drop inlets, etc.

The contract unit price for Curb and Gutter, per lineal foot, shall be payment in full for all preparation of subgrade and all special construction required at driveways, crosswalks and alley entrances; for furnishing all materials, including concrete masonry, reinforcement bars, and expansion joints; for placing, finishing, protecting and curing; and for all labor, tools, equipment and incidentals necessary to complete the work including backfilling the curb.

SECTION 604.

CONCRETE WALKS, DRIVEWAYS, AND TRAFFIC ISLANDS

A. GENERAL

This work shall consist of constructing sidewalks, driveways and traffic islands, with or without reinforcement, as the case may be, placed on the prepared foundation or base in one course of the required dimensions and design, all as shown on the plans and provided by the contract. Concrete used in the work shall be Grade A Air-Entrained or Grade A-WR Air-Entrained.

B. EQUIPMENT

Equipment and tools necessary for performing all parts of the work shall be satisfactory as to design, capacity and mechanical condition for the purposes intended, and any equipment which is not maintained in full working order, or which as used by the Contractor is inadequate to obtain the results prescribed, shall be repaired, improved, replaced, or supplemented to obtain the progress and workmanship contemplated by the contract.

C. CONSTRUCTION METHODS

The foundation shall be formed by excavating or filling to the required elevation. The foundation so constructed shall be tamped or rolled until thoroughly compacted to insure stability.

Forms shall be of wood or metal and shall be straight and of sufficient strength to resist displacement during the process of depositing and consolidating the concrete. The forms shall have a depth at least equal to the depth of the sidewalk. They shall

be securely staked, braced and held firmly to the required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be thoroughly cleaned and oiled before the concrete is placed against them.

The foundation and forms, and reinforcement when required, shall be checked and approved by the Engineer before the concrete is placed. The concrete shall be placed on a moist foundation deposited to the required depth, and consolidated and spaded sufficiently to bring the mortar to the surface, after which it shall be struck off and floated with an aluminum or magnesium float. Before the mortar has set, the surface shall be steel troweled and brushed. On sidewalks the brush shall be drawn across the sidewalk at right angles to the edges of the walk with adjacent strokes slightly overlapping, producing a uniform, slightly roughened surface with parallel brush marks. Curing of the concrete shall be as specified under SECTION 503 CONCRETE PAVEMENT. Clear liquid membrane-forming compounds may be used only if approved by the Engineer.

After the concrete has been cured, the spaces along the edges of sidewalk and driveway shall be backfilled to the required elevation with approved material. The material shall then be compacted until firm, and the surface neatly graded. Surplus or waste material resulting from the construction operations shall be disposed of by the Contractor as specified under SECTION 304 EXCAVATION.

#### D. MEASUREMENT AND PAYMENT

Concrete sidewalks and driveways shall be measured in place, and the area computed in square feet. The contract unit price of concrete sidewalks and driveways, per square foot, shall be full compensation for furnishing all materials; for preparation of foundation, backfilling and disposal of surplus material; for placing, finishing, protecting and curing; for all labor, tools, equipment and incidental necessary to complete the work. Unless the contract provides a bid item for Excavation, it shall be considered incidental and included in the price for Concrete, Sidewalks and Driveways.

Concrete Traffic Islands shall be measured in place, and the area computed in square yards. The contract unit price of Concrete Traffic Islands, per square yard, shall be full compensation for furnishing all materials; for excavations and preparation of foundation including backfilling and disposal of surplus material; for forming; for placing, finishing, protecting and curing of the concrete; and for all labor, tools, equipment and incidentals necessary to complete the work.

## PART VII

PART VII

STREET LIGHTING AND TRAFFIC SIGNALS

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SECTION 701.

ELECTRICAL CONDUIT

A. DESCRIPTION

This work shall consist of furnishing and installing metallic or nonmetallic conduit for signals and lighting units, all in accordance with the requirements of the plans, specifications and contract.

B. MATERIALS

Metal Conduit. The metal conduit shall conform to the requirements of the American National Standards Institute, Inc., Specification for Rigid Steel Conduit, Zinc Coated, ANSI Designation C 80.1, except as to identification and inspection.

Polyvinyl Chloride (PVC) Conduit. The polyvinyl chloride conduit shall be schedule 40 Carlon or approved equal.

Inspection. Each lot or shipment of conduit will be inspected after arrival at the job destination. When required by the Engineer, samples shall be furnished from any lot or shipment, for testing of an independent laboratory.

C. CONSTRUCTION METHODS

The conduit shall be of the nominal inside diameter designated on the plans or in the contract.

When so approved by the Engineer, the Contractor may substitute a larger size of conduit than that designated for the run; however, any additional costs shall be at the Contractor's expense and no adjustment in compensation will be allowed.

Each run of conduit shall be of one size for its entire length from outlet to outlet.

Standard conduit fittings shall be used.

The conduit shall be pitched for drainage. Unless otherwise shown on the plans, drainage shall be provided by drilling holes in the conduit at the low points. All burrs resulting from such drilling or from any cutting or threading of the conduit shall be removed before the conduit is installed.

A No. 12 gauge, or larger size, galvanized pull wire shall be installed in each run of conduit, as laid, which is to receive future conductors, unless the contract provides for the installation of cable. The wire shall be approximately four feet longer than the run of the conduit and shall be doubled back at least two feet at each terminal.

The underground conduit shall be laid in a 3" to 6" wide trench with a minimum depth of 24" unless otherwise indicated. Any protruding rocks or sharp stone shall be removed from bottom and sides of trench. The location of the trench shall be approved by the Engineer.

The trench shall be excavated true to line and grade to afford the conduit uniform bearing throughout its length. Approved sand backfill shall be placed in a well compacted 6" layer over the conduit in the 24"+ deep trenches. The remainder of the trench shall be filled with 3/4" Crushed Aggregate Base Course in well compacted 6" layers.

Upon completion of the work under the contract, the Contractor shall, in the presence of the Engineer or inspector, make an inspection of each installed conduit. Means shall be employed during the inspection to assure that the bore is fully open for its entire length. Any conduit found crushed, damaged, or unsatisfactory as determined by the Engineer, shall be replaced by the Contractor at his expense before acceptance of the work. The Contractor shall furnish all tools, equipment, and labor necessary or required to make the inspections.

#### D. MEASUREMENT AND PAYMENT

P.V.C. Conduit and Metal Conduit, shall be measured by the lineal foot in place, and the quantity measured for payment shall be the summation of linear feet, completed and accepted in accordance with the contract, based on the distance along the centerline of the conduit from the centerline of fitting to centerline of fitting or end of conduit or between ends of conduit, as the case may be.

The quantity of conduit, measured as provided above, will be paid for at the contract unit price per lineal foot of each of the specified sizes for P.V.C. (Size) and Metal Conduit (Size), as the case may be, which price shall be payment in full for furnishing, hauling, and placing the conduit and fittings; for furnishing and placing all conduit hangers, clips, attachments, and fittings used to support conduit on structures; for excavation, bedding and backfilling, including any sand or other required materials; for disposal of surplus materials; for making of inspections; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

## SECTION 702.

### UNDERGROUND POWER DISTRIBUTION WIRING

#### A. DESCRIPTION

This work shall consist of furnishing and installing conductors for traffic signals and lighting units, all in accordance with the requirements of the plans, specifications and contract.

#### B. MATERIALS

The power distributing 120-140 volt electric service lines for the electrification of the street light standards or traffic signals pertaining to this work shall each consist of 2 or 3 copper conductors with 600 volt URD chemically crosslinked polyethylene insulation or 600 v THWN conductors. The conductors shall be color coded throughout the system. All neutral conductors shall be white in color and phase conductors shall be black in color and red in color.

#### C. CONSTRUCTION METHODS

When power equipment is used to pull wires, it shall be utilized so as not to damage the raceway. A lubricant shall be used when pulling any wires.

Splices and taps into circuit shall be considered incidental to the contract. Splices and taps in the circuits shall be wrapped with 3M scotch fill tape or equal moulded over connectors to provide a thickness of 1 1/2 times the conductor insulation thickness and then wrapped with two half-lapped layers of 3M #33 scotch insulating tape or equal extending a minimum of 2" over the insulation of the conductor.

Splices may only be made within "pull boxes" or in base of standards. In the pull boxes the buried connections shall be especially well taped and sealed for fully waterproof connection. Neutral taps and connections will not be taped. Use plated split bolt connectors. Each circuit shall be marked in every pull box with an approved plastic tag identifying the circuit.

#### D. MEASUREMENT AND PAYMENT

Underground Conductor shall be measured by the lineal foot in place, and the quantity measured for payment shall be the summation of linear feet, completed and accepted in accordance with the contract.

The quantity of underground conductor, measured as provided above, will be paid for at the contract unit price per lineal

foot of each of the specified sizes for Underground Conductor, which price shall be payment in full for furnishing, hauling, placing, and splicing the conductor; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

## SECTION 703

### CONCRETE FOUNDATIONS

#### A. GENERAL

This work shall consist of constructing concrete foundations intended for supporting street lighting and/or traffic signals, in conformity with the requirements of the plans and specifications.

All pertinent requirements under SECTION 601 PORTLAND CEMENT CONCRETE shall apply to concrete used in the construction of concrete foundations. Concrete used in the work shall be Grade A Air-Entrained or A-WR Air-Entrained.

#### B. CONSTRUCTION METHODS

If soil is stable and firm, the lower part of each foundation may be poured directly into excavated foundation hole without the use of any forms. If, however, the soil face of the excavated foundation hole is not stable and it is reasonable to expect that in the process of pouring concrete, soil will enter said concrete, the Contractor must provide a standard disposal fiber form for at least 75% of the excavated depth to prevent such soil entry. The Engineer will decide to what extent such form work will be necessary.

During the pouring of the concrete, the foundation bolts shall be placed in position and properly supported to prevent displacement and arranged so as to cause the mast arm, where required, to be perpendicular to the curb line of the street.

#### C. BASIS OF PAYMENT

These items will be paid for at the contract until price per each for Concrete Foundation T-1, Concrete Foundation T-2, Concrete Foundation T-3, or Concrete Foundation for landscape lights, which prices shall be payment in full for furnishing and installing metal conduit elbows, reinforcement and anchor bolts; for furnishing and placing concrete masonry; for excavation, backfill and disposal of surplus materials; and for all labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 704.

PULL BOXES

A. DESCRIPTION

The work under this item shall include furnishing and installing pull boxes as detailed in the Construction Standards or as detailed on the plans and where shown on the plans or directed by the Engineer.

B. CONSTRUCTION METHODS

The Contractor shall set the concrete enclosure over spliced, taped and sealed conduits/conductors at proper elevation and permanently install the cast iron frame (with solid lid) in the concrete sidewalk or landscaped area directly above the said concrete enclosure.

C. BASIS OF PAYMENT

This item will be paid for at the contract unit price per each for Pull Box, which price shall be payment in full for furnishing and installing the cast iron frame (with solid lid); for furnishing and placing concrete masonry; for excavation, backfill and disposal of surplus materials; and for all labor, tools, equipment, and incidentals necessary to complete the work.

## PART VIII

PART VIII  
LANDSCAPING

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## SECTION 801.

### TOPSOIL

#### A. GENERAL

Topsoil shall be humus bearing fertile, friable dark soil, possessing characteristics that will produce good grass growth. Topsoil shall not be excessively acid or alkaline, nor contain toxic substances which might be harmful to plant growth. Topsoil shall also be reasonably free of subsoil, lumps, stones, roots or other debris which would hinder grading, sodding or planting operations. Unless otherwise specified, topsoil shall be placed at least four (4) inches thick and shall be graded and raked to the satisfaction of the Engineer. Finished terraces shall be free of stones, road materials, or lumps of dirt.

#### B. MEASUREMENT AND PAYMENT

Topsoil shall be measured in cubic yards based on tickets received by the Engineer for each load of topsoil. Payment for topsoil will not be made for any amount of topsoil not substantiated by a ticket received by the Engineer. Tickets for topsoil delivered to the City of Green Bay project shall be accepted only from trucks whose volume is clearly marked on the box. The City reserves the right to measure the truck box to check the volume so marked.

Delivery tickets shall show the date and location where used. These delivery tickets shall be given to the Inspector daily, or if the Inspector is not available, the delivery tickets shall be given to the Engineering Division Office within two work days after the material is delivered to the project area. Failure to provide these tickets in a timely manner may be cause to deny payment for the material.

The quantity of topsoil, measured as provided above, will be paid for at the contract unit price per cubic yard (Truck Measure) for Topsoil, which price shall be payment in full for furnishing, hauling, placing and compacting the specified material, including all equipment, tools, labor and incidentals necessary to complete the work as specified.

## SECTION 802.

### SODDING

The sodding shall comply with the requirements of Section 631, Sodding, of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition.

SECTION 803.

SEEDING

A. DESCRIPTION

This work shall consist of preparing seed beds and furnishing and sowing the required seed on terraces and other areas, as shown on the plans or as directed by the Engineer, all in accordance with the requirement of the specifications.

B. MATERIALS

Seed shall consist of a mixture of 30 percent Creeping Red Fescue, 60 percent Kentucky Bluegrass, and 10 percent Annual Ryegrass.

Fertilizer shall consist of Milorganite or equal.

C. CONSTRUCTION METHODS

Seed shall be sown at the rate of four (4) pounds per one thousand (1000) square feet. After a period of 30 days the Contractor shall reseed any areas that have failed to grow and shall repair and reseed any washed out areas. Fertilizer shall be applied at the rate of forty (40) pounds per one thousand (1000) square feet. All seed areas should be mulched with a light covering of weed free straw or hay. The seedbed shall be covered and free of large lumps. Seed shall be spread with the seeder, not by hand, for even seed distribution. The seed shall be covered with one-eighth to one-fourth inch of soil and the surface rolled lightly to put seed in contact with soil.

The Contractor shall keep the seeded areas moist at all times for a one-month period after installation.

D. BASIS OF PAYMENT

This item will be paid for at the contract unit price per pound for Seeding, which price shall be full compensation for furnishing, handling and storing all seed; for preparing the seed bed and sowing the seed; and for all labor, tools, equipment and incidentals necessary to complete the work.

The furnishing and placing of fertilizer is also included under the item of seeding unless otherwise specified.

SECTION 804.

PLANT MATERIALS

A. DESCRIPTION

This work shall consist of furnishing and planting plants of the species, varieties and sizes specified, complete in place at the locations designated on the plans or as directed by the Engineer. It shall include furnishing all necessary materials and performing all necessary work such as excavating plant holes, salvaging topsoil, potting, transplanting, backfilling, pruning, mulching, watering, heeling in, fertilizing, wrapping, guying and bracing, and rodent protection, disposing of surplus and waste materials, necessary care and required replacements pending acceptance, and such work necessary or incidental thereto to complete the item in accordance with the plans, specifications and contract.

B. MATERIALS

The Contractor shall provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1-1980, "American Standard for Nursery Stock". All plants shall be healthy, vigorous stock, grown in recognized nursery in accordance with accepted horticultural practices and free of disease, insects, eggs, larvae and defects such as knots, sun-scald, injuries, abrasions, or disfigurements.

All plants shall be hardy under climatic conditions similar to those in the location of the project.

Container grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil together, firm and whole. No plants shall be loose in the container.

Plants larger than specified in the plant list may be used if approved by the Engineer, but use of such plant shall not increase the unit price. If the use of larger plants is approved, the spread of roots or ball of earth shall be increased in proportion to the size of the plant.

All trees and shrubs will be labeled with a securely attached waterproof tag bearing legible designation of botanical and common name. Where formal arrangements or consecutive order of trees and shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.

The Engineer may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, condition and quality. The Engineer retains the right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during the progress of work.

### C. CONSTRUCTION METHODS

#### a) Handling and Protection of Plants

Roots and balls of plants shall be adequately protected at all times from the sun and drying winds. All balled and burlapped plants which cannot be planted immediately upon delivery shall be set on the ground and protected with a mulch covering or placed in heeled-in trenches immediately upon delivery. Upon delivery and continuing through the entire planting process all bare root plants shall be placed in a shady place and mulched and watered or heeled-in until the time of planting.

The planting seasons shall be in spring from the time the ground is workable until June 15th, and in the fall from the first frost until November 15th for deciduous plants and from early spring till June 15th or September 1st to October 1st for coniferous plants.

#### b) Installation of Plant Materials

The Engineer shall be responsible for marking the locations of all plant material. The locations of plants may vary slightly from the location shown on the plans.

1. Plant pits shall be excavated with vertical sides in accordance with the following outline:
  - a) Tree pits for 3 inch diameter trees shall be two feet greater in diameter than the ball of earth and sufficiently deep to allow for a 6" thick layer of compacted soil mix beneath the ball.
  - b) Tree pits for trees under 3" diameter shall be one foot greater in diameter than the ball of earth or roots of the tree.
2. Shrubs and evergreens shall be planted in pits 6 inches wider and deeper than the plant roots.
3. Excavated plant beds shall be a minimum of 6" deep in open areas, 12" deep for ground cover plants and 15" deep for herbaceous perennials and bedding plants.

After holes are excavated, the planting operation shall consist of the following:

1. Set balled and burlapped plants on a layer of compacted planting mix and bare root stock on a compacted mound, at such a height that after settling, the plant crown will be at original grade.
2. Remove all plastic and nylon binding materials from top and sides of balled and burlapped stock.
3. Roots of bare root plants shall be properly spread out and topsoil carefully worked in among them. Any broken or frayed roots shall be cut off clean.
4. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When pit is approximately two-thirds full, water thoroughly. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.
5. Immediately after tree pits are backfilled, a shallow basin slightly larger than the pit shall be formed with a ridge of soil to contain water. After planting, cultivate soil in shrub beds to a minimum of 6", remove sufficient soil to accommodate mulch, edge bed outline and grade to a fine, smooth surface while removing all extraneous material over 1 1/2", including sticks, stones or rubbish.

c) Pruning

All trees and shrubs shall be pruned in accordance with USA Standards 260.1-1980 to preserve the natural character of the plant. All dead wood, suckers and all broken or badly bruised branches shall be removed. In addition, one fourth to one-third of the wood shall be removed by thinning out and shortening branches to balance the root loss due to transplanting. Pruning shall be done with clean, sharp tools. In the case of particularly sensitive or disease prone species, the Contractor shall be required to rinse shears in alcohol or other approved sterilizing agent.

d) Wrapping

Wrapping of all trees shall be done after they are planted. The trunks of all trees shall be wrapped spirally from bottom to top with waterproof crepe paper specifically made for this purpose. The wrapping paper shall be no less than 4" wide and each wrap shall overlap the one previous by 50%. Wrapping shall extend from ground line to height of main branches. It shall be snug to tree's trunk, neat in appearance, and secured in place at top, middle and base by masking tape or twine.

e) Guying and Staking

All evergreen trees and all deciduous trees, two inches or greater in diameter, shall be secured in place with three guy wires. The wires shall each be a double strand of 12 gauge galvanized wire twisted with a loop in the middle for tightening. Guys shall be secured to the ground with 2 in. X 2 in. X 2 ft. wood stakes. Wires shall be looped around bottom branches of tree with 1/2 in. garden hose between to prevent chaffing.

All deciduous trees less than 2 inches in diameter shall be secured in place with two stakes. Stakes shall be new, 8 foot long steel T-fence posts, gray, green or brown in color. Stakes shall be driven a minimum of two feet into the ground along the edge of the plant hole. Trees shall be secured to stakes in a manner that secures the tree without damaging it. This includes cloth banding, duct taping or wire-hose apparatus.

f) Fertilizing

Fertilizing shall be done after planting and before mulching. Shrubs shall be fertilized with 16-8-8 ratio N-P-K at a rate of 2 lbs. per 100 sq. ft. of bed. Trees shall be fertilized with a formula 10-10-10 fertilizer at a rate of one pound per tall-growing tree, or 1/2 lb. per low-growing tree.

g) Mulching

All trees and shrubs shall be mulched with material as specified in plans to a depth of three (3) inches. For trees, the diameter of the mulch shall not be less than the diameter of the plant hole. Shrub beds shall have the mulch cover the entire area between the shrubs, with the mulch extending out a distance of approximately 18 inches beyond the outer shrubs in the bed, unless designated further on plan. A fabric weed control barrier, specifically designed for this purpose will be installed where designated.

h) Rodent Protection

All deciduous trees designated as requiring rodent protection shall be protected with a 2' X 2' piece of standard galvanized hardware cloth with at least four (4) mesh per inch. The wire shall be rolled into a cylindrical shape around the tree trunk with the bottom of the mesh at least two (2) inches below the finished grade and the edges of the mesh overlapped slightly. Three 3/8" X 36" round metal rods shall be equally spaced inside and against the mesh and driven into the ground until even with the top of the wire. The edges of the wire cloth shall be held together and the wire cloth shall be held to the rods with hogrings.

All deciduous shrubs designated as requiring rodent protection shall also be constructed of 1/4 in. mesh and 3/8 in. rods but the dimensions of the fabric and length of rods will be increased so as to allow a minimum of four (4) inches between the outer tips of the shrub and the mesh, and of sufficient height to allow no more than three (3) inches of shrub to extend beyond the top of the mesh. No mesh shall be installed less than two (2) feet high. In certain special situations other means of rodent protection may be called for including pre-coiled plastic or chemical sprays.

i) Cleaning Up

The Contractor shall at all times keep the premises free from the accumulation of waste materials and rubbish caused by his work. When planting in an area has been completed, the area shall be thoroughly cleaned up. All debris, rubbish, excess soil and waste shall be removed from the property. Existing turf areas which have been injured by the work shall be re-graded and sodded, and the entire area, when completed, shall be neat and clean to the satisfaction of the Engineer.

j) Watering

In addition to the watering done at planting time, all spring planted trees and shrubs shall be watered four (4) times during the following summer. All fall planted trees and shrubs will be watered once after planting and before the first freeze. Sufficient water shall be applied to thoroughly wet the root system.

D. BASIS OF PAYMENT

The number of plants, furnished and planted, will be paid for at the contract unit price each for Trees (Species and Size) or Shrubs (Species and Size), as case may be, which price shall be payment in full for furnishing, transporting, handling, potting, storing, pruning, and placing plant materials; for all excavation of plant holes, salvaging of topsoil, mixing and backfilling; for furnishing and applying all required topsoil, fertilizer, mulch, water, wrapping, guys and braces, and rodent protection; for disposal of all excess and waste materials; for care; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

SECTION 805.

DRY SET PAVERS

A. GENERAL

Work shall include furnishing all labor, materials, and equipment necessary to install dry set pavers on a sand laying course in the location and patterns shown on the plans.

Pavers shall be installed by experienced crews with proven experience on at least one job of 10,000 square feet or more.

Work shall proceed in an orderly manner with other trades coordinated to install their work immediately ahead of the paver installation in order to coordinate final locations to take best advantage of the required paver patterns and minimize paver cutting.

Finished paver areas shall be free from bump or depressions and evenly graded to the lines required.

The Contractor shall guarantee all materials and workmanship for a period of two years after substantial completion. Repairs needed to remove bumps, depressions, general unevenness or defective materials shall be borne by the Contractor at no expense to the City during the guarantee period.

B. MATERIALS

- a) Paver shall be a holland style 4-1/8" x 8-1/2" x 2-3/8" deep or an approved equal.
- b) Cementitious materials. Materials shall conform to the following applicable ASTM Specifications:
  1. Portland Cement - Specification C150
  2. Blended Cements - Specification C595
  3. Hydrated Lime, type S - Specification C207
  4. Pozzolans - Specification C618
- c) Aggregate shall conform to the following ASTM Specifications except that grading requirements shall not necessarily apply:
  1. Normal weight - Specification C33, for Concrete Aggregates.
  2. Lightweight - Specification C331, for lightweight aggregates for concrete masonry units.

- d) Other Constituents. Air-Entraining agents, coloring pigments, integral water repellants, finely ground silica, etc., shall be previously established as suitable for use in concrete and either shall conform to ASTM Standards where applicable, or shall be shown by test or experience not to be detrimental to the concrete.
- e) Physical Requirements
1. Compressive Strength. At the time of delivery to the work site, the average compressive strength shall be not less than 8,500 PSI with no individual unit less than 7,500 PSI.
  2. Absorption. The average absorption shall not be greater than 5%, with no individual unit greater than 7%.
  3. Durability. The manufacturer shall satisfy the purchaser by either proven field performance or the laboratory freeze-thaw test that the paving units have adequate durability if they are to be subjected to a freeze-thaw environment.
    - a. Proven Field Performance. Satisfactory field performance is indicated when units similar in composition, and made with the same manufacturing process as those to be supplied to the purchaser, do not exhibit objectionable deterioration after at least three years. The units used as the basis for proven field performance shall have been exposed to the same general type environment, temperature range, and traffic volume as is contemplated for the units supplied to the purchaser.
    - b. Freeze-Thaw Test. When tested in accordance with Section 8 of ASTM C 67-73, Specimens shall have no breakage and not greater than 1.0% loss in dry weight of any individual unit when subjected to 50 cycles of freezing or thawing. This test shall be conducted not more than 12 months prior to delivery of units.
    - c. Abrasion Resistance. When tested in accordance with ASTM C 418-76, "Abrasion Resistance of Concrete by Sandblasting", Specifications shall not have greater volume loss than 15 cubic centimeters per 50 square centimeters. The average thickness loss shall not exceed 3 millimeters.
- f) Permissible Variations in Dimensions
1. Length or width of units shall not differ by more than 1/16" from approved samples. Heights of units shall not differ by more than 1/8" from the specified standard dimension.

g) Visual Inspection

1. All units shall be sound and free of defects that would interfere with the proper placing of unit or impair the strength or permanence of the construction. Minor cracks incidental to the usual methods of manufacture, or minor chipping resulting from customary methods of handling in shipping and delivery, shall not be deemed grounds for rejection.

h) Sampling and Testing

1. The Engineer shall be accorded proper facilities to inspect and sample the units at the place of manufacture from the lots ready for delivery.
2. Sample and test units in accordance with ASTM Methods C140, Sampling and Testing concrete masonry units, except as required in Section 3.3.
3. Tests shall be made on every shipment to verify that pavers meet or exceed the physical requirements outlined above.

i) Rejection

1. In case the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new specimens shall be selected by the purchaser from the retained lot and tested at the expense of the manufacturer. In case the second set of specimens fail to conform to the test requirements, the entire lot shall be rejected.

j) Sand Laying Course

The sand laying course shall consist of clean coarse concrete sand, not mason sand, with the following gradation limits:

<u>Sieve Size</u>	<u>% Passing</u>
3/8"	100
4	90-100
8	80-95
16	55-85
50	10-35
200	0-5

## C. CONSTRUCTION METHODS

### 1. General

- a. The Contractor shall submit before construction to the Engineer for approval, samples of the pavers and color range requested. The sample shall be securely banded or mounted in a pattern emulating a pattern appearing in this project. Samples will be reviewed before authorizing construction of a field sample panel.
- b. Upon approval of the sample, the Contractor shall construct for approval a 200 square foot panel in one of the project paving areas. If the sample is approved, it may be left as part of the final paving. If not approved, the panel will be reconstructed until acceptable.

### 2. Construction of the Sand Laying Course

- a. The finished base course shall be approved by the paving Contractor before placement of the sand laying course. Commencement of the sand course shall mean acceptance of the crushed aggregate base course.
- b. The sand laying course shall be spread evenly over the area to be paved and screeded to a level that will produce the required 1-1/4" thickness when the paving stones have been placed and vibrated.
- c. Once screeded and leveled, this sand laying course shall not be disturbed in any way.

### 3. Laying of Pavers

- a. The paver stones shall be laid in the patterns shown on the plans and in the details.
- b. Utility covers in the areas to be paved shall be adjusted to finish grades.
- c. The paver stones shall be laid in such a manner that the desired pattern is maintained and the joints between the stones do not exceed 1/8".
- d. The gaps at the edges of the paved surface shall be filled with stones cut to fit tightly. The stones shall be cut to a straight, even surface without cracks or chips. Pavers shall be cut to fit closely around existing surface features.
- e. The paver stones shall be vibrated to their final level by 2 or 3 passes of a vibrating plate compactor.

- f. After first vibration, sand containing at least 30% - 1/8" particles shall be brushed over the surface and vibrated into the joints with additional passes of the plate vibrator so as to completely fill joints.
- g. Surplus material shall then be swept from the surface and the entire site left clean.
- h. After final vibrating, the surface shall be true to grade and shall not vary by more than 1/4" when tested with a 10' board at any location on the surface.

D. MEASUREMENT AND PAYMENT

Dry set pavers shall be measured in place and the area computed in square feet. The contract unit price of dry set pavers shall be full compensation for furnishing all materials, including sand; for preparation of the laying bed, paver installation; for job site clean-up and for all tools, equipment and incidentals to complete the work.

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PART IX

PART IX  
INCIDENTAL CONSTRUCTION

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SECTION 901.

MUDJACKING

A. DESCRIPTION

The work under this item shall consist of raising concrete curb and gutter, pavement, aprons, and sidewalk by injecting a Portland cement grout mix under the slab or curb and gutter at various locations throughout the City of Green Bay as directed by the Engineer.

B. MATERIALS AND CONSTRUCTION METHODS

The grout mix will contain at least 7 percent Portland cement and shall have a consistency, stiff enough to raise the slab or curb and gutter without blowing or leaking, and yet be fluid enough to prevent pyramiding.

Holes for injecting grout mix should be spaced not less than 12 inches nor more than 18 inches from a transverse joint or crack.

C. BASIS OF PAYMENT

The Contractor will not be paid for unsuccessful mudjacking.

The total length or area of an item mudjacked per block of a street determines the price used in computing the payment.

SECTION 902.

STEEL PLATE BEAM GUARD

This work shall consist of the construction of steel plate beam guard at the location shown on the plans or where directed by the Engineer. This work shall comply with all pertinent requirements for Steel Plate Beam Guard, Class B of Section 614. Guard Fence, Beam Guard And Marker Posts of the Standard Specifications for Road and Bridge Construction of the State of Wisconsin, Department of Transportation, Division of Highways, Latest Edition, except as modified herein or the special provisions of the contract.

Where shown on the plans or directed by the Engineer, steel plate beam guards salvaged from previous construction may be used. They shall be paid as Salvaged Steel Plate Beam Guard.

SECTION 903.

TIMBER PILING

A. DESCRIPTION

This work shall consist of furnishing, treating, if required, and cutting off timber piling all in accordance with the requirements of the plans and specifications.

B. MATERIALS

The wood species may be any of the following: Pacific Coast Douglas Fir, White Pine, Southern Yellow Pine, Red (Norway) Pine, Jack Pine, Western Larch, Oak or Cedar. All timber piles shall conform to the following requirements:

Soundness: All piles shall be of sound wood, free from decay, red heart, or insect attack.

Knots: Sound knots in the three-quarters of the length from the butt of piles shall be no larger than four inches, or one-third the diameter of the pile at the point where they occur, whichever is the smaller. Sound knots in the remaining one-quarter of the length shall be no larger than five inches, or one-half the diameter of the pile at the point where they occur, whichever is the smaller. The sum of sizes of all knots in any foot of length of the pile shall not exceed twice the size of the largest permitted single knot. Cluster knots are not permitted.

Holes: Holes less than one-half inch in average diameter are permitted if the sum of the average of all holes in any square foot of pile surface does not exceed 1 1/2 inches.

Splits and Shakes: Splits shall not exceed the butt diameter of the pile. The length of any shake or combination of shakes in the outer half of the radius of the butt of the pile, when measured along the curve of the annual ring, shall not exceed one-third the circumference of the butt of the pile.

Heartwood and Density: The diameter of the heartwood at the butt shall not be less than eight-tenths of the diameter of the pile at the butt.

Peeling: Piles shall be peeled clean of the outer bark and at least 90 percent of the inner bark.

Straightness: A straight line from the center of the butt to the center of the tip shall lie entirely within the body of the pile.

Cutting and Trimming: Butts and knots shall be sawed square with the axis of the pile. All knots and limbs shall be cut flush with the surface of the pile.

Twist of Grain: The twist of the spiral grain in any 20 feet of pile length shall not exceed one-half of the pile circumference at the mid-point of the length measured.

Dimensions: For timber piles longer than 20 feet, the pile diameter shall be at least 13 inches and not more than 24 inches at three feet from the butt. The piles shall have a continuous taper from the point of butt measurement to the tip.

#### C. CONSTRUCTION METHODS

Piles shall be pointed before driving, with a metal shoe if necessary, the head sawed off squarely and chamfered to fit the base of the hammer and protected with a cushion cap to prevent excess brooming.

Piling timber shall be placed to alignment and grade and securely fastened as indicated on the plans or as ordered by the Engineer. The Engineer may require that all piling timber be treated.

Length of piling needed shall be determined by the Engineer.

#### D. MEASUREMENT AND PAYMENT

Unless otherwise specified in the Special Provisions or the Proposal, the quantity of Timber Piling measured for payment shall be the summation of the lengths left in place below cutoff. The quantity unless otherwise specified shall be paid for at the contract unit price per lineal foot for Timber Piling which price shall be full compensation for preparing, framing, driving and cutting of piling; for treating cuts and abrasions; for removing and disposing upheaved material; and for furnishing all equipment, tools, labor and incidentals necessary to complete the work.

PART X

## PART X

## SEWERS

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SECTION 1001.

GENERAL

A. DESCRIPTION

Storm and Sanitary Sewer Construction shall consist of excavating the required trenches and tunnels; furnishing and laying therein pipe or monolithic concrete masonry sewers and required structures and appurtenances; backfilling the trenches; and restoring the site of the work at the locations and to the required lines and grades; all as shown on the plans and provided by the contract.

B. EQUIPMENT

Equipment and tools necessary for performing all parts of the work shall be satisfactory as to design, capacity, and mechanical condition for the purposes intended, and any equipment which is not maintained in full working order, or which as used by the contractor is inadequate to obtain the results prescribed, shall be repaired, replaced or supplemented to obtain the progress and workmanship contemplated by the contract.

C. SANITARY SEWER INFILTRATION TEST

All leakage tests shall be completed and approved after the sanitary sewers, including laterals and appurtenant structures, have been installed, backfilled and cleaned, but prior to the placement of a permanent surface.

When leakage or infiltration exceeds the amount allowed by the specifications, the contractor at his expense, shall locate the leaks and make the necessary repairs or replacements in accordance with the specifications to reduce the leakage or infiltration to the specified limits. Any individually detectable leaks shall be repaired, regardless of the results of the tests.

Leakage tests shall be made on all completed pipelines using one of the following tests:

1. Water Infiltration Test. If, in the opinion of the Engineer, excessive groundwater is encountered in the construction of a section of a sewer, the Water Infiltration Test shall be used for the leakage test. A minimum positive head of two feet over the top of the pipe shall be available for this test to be considered valid.

The outlet end of the sewer at the upper structure shall be closed sufficiently to prevent the entrance of water, and pumping of groundwater, if such was required, shall be discontinued for at least three (3) days, after which the section shall be tested for infiltration.

The rate of infiltration into each individual reach of sewer between adjoining manholes shall not exceed 200 gallons per day per inch diameter per mile of sewer.

The rate of infiltration into manholes shall not exceed 200 gallons per day per inch diameter per mile using the total number of vertical feet of manhole expressed as the equivalent diameter sewer.

Unless otherwise specified, infiltration will be measured by the Engineer using measuring devices furnished by the City.

2. Low Pressure Air Test. If, in the opinion of the Engineer, sufficient groundwater is not present to conduct the Water Infiltration Test, the Low Pressure Air Test shall be used for the leakage test.

The contractor shall furnish all materials, equipment, and labor for making an air test. Air test equipment shall be approved by the Engineer.

Each section of sewer shall be tested between successive manholes by plugging and bracing all openings in the mainline sewer and the upper ends of all house connection sewers. Prior to any air pressure testing, all pipe plugs shall be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again.

The final leakage test shall be conducted in the presence of the Engineer and in accordance with ASTM C828.

If the time lapse (in seconds) required for the air pressure to decrease from 3.5 psig to 2.5 psig exceeds that shown in the following table, the pipe shall be presumed to be within acceptable limits for leakage.

If the time lapse is less than that shown in the table, the contractor shall make the necessary corrections to reduce the leakage to acceptable limits.

LOW PRESSURE AIR TEST TIME (MANHOLE TO MANHOLE)

Specifications time (Min:Sec) required for loss of air pressure from 3.5 psig to 2.5 psig for size and length of pipe and laterals indicated, i.e., total test time = (T) length of mainline + (T) total length of laterals.

---

	Pipe Diameter "D" in Inches								
	4	6	8	10	12	15	18	21	24
25	0:04	0:10	0:18	0:22	0:27	0:31	0:36	0:45	0:54
50	0:09	0:21	0:36	0:45	0:54	1:03	1:12	1:30	1:48
75	0:13	0:31	0:54	1:07	1:21	1:34	1:48	2:15	2:42
100	0:18	0:42	1:12	1:30	1:48	2:06	2:24	3:00	3:36
125	0:22	0:52	1:30	1:52	2:15	2:37	3:00	3:45	4:30
150	0:27	1:03	1:48	2:15	2:42	3:09	3:36	4:30	5:24
175	0:31	1:13	2:06	2:37	3:09	3:40	4:12	5:15	6:18
200	0:36	1:24	2:24	3:00	3:36	4:12	4:48	6:00	7:12
225	0:40	1:34	2:42	3:22	4:03	4:43	5:24	6:45	8:06
250	0:45	1:45	3:00	3:45	4:30	5:15	6:00	7:30	9:00
275	0:49	1:55	3:18	4:07	4:57	5:46	6:36	8:15	9:54
300	0:54	2:06	3:36	4:30	5:24	6:18	7:12	9:00	10:48
325	0:58	2:16	3:54	4:52	5:51	6:49	7:48	9:45	11:42
350	1:03	2:27	4:12	5:15	6:18	7:21	8:24	10:30	12:36
375	1:07	2:37	4:30	5:37	6:45	7:52	9:00	11:15	13:30
400	1:12	2:48	4:48	6:00	7:12	8:24	9:36	12:00	14:24
425	1:16	2:58	5:06	6:22	7:39	8:55	10:12	12:45	15:18
450	1:21	3:09	5:24	6:45	8:06	9:27	10:48	13:30	16:12
475	1:25	3:19	5:42	7:07	8:33	9:58	11:24	14:15	17:06
500	1:30	3:30	6:00	7:30	9:00	10:30	12:00	15:00	18:00

It is not necessary to hold the test for the whole period when it is clearly evident that the rate of air loss is less than the allowable.

D. TREE REMOVAL

Utility contractors shall be responsible for complete tree removal and disposal necessary for the performance of their contract. Brush shall be processed through chippers. Trunks, stumps and chips shall be disposed of as directed by the Department of Public Works. The cost of tree removal and disposal shall be considered incidental to the contract.

E. SEWER TELEVISIONING

Prior to final acceptance of the project, the City will televise certain sections of the sewers, as determined by the Engineer, at no expense to the Contractor. The Contractor shall be required to repair all visible leaks.

SECTION 1002.

MATERIALS

A. GENERAL

All material specified, unless otherwise distinctly stated, shall be furnished at the Contractor's expense. All materials used shall be as good as can be obtained in the open market, and no material shall be used or work covered up until it has been inspected and approved. Any material rejected by the Engineer or inspector shall be removed at once from the work, and if any material once rejected be brought upon the work a second time, such material shall be destroyed by the inspector or become the property of the City.

All pipe shall be tested to assure compliance with the designated A.S.T.M. specifications by the Engineer or if so ordered by an independent testing laboratory approved by the Engineer. The cost of testing shall be borne by the Contractor.

Samples of the materials proposed or furnished for the work may be taken by the Engineer at any time, at the point of manufacture, point of delivery, or site of work. They will be selected as far as practicable, in accordance with standard methods for sampling materials as specified in the A.S.T.M. standards. Cost of samples selected for testing shall be borne by the Contractor.

The pipe manufacturer shall supply all fittings and tees shown on plans, including sanitary and storm connections.

B. REQUIREMENTS FOR ALL PIPE

Straightness: Pipe intended to be straight shall have a maximum ordinate as measured from the concave side of the pipe not to exceed 1/8 inch per foot of length.

Marking: Each length of pipe shall bear the name or trademark of the manufacturer, the location of the plant and the date of manufacture. Each length shall likewise be marked to designate the class or strength of the pipe. The markings shall be made on the exterior or interior of the pipe barrel near the bell or groove end and shall be plainly visible. Pipe with either elliptical reinforcing, or of special design with a double lap of steel at inside faces of the top and bottom of the pipe shall have the word "top" or "bottom" clearly stencilled on the inside of the pipe at the correct place to indicate the proper position when laid.

Fittings: Fittings such as wyes, tees and bends shall be made in such a manner as will provide strength and water tightness at least equal to the class of the adjacent main line pipe to which they are jointed and shall conform to all other requirements specified for pipe of corresponding class and internal diameter. Joints shall be the same type as used on the adjoining pipe.

Fabricated branches for wyes and tees shall be securely attached to the wall of the pipe in a watertight manner and shall be flush with the inside surface of the pipe. Tee branches shall have their axes perpendicular to the longitudinal axis of the pipe. Wye branches shall have their axes approximately 60 degrees for clay pipe and 45 degrees for concrete pipe, from the longitudinal axis of the pipe, measured from the bell end. Pipe reinforcement shall not be interrupted beyond a radial distance of three inches outside of the fitting.

Handling Holes: Pipe Handling holes are permitted only on reinforced concrete storm sewer pipe 21 inches or larger in diameter. One handling hole is permitted on straight lengths of pipe, less than 48" in diameter, and two on pipe 48" and larger in diameter. After the pipe has been laid, the handling holes shall be promptly plugged with mortar and an approved manufactured plug. The Engineer reserves the right to prohibit handling holes where he deems them undesirable.

Rejection: Pipe shall be subject to rejection for failure to conform to any requirement of the specifications or for any of the following reasons:

1. Fractures or cracks passing through the pipe wall or socket, except that a single crack not exceeding 2 inches in length at either end of the pipe or a single fracture in the socket not exceeding 3 inches in width nor 2 inches in length shall not be considered cause for rejection unless these defects exist in more than 5% of the entire shipment or delivery.
2. Chips or fractures on the interior of the pipe exceeding 2 inches in length, 1 inch in width and of a depth more than 1/4 the barrel thickness.
3. Cracks, sufficient to impair the strength, durability, or serviceability of the pipe.
4. Defects that indicate improper proportioning, mixing and molding.
5. Variations of more than 1/8 inch per linear foot in alignment of a pipe intended to be straight.
6. Insecure attachment of spurs.

7. Damaged ends, where such damage would prevent making a satisfactory joint.

#### C. GENERAL REQUIREMENTS FOR SANITARY SEWER

Unless otherwise specified in the Special Provisions of the Contract, Polyvinyl Chloride pipe, A.B.S. Composite pipe, Non-reinforced Concrete pipe or Reinforced Concrete pipe, may be used for sanitary sewers providing they meet the pertinent requirements of these specifications.

Unless otherwise specified in the Special Provisions of the contract, Cast Iron Pipe, Polyvinyl Chloride pipe, or A.B.S. Composite pipe may be used for sanitary connections providing they meet the pertinent requirements of these specifications.

Deflection tests shall be performed for all polyvinyl chloride and A.B.S. Composite pipe installations. The deflection test shall be performed without mechanical pulling devices. If deflection testing occurs within 30 days of placement of the final backfill, deflection may not exceed five percent (5%). Maximum deflection may not exceed 7.5 percent when testing occurs more than 30 days after placement of the final backfill.

#### D. GENERAL REQUIREMENTS FOR STORM SEWER

All mainline storm sewer shall be Reinforced Concrete Pipe unless otherwise specified in the Special Provisions of the contract.

Unless otherwise specified in the Special Provisions of the contract, Polyvinyl Chloride pipe or A.B.S. Composite pipe may be used for 6-Inch storm laterals providing they meet the pertinent requirements of these specifications.

All 12-Inch catch basin leads and storm laterals shall be Reinforced Concrete Pipe with rubber gasket joint.

All daylighted pipe 12 Inches in diameter and over must have screened inlets with vertical bars 4 inches center to center and a horizontal bar across the midpoint. Both vertical and horizontal bars shall be No. 2 bars for 12-Inch to 24-Inch pipe and No. 4 bars for pipe larger than 24-Inch. All bars to be welded to 1/4-inch x 1 1/2-inch steel strap and anchored to the pipe with anchor bolts (6-inch or 12-inch). Three (3) anchor bolts shall be used on 12-Inch or 24-Inch pipe and four anchor bolts are required for larger than 24 inch.

#### E. POLYVINYL CHLORIDE SEWER PIPE AND FITTINGS

Pipe and fittings furnished under this classification shall meet the requirements of ASTM D 3033, ASTM D 3034, and ASTM F 679, and all subsequent revisions thereof.

A-2000 PVC pipe may be used as approved by the Wisconsin Department of Natural Resources. The Wisconsin Department of Natural Resources currently limits A-2000 PVC pipe burial depth to a maximum of 20 feet.

Joining of pipe sections and fittings shall be accomplished by solvent welding in accordance with recommendations of the pipe manufacturer or with gaskets which have been approved by the Department of Natural Resources of the State of Wisconsin.

F. A.P.S. COMPOSITE SEWER PIPE AND FITTINGS

Pipe furnished under this classification shall meet the material requirements set forth in A.S.T.M. Designation D-2680, and all subsequent revisions thereof, including the following detailed requirements:

Joining: Factory attachment of couplings and saddle fittings and field joining of pipe sections and fittings shall be accomplished by solvent welding in accordance with the recommendations of the pipe manufacturer and with the approval of the Engineer. All exposed filler material shall be field coated with A.B.S. Solvent Cement.

Rejection: Pipe shall be subject to rejection for failure to conform to material requirements of A.S.T.M. D-2680 or for any of the following reasons:

1. Distortion or puncture of the inner shell. (Distortion or puncture of the outer shell shall not be reasons for rejection if the inner shell is unaffected and such exterior distortion or puncture is suitably repaired with a solvent welded patch to the satisfaction of the Engineer.)
2. Through cracks in coupling.
3. Faulty attachment of couplings or fitting spurs.
4. Voids in the concrete filler at pipe ends, exceeding 1" in depth as measured from the pipe end and exceeding 10% of the pipe circumference. However, this pipe may be used if the faulty pipe end is sawed off and coated to the satisfaction of the Engineer.

Marking: In addition to the markings required in Subsection 1002-B, A.B.S. pipe and fittings shall be marked as follows:

Each length of pipe shall be clearly marked as follows in intervals of five feet or less and each fitting shall be marked as follows:

1. Nominal pipe diameter.
2. This A.S.T.M. Designation D-2680.
3. Date of Manufacture of lot number.

G. CAST IRON AND DUCTILE IRON PIPE AND FITTINGS

Cast iron pipe and fittings furnished under these specifications shall be of commercial grade known as "Extra Heavy" and shall meet the requirements of AWWA C100 and all subsequent revisions thereof.

Ductile iron pipe and fittings shall meet the requirements of ASTM A 746.

Cast iron and ductile iron pipe joints shall consist of rubber gasket joints or mechanical joints meeting the requirements of AWWA C100.

H. NON-REINFORCED CONCRETE SEWER PIPE

Pipe furnished under this classification shall meet the requirements set forth in A.S.T.M. Designation C-14, and all subsequent revisions thereof, except as modified herein or in the Special Provisions of the contract. Rubber-type joints for circular concrete sewer pipe shall be in accordance with A.S.T.M. designation C-443.

I. REINFORCED CONCRETE PIPE

Pipe furnished under this classification shall meet the requirements set forth in A.S.T.M. Designation C-76 for circular pipe, and A.S.T.M. Designation C-507 for elliptical pipe. Rubber-type joints for circular concrete sewer pipe shall be in accordance with A.S.T.M. Designation C-443.

J. VITRIFIED CLAY PIPE

The pipe, fittings and accessories shall be of extra strength vitrified clay and shall conform to the requirements of specifications for extra strength clay pipe, ASTM Designation C-700. Factory manufactured joints used with vitrified clay pipe shall be in accordance with ASTM Designation C-425.

K. CORRUGATED METAL CULVERT PIPE AND FITTINGS

1. Corrugated Steel Culvert Pipe and Pipe Arches

Pipe, fittings, and apron endwalls furnished under this classification shall conform to the requirements of the specification for metallic coated (galvanized or aluminized) corrugated iron or steel culverts and underdrains, AASHTO Designation: M 36 and the dimensions shown on the plans.

2. Corrugated Aluminum Pipe Culverts

Pipe, fittings and apron endwalls furnished under this classification shall conform to the requirements of the specification for corrugated aluminum alloy culverts and underdrains, AASHTO Designation: M 196, and to the dimensions shown on the plans.

3. Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches

Bituminous coated pipe and fittings furnished under this classification shall conform to the requirements of the standard specification for corrugated metal pipe and pipe arches, AASHTO M 36, or aluminum alloy culvert pipe, AASHTO M 196, and in addition, shall be coated with bituminous material in accordance with AASHTO Designation: M 190.

4. Polymeric Coated Culvert Pipe and Pipe Arches

Pipe and fittings furnished under this classification shall conform to the requirements of the specification for zinc coated (galvanized) iron or steel sheets for culverts and underdrains, AASHTO Designation: M 218 and the specification for precoated galvanized steel sheet for culverts and underdrains, AASHTO Designation: M 246 and the dimensions shown on the plans.

L. POLYVINYL CHLORIDE PIPE UNDERDRAIN

Pipes and fittings under this classification shall conform to the requirements of ASTM D 3034. Wall thickness shall be SDR 35 and the pipe shall be perforated with circular or slotted holes in accordance with the requirements of AASHTO M 175.

M. SANITARY SEWER JOINTS, GENERAL

Joints of all sanitary sewers shall have been approved by the Engineer. The joints shall be a rubber-type gasket or chemically welded joints. This shall include caps for bulkheading of mainline sewer and connections.

N. MORTAR

Unless otherwise provided, mortar shall be comprised of two parts of screened sharp sand for mortar and one part by volume of Portland cement.

The mortar shall be machine mixed unless otherwise permitted by the Engineer. Machine mixed mortar shall be prepared in an approved mixer and shall be mixed not less than 1 1/2 minutes. In the preparation of hand-mixed mortar, the sand and cement shall be

thoroughly mixed together in a clean, tight mortar box until the mixture is of uniform color, after which clean water shall be added in such quantity as to form a stiff paste. Mortar shall be used within 45 minutes after mixing.

O. CONCRETE

Portland cement concrete used in the work shall conform to the requirements of Grade A concrete of Section 601, Portland Cement Concrete.

P. BACKFILL

Unless otherwise specified in the contract, the following definitions will be used in defining the types of backfill for specific streets and areas. Hereinafter, the word backfill shall mean any of the following three types:

1. Natural Backfill: Natural backfill shall mean existing material removed from the trench.
2. Granular Backfill: Granular backfill shall mean pit run sand-gravel material of which 98% by weight will pass the three inch screen and no more than 5% by weight shall pass the No. 200 screen. The material shall be evenly graded, free from debris and organic material.

Excavated material from the same trench may be used as backfill in the same trench, and will be considered as Granular Backfill if it meets the following specifications: 98% by weight shall pass the three inch screen, and no more than 20% by weight shall pass the No. 200 screen.

3. Gravel Backfill: Gravel backfill shall mean 3/4" crushed aggregate meeting the requirements of Gradation No. 1, Section 401 of these specifications.

## SECTION 1003.

### CONSTRUCTION METHODS

#### A. GENERAL

Unless otherwise provided in the contract or permitted by the Engineer, the work of constructing sewers shall be done in open trenches and in a manner to protect pipe lines or sewers from unusual stresses.

The Contractor shall provide for the flow of all sewers, drains, or creeks, interrupted during the progress of the work, and shall restore or make good all connections as directed by the Engineer, or he shall, if so ordered, connect the said sewer, drain or creek with the sewer.

The Contractor shall provide the necessary facilities such as steel stakes, grade pole, and batter boards for transferring the grade and line from the Engineer's stakes to the pipe. Not less than three batter boards set directly from the Engineer's stakes shall be in place at all times. Such additional batter boards as may be needed for expeditious and proper handling of the work may be sighted in but shall be in addition to the three batter boards from direct setting. The distance between batter boards shall be 33 feet plus or minus 10 feet. The width of the batter boards shall be at least six inches. Materials used shall be free of warping. If the offset method is used, the string lines shall be at least 8 feet apart and the batter boards placed as close to the trench as possible.

If approved by the Engineer, the Laser Beam method may be used in lieu of batter boards. When the Laser Beam method is used, it shall be set up inside the manhole and the Contractor shall check the grade every 100 feet by a method approved by the Engineer.

At the start of construction, the Contractor shall install a temporary bulkhead in the first pipe laid out of the manhole. The bulkhead shall be of a type approved by the Engineer. The bulkhead shall not be removed until final approval of the project by the Engineer.

The Contractor is responsible for locating and reconnecting all in-service connections. The cost of this work shall be included in the bid price for the respective size of reconnection.

#### B. TRENCH

The width of the trench shall be ample to permit the pipe bedding material and backfill to be placed and compacted as specified. Trenches shall be of sufficient width, when required to permit the placing of trench supports, sheeting and bracing.

In order to limit excessive loads on the pipe, the maximum width of trench shall not be more than 18 inches wider than the outside diameter of the pipe or 30 inches whichever is greater. The above limiting restrictions on trench width apply from the bottom of the pipe trench to the outside top of the pipe.

When the trench width above the top of the pipe is appreciably greater than that which is reasonably required by project conditions in the judgement of the Engineer, any additional cost for backfill material, surface restoration or other items that are the result of such excess trench width, shall be borne by the Contractor.

In no case shall more than 400 feet of trench be opened in advance of the completed work. In no case shall such excavation extend at the same time across more than two parallel streets which intersect the street in which the work is being done. The trench shall be backfilled as near as possible, to the end of the day's work.

#### C. USE OF SHOE

Where conditions required the use of a shoe or where its use, in the judgement of the Engineer, would result in greater safety, less inconvenience, or appreciable savings to the City, the Contractor shall use a shoe of suitable design for the depth of trench and size of pipe being installed. Maximum and minimum trench widths required elsewhere in these specifications shall also apply when a shoe is used. It shall be of the length and type which meets the Federal Occupational Safety and Health Act (OSHA) Specifications.

Before the shoe is moved, bedding material shall be placed and compacted. As the shoe is moved, the bedding material at the down grade end of the shoe must be immediately tamped in place to fill any voids resulting from the movement of the shoe.

Before the shoe is moved, the pipes shall be securely held to prevent any movement or displacement of said pipes as the shoe is being moved. In the event that pipe movement occurs, the Contractor will be required to relay the affected portions of the sewer.

#### D. SHEETING, SHORING AND BRACING

The Contractor shall furnish, install and maintain such sheeting, bracing and shoring as may be required to support the sides of the excavation and to prevent any movement of earth which would damage or delay the work or cause damage to adjacent pavement, buildings or other structures. If in the opinion of the Engineer, sufficient or proper supports have not been provided at any point, he may order additional supports placed at the expense of the Contractor, and neither the placing of such additional supports

by the order of the Engineer, nor the failure of the Engineer to order such additional supports, shall relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside the sheeting, but if voids are formed, they shall immediately be filled and compacted to the satisfaction of the Engineer. Damages resulting from failure or improper sheeting, shoring and bracing shall be the sole responsibility of the Contractor.

Trench sheeting shall not be pulled unless the pipe strength is sufficient to carry trench loads based on the trench width to the back of the sheeting at the top of the pipe. All sheeting and bracing which is not left in place in the trench, shall be removed in such manner as not to endanger the installed pipe or other structures, utility conduits or property, whether public or private. All voids left or caused by the withdrawal of the sheeting shall be immediately refilled with backfill material by ramming with tools adapted for that purpose, by watering, or as may be directed by the Engineer.

#### E. AUGERING

Augering may be required and will be permitted in certain instances in preference to opening the street for the installation of storm sewers, sanitary sewer, water, and gas connections only. A steel casing of sufficient size and strength will be provided by the Contractor to facilitate augering and the casing will be left in place after augering. The space surrounding the pipe shall be thoroughly and completely filled by forcing in under pressure a slurry-like mixture composed of one part cement, one part fly ash and eight parts of fine clean sand. The composition of the sand shall be such that 100% will pass the No. 10 screen and not more than 5% shall pass the No. 200 screen. After placing of slurry mixture, the interior of the pipe shall be inspected and cleaned to remove any mixture which may have entered the interior of the pipe line.

#### F. TUNNELING

Where tunneling is required, or, because of the circumstances involved, the Contractor prefers that type of construction after prior approval of the Engineer, the cost of the sheathing shall be part of the bid price and shall not be construed, nor paid for, as an extra. The backfilling of the tunnel shall be made by thoroughly compacted concrete when so specified and, when not otherwise specified, by pumping or forcing in a lean slurry mixture as indicated above for augering or, if the volume is large, by a mixture of one part fly ash, one part cement, four parts sand, and eight parts stone. The material shall be forced in at one end until it passes through the tunnel surrounding the pipe to the opposite end or, in special cases, may be pumped in from the top at the center of the tunnel until it emerges at both ends. The pipe line shall be properly bedded and joints made as

for open cut except when concrete encasement is required. Concrete for encasement shall be Class A concrete as specified in Section 601, Portland Cement Concrete.

#### G. JACKING

In jacking a pipe through an embankment or under a street or railroad, all jacking operations shall be made under close supervision of the Engineer or inspector assigned to the project. The hydraulic jack shall be of suitable capacity to properly move the pipe and suitable tracks or skids shall be installed to properly align the pipe in such a manner that the required tolerances in line and grade can be maintained. Care should be taken so as not to remove more of the dirt surrounding the pipe than is absolutely necessary. After "holing through", the interstices surrounding the pipe shall be completely filled with a grout mixture of the same proportions as herein specified for mortar, to which has been added fly ash not to exceed thirty pounds per bag of cement. The grout shall be forced in under pressure of approximately two hundred pounds per square inch and grouting operations continued until the Engineer is satisfied that all voids and interstices have been completely filled.

#### H. ROCK EXCAVATION

Wherever the word rock is used in these specifications, it shall mean solid ledge rock and all other minerals geologically placed. Also all conglomerate deposits and any other material; so firmly cemented as to present all the characteristics of solid rock, which materials is as hard or so firmly cemented that in the opinion of the Engineer it is not practical to excavate and remove same with a backhoe except after thorough and continuous drilling and blasting. Boulder, hard heads and stones, one-half (1/2) cubic yard in volume or larger, shall be classified as rock. The Engineer shall be the sole judge as to what constitutes rock excavation.

Shales, hard pan, masonry and concrete structures or foundations, plain or bituminous bound base or surface courses, broken rock, broken concrete, stratified or deteriorated ledge rock or any material which can be excavated with a backhoe shall not be classified as rock.

Backhoes as referred to above shall be taken to apply to a modern backhoe of not less than three-quarters (3/4) cubic yard manufacturer's rated capacity, having adequate power and being in good running condition in the hands of an experienced operator.

Where blasting is necessary, the Contractor shall obtain the required permits and licenses from the City Fire Department at his own expense. All blasting shall be under the supervision of a licensed registered blaster. This work shall be done with due regard to the safety of workmen, other people, and public and private property.

The methods of covering blasts, amounts of charges used, storage and transportation of explosives and detonators, and the general procedure for doing this work shall conform to standard practice and shall meet all requirements of local ordinance and other regulations and shall be subject to the approval of the Engineer. Only electric detonators shall be used in blasting. The Engineer reserves the right to approve the time that blasting will be permitted and no claim for loss or delay will be allowed on that account.

All injuries or losses to persons or property, by reason of blasting, shall be borne by the Contractor. The Contractor shall give a proper warning to all persons who may be in the vicinity of the work before the blast is set off. Any damage done by blasting shall be immediately settled for by the Contractor. The City will cooperate with the Contractor in protecting life and property but will not assume any responsibility for the operations of the Contractor, nor will the City be responsible for any damages to persons or property as the result of the blasting operations.

Rock shall be removed to provide a clearance for all pipes, appurtenances or structures of at least six inches below the bell of the pipe, and a minimum of six inches on each side of the pipe. The specified minimum clearances are the minimum clear distances which will be permitted between any part of the pipe or appurtenances being laid and any part, point or projection of the rock. Crushed stone, or pea gravel as determined by the Engineer, shall be used as a cushion in areas of rock excavation and shaped to conform to the lower portion of the pipe to be placed. The cost of said crushed stone, or pea gravel shall be included under Rock Excavation.

#### I. DEWATERING

The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and ground water, including water or sewage from exposed sewers or watermains, from all excavations and trenches or other parts of the work. The excavation shall be kept dry during the preparation of the subgrade and continually thereafter until the structure to be built or the installation of the pipe line is completed to such an extent that no damage from hydrostatic pressure, flotation or other causes will result. No water, sand, earth or other material shall be allowed under any circumstances, to enter said sewer. No sewer shall be laid in water.

Where work is in soil containing an excessive amount of water, the Contractor shall provide, install and maintain suitable well points connected to manifolds or reliable pumping equipment and shall so operate them to insure proper construction of the work. The Contractor shall make every effort to prevent sand, sediment or debris from entering any existing pipe line or conduit which he may use for drainage purposes. The repair or cleaning of drainage structures made necessary by the Contractor's operations, shall be

performed by and at the expense of the Contractor. Arrangements for discharge of ground water into any public sewer shall be previously approved by the Engineer.

Dewatering including the use of stone or gravel for dewatering purposes when required, will not be paid for separately but shall be included in the unit price per lineal foot of work.

#### J. BEDDING

Bedding Material shall consist of 3/4" stone, or existing granular material, if approved by the Engineer.

The sewer trench shall be excavated to a depth of four (4) inches below the bottom of the pipe, and bedding material shall be placed to provide a firm and uniform bearing for the barrel of the pipe with additional shaping under the bells on bell and spigot pipe. Where the Contractor over-excavates the bottom of the trench, the Contractor shall bring the bottom of the trench to proper grade by the addition of bedding material at the expense of the Contractor. After each pipe has been graded, aligned and placed in final position on the bedding material and jointing is complete, additional bedding material shall be carefully placed and compacted under and around each side of the pipe and over the pipe until it is completely covered by 12 inches of bedding material. Said material shall be distributed along both sides of the pipe uniformly and simultaneously to prevent lateral displacement of the pipe. All the work of providing proper pipe bedding shall be considered an integral part of installing the pipe and shall be completed immediately after the pipe is laid to the correct alignment and grade.

Whenever it is necessary due to the nature of the material on the bottom of the trench to excavate below grade, the Contractor shall remove said material to the required depth below grade and fill in with 1 1/2" crushed stone or 3" breaker run, all as directed by the Engineer. Payment for the excavation below grade shall be considered incidental and included in the unit price for 1 1/2" Crushed Stone Cradle or 3" Crushed Stone Cradle. If, in the opinion of the Engineer, further means of support are necessary, such as piling, sheeting-in-place or concrete, the Contractor shall excavate for and put same in position at his contract price for timber, sheeting or concrete.

#### K. LAYING PIPE SEWERS

The laying of pipes in finished trenches shall commence at the lowest point and shall proceed towards the upper end and the pipe shall be laid so that the spigot or tongue ends point in the direction of flow.

Sockets shall be carefully cleaned before pipes are lowered into trenches. The pipes shall be so lowered as to avoid unnecessary handling in the trench. Each section shall have a firm bearing throughout its length and shall be substantially true to the line and grade required.

All pipes shall be laid with ends abutting and reasonable care shall be exercised when shoving the pipes together so that the joints will be properly adjusted and will not be unnecessarily large. The pipes shall be fitted and matched so that when set firmly to line and grade they will form a sewer with a smooth and uniform invert.

After the pipe is installed, the lift holes shall be sealed with suitable concrete and approved plugs.

The Contractor will be required to pull a mandrell through the P.V.C. and/or A.B.S. sanitary sewer pipe. All mandrells shall be approved by the Engineer prior to use.

In the event the Contractor finds it difficult to obtain a certain size pipe, as specified on the plans or in the contract, he will be allowed, upon approval of the Engineer, to furnish and install a larger size. In such case, the additional cost resulting from such substitution shall be at the Contractor's expense and no adjustment in compensation will be allowed.

The depth of the proposed or reconstructed sewer laterals at the property line shall be the minimum as follows unless otherwise specified by the Engineer:

Storm - 5' or a minimum 1% slope from mainline

Sanitary - 8' or a minimum 1% slope from mainline

#### L. STORM SEWER JOINTS

Joints shall not be made until the pipe is in the trench and set to true line and grade. The joints shall be filled with mortar as specified in Subsection 1002-N.

The mortar shall be placed on the inside of the socket part of the joint from the invert to a point above the springline of the pipe before the connecting pipe is jointed. After joining the two pipes, mortar shall be pressed in the space between the socket and spigot so as to entirely fill the space, from the top of the joint down to a point below springline.

M. "T" AND WYE BRANCHES AND END CONNECTIONS

Unless otherwise specified, "T" or wye branches shall be provided in the sewer main for all side building connections. The number and size of said "T" or wye branches shall be specified or noted in the proposal. Cost of said "T" or wye branches shall be included in the price per lineal foot of sewer.

All "T" or wye branches shall have hubs which will receive a rubber-type gasket. "T" or wye branches or the ends of connections shall be bulkheaded with concrete plugs. These plugs shall be sealed with hot poured bituminous compound. Plugs for P.V.C. or A.B.S. pipe shall be rubber rings or solvent weld joints. No other plugs may be used without the approval of the Engineer.

Main line sewer construction will be halted by the Engineer if tees corresponding to connections on the plans are not supplied by the pipe supplier. Tees constructed in the field will not be allowed unless approved by the Engineer. Tapped tees will be core drilled whenever possible.

N. MANHOLES, CATCH BASINS, AND INLETS

It shall be construed that the inlet and discharge elevations for catch basins, manholes and inlets as indicated on the plans are subject to such revisions as may be necessary to fit field conditions and that the Engineer reserves the right to increase or decrease the depth of manholes, catch basins or inlets in order to adjust their inlet or discharge elevations. No additional compensation will be made for this adjustment except as provided for under basis of payment.

Manholes, catch basins and inlets shall be constructed in accordance with the standards of the City of Green Bay. Only those castings designated in the standards on castings will be permitted. All storm manholes shall be constructed of precast or poured concrete. Cored concrete blocks will not be allowed.

Precast manholes, catch basins and inlets shall be approved by the Engineer. Request for approval shall not be later than the preconstruction meeting and shall include specification drawings of the units.

All manhole joints and the area around the installation of manhole steps that has been disturbed after original production, plus an additional 6-inches of undisturbed manhole sections must be backplastered with Bloc Bond (Owens/Corning Fiberglass, or equal) according to directions on the materials.

Each sanitary manhole joint will be sealed with one 1 1/2 inch ring of "Kent-Seal No. 2", or equal, according to the manufacturer's specifications around the entire circumference of the joint.

Where required, the Contractor shall sawcut a new connection into an existing manhole or sewer structure. The first pipe at the manhole shall be a concrete pipe, thereafter the line shall be adapted to the type of pipe being used with an approved adapter. The new connection shall be neatly bricked or concreted into the wall of the manhole or structure.

All pipes entering or leaving a sanitary manhole shall be provided with flexible joints within 12 inches of the manhole structure and shall be placed on firmly compacted bedding, particularly within the area of the manhole excavation. Special care shall be taken to see that the openings through which pipes enter the structure are completely and firmly rammed full of mortar to ensure watertightness.

## O. BACKFILLING

### (1) General

All trenches and excavations shall be carefully backfilled with excavated material or specified backfill materials. All material used for backfill shall be free from cinders, ashes, organic material, boulder stones, or rocks larger than six inches in diameter, frozen material or other material which in the opinion of the Engineer, is unsuitable.

In backfilling the trench, the Contractor shall take all necessary precautions to protect the pipe from any damage or shifting of the pipe. In general, backfilling shall be performed by pushing the material from the end of the trench into, along and directly over the pipe so that the material will be applied in the form of a rolling slope rather than by side filling which will damage the pipe. Backfilling from the sides will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as the Engineer may approve.

The surplus material on the traveled roadway shall be removed and the street left in a neat and passable condition. In the event that the Contractor neglects to comply with the aforesaid conditions within five (5) days after the trench has been backfilled, the City Street Department will do such work as necessary and the cost of such work will be deducted from any money due the Contractor.

The backfilling of tunnels and shafts for tunneling and jacking operations shall be in accordance with the requirements specified in the contract. Where not specified in the contract, such backfilling shall be as directed by the Engineer.

In instances where the depth of pipe is such that less than two feet of fill exists over the pipe below natural ground, a berm shall be constructed over the pipe to provide for a minimum of two feet of cover above the outside top of the pipe with a minimum top width of ten feet and side slopes down to natural ground of two feet horizontally to one foot vertically.

Backfilling of the trench and berm construction shall be considered incidental to the contract.

(2) Gravel Backfill

Gravel backfill will be used for any construction on any street open to traffic and for an additional distance of 5 feet from the back of the proposed back of curb and at driveway or alley crossings. (See Sewer Standard page 215)

(3) Granular Backfill

Granular backfill will be used for any construction on a proposed street and for an additional distance of 5 feet from the back of the proposed back of curb. (See Sewer Standard page 215)

(4) Natural Backfill

Natural backfill may be used in trenches which are not in the limits as specified in (2) Gravel Backfill, or (3) Granular Backfill.

P. COMPACTION OF TRENCH BACKFILL

(1) Methods

(a) Flushing

Jets shall be inserted at not more than four foot intervals as measured in any direction through the entire width of the top of the trench backfill. Penetration shall be to the top of the pipe, to native ground on side slopes, and to the preceding lift. The jetting operations shall be completed as closely as practicable to the pipelaying and backfilling operation. In excessively deep trenches and where the Engineer may direct, the backfill shall be placed in two or more lifts and each shall be jetted separately. Where the

backfill has been placed and traffic has compacted the surface, the Contractor shall loosen and shape the surface before water settling is begun. Ponding will be required after the jetting only if and whenever the Engineer deems it to be necessary.

Hydrant settling water shall be utilized when hydrants or other sources of water exist.

Hauled settling water shall be utilized when water from hydrants or other sources is not available.

(b) Mechanical

Mechanical compaction of trench backfill shall consist of depositing, spreading and leveling trench backfill in layers not exceeding 12" in thickness and compacting by means of mechanical tamping, vibratory compaction, etc. to the following specifications:

- a. The top three feet, as measured from finished grade, shall be compacted to a minimum of 95 percent of Modified Proctor (AASHTO Designation T180-61); and
- b. The remaining layers, down to the spring line of the pipe, shall be compacted to a minimum of 90 percent of Modified Proctor (AASHTO Designation T-180-61).

(2) Compaction Method for Specified Backfill

- (a) Granular backfilled trenches may be flushed or mechanically compacted.
- (b) Mechanical compaction is required of all gravel backfilled and natural backfilled trenches.

(3) Damage Caused by Improper Compaction

The Contractor shall be responsible and liable for failure in the replaced driveway, pavement or sidewalk for a period of 5 years when, in the opinion of the Engineer, said failure is due to improper compaction of the backfilled trench.

Q. EXCAVATED MATERIALS

No variation from the contract price shall be made, whatever may be the nature of the material through which the cut is to be made except for rock excavation. The Contractor shall assume all risk as to the nature of said materials.

The excavated material to be used for trench backfilling must be stored so that it will cause a minimum of inconvenience to public travel, adjacent owners or tenants. The excavated material which is not to be used for trench backfilling shall be removed immediately from the site of the work.

The City shall have prior claim to all surplus excavated material.

Surplus excavated material shall be deposited at such point, as may be directed by the Engineer, at the expense of the Contractor; the haul not to exceed five (5) miles. Where length of haul to a point of disposal designated by the Engineer is farther than five miles from the project site, the Contractor shall receive compensation at a negotiated price based on labor and vehicle operations costs.

When an abutting property owner within project limits wishes surplus material for fill, it shall be supplied to him, subject to the approval of the Engineer, at no cost to the property owner. No material shall be deposited on private property unless the property owner has obtained a permit from the Engineer. If the City of Green Bay does not have use of the surplus material, it shall be disposed of by the Contractor.

#### R. SALVAGED MATERIALS

All existing manhole, catch basin, and inlet castings, culvert pipe and sewer pipe to be salvaged shall remain the property of the City and shall be salvaged by the Contractor and deposited where designated by the Engineer for future use by the City.

#### S. SEWERS CROSSING STREETS AND STREET REPAIR

All concrete or asphalt pavements shall be sawed to a minimum depth of three (3) inches prior to being shattered.

Concrete pavement shall be broken, after sawing, with jack-hammers or ram-type breakers. The cost of said sawing, breaking and removal of pavements shall be included in the unit price bid for the sewer.

Whenever a sewer line, or catch basin or other utility crosses an existing street, gravel backfill shall be used. The cost of said gravel backfill shall be at the Contractor's expense. The Contractor shall place a temporary surface dressing of three (3) inches of cold mix bituminous material on top of the trench the same day the trench is backfilled. Cold mix bituminous material is available at the Municipal Garage for said cuts. The Contractor is responsible for the cost of cold mix bituminous material. All trenches shall be maintained by the Contractor until the job has been accepted by the City Council.

Final replacement of said asphalt and concrete pavements, curbing, sidewalk and driveways, in all sanitary and storm contracts, shall be the responsibility of the City unless specified in the proposal.

If replacement items are included in the proposal, all replacement shall be made by a pavement Contractor approved by the Engineer.

T. DAMAGE TO EXISTING STRUCTURES

The Contractor shall, at his own expense, shore up or otherwise protect and make good all fences, sidewalks, walls, buildings, bridges, railroad tracks, water, gas or sewer pipe and all other property, public or private, that may be destroyed or damaged by the progress of the work, and shall be held responsible for all damage of whatsoever nature caused by the neglect of protection or from any other source connected with the prosecution of this work.

U. ABANDONMENT OR REMOVAL OF CONDUITS AND STRUCTURE

The Contractor will be responsible for the removal or abandonment of all existing pipe, inlets, catch basins, and manholes and the bulkheading and grouting or removal of abandoned inlet leads, as designated on the plans. The cost of this work will be considered incidental to the contract.

All abandoned sanitary or storm sewer conduits and all abandoned utility conduits shall be thoroughly and completely filled with a slurry-like mixture composed of one part cement, one part fly ash, and eight parts fine, clean sand. The composition of the sand shall be such that 100 percent will pass the No. 10 screen and not more than five percent shall pass the No. 200 screen.

When catch basins, inlets, or manholes are to be abandoned, the walls of the structure shall be removed to a minimum depth of three (3) feet below the proposed or existing top of curb grade. The bottom of the structure shall be broken up to prevent water entrapment. The remaining structure shall be backfilled with specified backfill material to be placed in layers not more than 12 inches in depth and mechanically compacted to 90% of Modified Proctor (AASHTO Designation T130-61).

Structures designated to be removed shall be removed to the full depth of the structure, including its foundation. Voids resulting from abandoned or removed structures shall be filled with specified backfill material placed in layers not more than 12 inches in depth and mechanically compacted to 90% of Modified Proctor.

V. FINAL CLEAN UP AND INSPECTION

The Contractor shall restore all terraces to a neat condition by removing all traces of clay or sand and by placing topsoil across the width of the excavation to a depth of not less than four inches. Prior approval of the type and condition of topsoil shall be obtained by the Contractor. Reseeding of terraces shall be by the property owner.

The Engineer may order the Contractor to clean up completed portions of the site from time to time as work progresses. In no case shall rubbish, earth, stone or other materials remain more than 400 feet in the rear of the completed work.

If the Contractor fails to complete this cleanup after receiving a five day notice to remove the same, the Engineer may have the site cleaned up and removed by others at the Contractor's expense.

Upon the completion of the work constructed under this contract or a part thereof, the Contractor shall thoroughly and systematically clean and make any needed repairs to the sewer or other structures. He shall at his own expense, remove and properly dispose of all water, dirt, rubbish, construction materials or any other foreign substances. Any defects of any nature whatsoever shall be promptly corrected by the Contractor at his own expense. The final cleaning and repairing shall be so arranged as to be completed upon the final completion of the construction work. Notice to begin such final cleaning and repairs, if such is needed, will be given by the Engineer and shall be complied with by the Contractor.

The Engineer will make an inspection of the work during the progress of final cleaning and repairing and any work so inspected shall be kept clean by the Contractor until the final inspection by the City and the acceptance of the entire work.

When the Contractor has finally cleaned and repaired the whole or any portion of the work, he shall notify the Engineer in writing that he is ready for a final inspection of the whole or a portion of the work and the Engineer will thereupon inspect the work. If the work is not found satisfactory, the Engineer may require further cleaning and repairing and when these are completed, upon further notice, will again inspect the work. In no case will the final estimate be prepared until the Contractor has complied with all the requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the plans and specifications and contract, and that such work is ready for his final inspection and acceptance by the City.

SECTION 1004.

MEASUREMENT AND PAYMENT

A. SANITARY SEWER

Sanitary sewers shall be measured by the lineal foot in place, and the quantity measured for payment shall be the number of lineal feet of each of the various sizes and types completed and accepted in accordance with the contract, measured along the centerline of said sewer, center to center of manholes.

The quantity of sanitary sewers, measured as specified herein, will be paid for at the contract unit price per lineal foot of the various sizes and types of sanitary sewer. This price shall be payment in full for furnishing all materials, including all "T" or wye house connections required, for all excavation, sheeting and shoring, forming foundation, laying pipe, sealing joints and making connections to new and existing fixtures; for furnishing granular or gravel backfill material when required, for backfilling, cleaning out and restoring site of work; for building all manholes when so indicated in proposal; and for all labor, tools, equipment, and incidentals necessary to complete the work in accordance with the contract.

B. 3/4" CRUSHED STONE OR PEA GRAVEL BEDDING MATERIAL.

This material shall be measured by lineal foot in place, and the quantity measured for payment shall be the number of lineal feet of the material placed and accepted in accordance with the contract, measured along the centerline of the trench.

The quantity of 3/4" Crushed Stone or Pea Gravel Bedding Material, measured as specified herein, will be paid for at the contract unit price per lineal foot for 3/4" Crushed Stone or Pea Gravel Bedding Material, complete in place, which price shall be full compensation for furnishing, hauling, placing and compacting the specified material, including all equipment, tools, labor and incidentals necessary to complete the work as specified.

C. 3" AND 1 1/2" CRUSHED STONE CRADLE

Crushed Stone Cradle shall be measured in cubic yards based on tickets received by the Engineer for each load of Crushed Stone Cradle. Tickets for Crushed Stone Cradle delivered to a City of Green Bay project shall be accepted only from trucks whose volume is clearly marked on the box. The City reserves the right to measure the truck box to check the volume so marked.

Delivery tickets shall show the date and location where used. These delivery tickets shall be given to the Inspector daily, or if the Inspector is not available, the delivery tickets shall be given to the Engineering Division office within two work days after the material is delivered to the project area. Failure to provide these tickets in a timely manner may be cause to deny payment for the material.

The quantity of Crushed Stone Cradle, measured as specified herein, will be paid for at the contract unit price per cubic yard (truck measure) for Crushed Stone Cradle, complete in place, which price shall be full compensation for furnishing, hauling, placing and compacting the specified material, including all equipment, tools, labor and incidentals necessary to complete the work as specified including extra excavation.

#### D. STORM SEWER

Storm sewers shall be measured by the lineal foot in place, and the quantity measured for payment shall be the number of lineal feet of each of the various sizes and types completed and accepted in accordance with the contract, measured along the centerline of said sewer, center to center of manholes. Catch basin and inlet connections shall be measured from inside of manhole to inside of catch basin.

The quantity of storm sewer, measured as specified herein, will be paid for at the contract unit price per lineal foot of the various sizes and types of storm sewer. This price shall be payment in full for furnishing all materials, including all special "Y"s, elbows and connections required, for all excavation, sheeting and shoring, forming foundation, laying pipe, sealing joints and making connections to new or existing fixtures; for furnishing granular or gravel backfill material; for backfilling, cleaning out and restoring site of work; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work in accordance with the contract.

#### E. MANHOLES

Manholes of various sizes and types shall be measured for payment in individual units, lineal feet of depth, or considered incidental and included in the price of the sewer. The method of payment will be as shown in the proposal. Payment for this work shall be full compensation for furnishing all materials, including all masonry, conduit and sewer connections, steps, frames, grates, lids and other fittings; for all excavation, backfilling, disposal of surplus material, cleaning out and restoring the site of work; and for all labor, tools, equipment and incidentals necessary for each structure complete.

F. INLETS AND CATCH BASINS

Inlets and catch basins of various types shall be paid for at the contract unit price each, which price shall be full compensation for furnishing all materials, including all masonry, conduit and sewer connections, frames, grates and other fittings; for all excavation, backfilling, disposal of surplus material, and restoring the site of work; and for all labor, tools, equipment and incidentals necessary for each structure complete.

G. ROCK EXCAVATION

Only boulders, hard head or stones of one-half (1/2) cubic yard or greater in volume or rock as defined herein, will be measured for payment. The cross sectional area will be measured at 33 foot intervals, or closer if required, to accurately measure the trench. The volume will be computed by the Engineer using the method of average end areas based on measurements of rock actually removed subject to the maximum limits as specified herein:

1. Below the outside top of pipe, maximum width shall be the outside diameter of the pipe bell plus 12 inches but not less than 30 inches.
2. From outside top of pipe to the top of rock, maximum width shall be computed based on a 1 to 5 slope for the vertical sides of the trench.
3. Maximum depth shall be computed from 6 inches below the bell of the pipe to the top of the rock formation.

Rock excavation shall be paid for at the contract price per cubic yard, which price shall be payment in full for completing all work as specified herein including removal and disposal of the rock and furnishing a proper cushion on which the pipe is to be placed.

STRUCTURE RECONSTRUCTION, REPLACEMENT AND ADJUSTMENT

A. MANHOLE AND INLET RECONSTRUCTION

All special inlets and standard inlets shall be constructed with 6-inch perforated underdrain attached. Where the inlet is located in a driveway or sidewalk, the 6-inch perforated underdrain will be extended parallel with the curb line to clear the limits of the driveway or sidewalk. Additional 6-inch perforated underdrain, in excess of 6 feet (measured from the center of the inlet) will be paid for under the item 6-inch perforated underdrain.

All pipe used to re-lay leads shall be either reinforced concrete, Class V, Asphalt-Coated Corrugated Metal Culvert Pipe, or Aluminum corrugated Metal Pipe, as specified by the Engineer.

The unit price for reconstruction of inlets and reconstruction of manholes shall not include the cost of the castings. All related work such as sawing of pavement, sidewalk and pavement replacement, and topsoil shall be considered incidental and included in the unit cost.

B. MANHOLE AND INLET CASTING REPLACEMENT

Existing castings will be re-used by the Contractor and if a new casting is required, it will be furnished by the City at no charge to the Contractor. Castings not used will be salvaged by the Contractor and deposited at the East Side Municipal Garage.

Replacing manhole and inlet castings shall be done at locations where ordered by the Engineer and shall consist of removing, adjusting (if required), and replacing existing castings with new castings. All related work such as sawing, sidewalk and pavement replacement, and topsoil shall be considered incidental and included in the unit cost of the item replace existing manhole and inlet castings.

C. ADJUSTING EXISTING CASTINGS

Adjusting existing catch basin, manhole and inlet castings shall be done at locations where ordered by the Engineer. Adjustments shall consist of removing existing castings and adjusting the top of the existing structure by removing or adding concrete, brick masonry, or as the case may be, reinstalling the fixtures by supporting them on precast concrete adjusting rings. Payment will be made for those items vertically adjusted 2 inches or more. Vertical adjustments less than 2 inches shall be considered incidental and included in the unit cost of item being adjusted.

## PART XI

PART XI  
WATER MAINS

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## SECTION 1101.

### GENERAL

#### A. DESCRIPTION

Water main Construction shall consist of excavating the required trenches and tunnels; furnishing and laying therein pipe or the required structures and appurtenances; backfilling the trenches; and restoring the site of the work at the locations and to the required lines and grades; all as shown on the plans and provided by the contract.

#### B. EQUIPMENT

Equipment and tools necessary for performing all parts of the work shall be satisfactory as to design, capacity, and mechanical condition for the purposes intended, and any equipment which is not maintained in full working order, or which as used by the contractor is inadequate to obtain the results prescribed, shall be repaired, replaced or supplemented to obtain the progress and workmanship contemplated by the contract.

Trenching machinery or other appliances will be allowed where their use will not interfere with the proper construction of the work, and all machines must be kept to the true line of the trench.

#### C. MAINTENANCE OF CROSS WALKS AND GUTTERS

Cross walks and street intersections must at all times be maintained by suitable bridging. At least six feet in width of sidewalk shall be maintained on both sides of the street in which work is being done. Gutters must not be obstructed at any time and where it is necessary to cover them over, a continuous pipe or drain shall first be laid of ample capacity to carry off the storm water likely to reach the gutters and such pipe or drain shall be kept open and free from obstructions.

Free access must always be maintained to fire hydrants, sewers and underground conduit, manholes, water or gas valves. All sewerage and ground water pumped to the surface shall be conducted away in a covered trough or pipe whenever required by the Engineer.

#### D. FLOW OF SEWERS AND WATER COURSES

The Contractor shall provide for the flow of all sewers, drains, culverts or water courses interrupted by him during the progress of the work, and he shall restore such drains or water courses to the satisfaction of the Engineer.

SECTION 1102.

MATERIALS

A. GENERAL

The Green Bay Water Utility will supply all water mains, polyethylene tubing, steel casing pipe, service lateral materials, and fittings, unless otherwise specified. All bedding, backfill, blocking, and concrete shall be supplied and paid for by the Contractor.

B. MATERIALS

(a) Ductile-Iron Pipe

All ductile-iron pipe shall be designed and manufactured for the specified working and water hammer pressures and in accordance with AWWA Standard Specification for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids - AWWA C151-71.

The pipe shall be class 52, furnished with push-on joints.

All pipe shall be cement-mortar lined in accordance with Sec. 51-8 - ANSI A21.51-1971 (AWWA C151).

Furnish all rubber gaskets and all special materials required for making the joints.

Furnish a cable bond conductor to provide positive electrical conductivity across pipe joints capable of carrying 500-600 amps.

(b) Cast Iron Fittings

All fittings may be gray cast iron, conforming to AWWA Standard for Cast Iron Fittings C110-71, 150 psi rating. Fittings shall be mechanical joints, complete with lead tipped gaskets and accessories.

(c) Resilient Wedged Seated Gate Valves

- (1) Valves shall be manufactured in accordance with AWWA Specifications C509-80. Valves 12" and smaller shall be designed for 200 psi water working pressure. Valves shall have mechanical joint ends and shall have clear water wall equal to the full nominal diameter of the valve. Valves shall be resilient wedged seated gate valves with non-rising stems.

- (2) Each valve shall have maker's name, pressure rating and year in which manufactured casted on body. Prior to shipment, each valve shall be tested by hydraulic pressure equal to the AWWA test pressure.
- (3) Stuffing boxes shall be O-ring seal type with 2 rings located in stem above thrust collar. All stem seals shall be replaceable with valve wide while open and subjected to full rated pressure.
- (4) The thrust bearing recess and stem opening in the bonnet shall be bronze bushed.
- (5) Body and cover bolts and nuts shall meet specifications ASTM A-307. Exterior and interior of valve shall be protected by an epoxy coating.
- (6) Wedge shall seat against seating surfaces arranged symmetrically about the center line of the operating system, so that seating is equally effective regardless of direction of pressure unbalance across the wedge.
- (7) Waterway shall be smooth and shall have no depressions or cavities in seat area where foreign material can lodge and prevent closure or sealing.

(d) Valve and Hydrant Operation

All valves and hydrants shall be open right.

(e) Curb Boxes

Curb boxes shall be 1 1/4" x 7', Mueller H-10306 or equal.

(f) Valve Boxes

Valve boxes and valve box parts shall be made of Cast Iron Clow F-2450, F-2460, F-2480, F-2484, Tyler #6860 DD or equal.

(g) Curb Stops - Inverted Key

Curb stops shall be Mueller H-15200 or Ford B22-333, copper to copper connections.

(h) Corporation Stops

Corporation stops shall be Mueller H-15000 or Ford F600, copper connection.

(i) Fire Hydrant Specifications

All fire hydrants shall fully comply with AWWA Standard C-502 latest revisions.

Stem seals are to be "O" rings.

All hydrants shall have two 2 1/2" hose connections and one 3 1/2" pumper outlet. Outlet nozzle threads for 1 1/2" outlets to be National Standard threads.

The nozzles may either be leaded and caulked or threaded into place. In case of threaded construction, "O" rings shall be used as pressure seals.

All hydrants shall be of compression type main valve closing with the line pressure.

The main valve opening shall be 5 1/4" in size.

All hydrants shall have 1 1/4" pentagon shape operating nut, hoze nozzle caps and pumper caps.

Hydrants shall be equipped with no less than one drain valve and two drain outlets.

The main valve seat ring shall be bronze. The main valve shall be removable through the upper barrel from above ground without disassembling at the ground line flanges.

All hydrants shall be of the traffic model design consisting of a safety flange and a safety sleeve coupling. The design shall permit rotation of the upper barrel to position the nozzle in any direction. The nozzle placement shall not be restricted by bolt hole placement.

Finished color of hydrants shall be yellow above ground.

Acceptable hydrants will be the Mueller Centurian, Waterous Pacer, or the Clow F-2500.

(j) Polyethylene Encasement

Polyethylene shall conform to AWWA Standard Specification for Polyethylene Encasement for Ductile Cast-Iron Piping for Water and Other Liquids, AWWA C105-72 (ANSI A21.5-1972). Polyethylene must come in rolls (lay flat), and perforated in 20-foot sections.

(k) Copper Tubing

Copper tubing shall be type K, as specified by AWWA Standard C800-84.

(l) Bedding Material

All water mains shall be laid in a sand bedding as hereinafter specified, with six inches of sand below, above and around the pipe material. The sand shall be evenly graded clean, and free of organic material. No more than 8% by weight shall pass the No. 200 sieve and 100% shall pass the No. 4 sieve.

(m) Concrete

Concrete shall be Grade "A" concrete as specified in Section 601, PORTLAND CEMENT CONCRETE, of the City of Green Bay "Standard Specifications and Construction Standards for Public Works Construction", except as modified herein on the plans.

(n) Concrete and Mortar

Wherever concrete or mortar is required to complete the construction herein specified, it shall be furnished by the Contractor at his expense.

~~(o) Gravel Backfill~~

Gravel backfill shall mean 3/4" crushed aggregate meeting the requirements of Gradation No. 1 in Section 401 of these specifications.

SECTION 1103.

CONSTRUCTION METHODS

A. GENERAL

Unless otherwise provided in the contract or permitted by the Engineer, the work of constructing water mains shall be done in open trenches and in a manner to protect pipe lines from unusual stresses.

B. TRENCH EXCAVATION

The ground is to be excavated in open trenches where the depth is not prohibitive. The trench shall be excavated to a depth 6 inches lower than the bottom of the pipe barrel in order to provide for a 6 inch layer of sand bedding material as hereinbefore specified. The excavation shall be uniform and truly parallel to the grade line in order to provide a uniform thickness of bedding material beneath the pipe. The trench shall be of such depth as will provide a 6'6" cover, measured from finished ground line to top of bells of all water pipe.

The maximum permissible width of trench at the top of the pipe shall be the outside diameter of the pipe plus 22", unless the Engineer gives permission in writing to use a greater width. If sheathing is used, it shall be placed inside of the above width. The minimum width of open trenches shall be such that when the supporting sheathing is in place on each side of the trench there shall be a clear space of at least 9" between the trench face of the sheeting and the outside of the pipe at the spring line.

If the soil is such that the excavation must be made with a clam shell, hoe, or similar equipment, or if for any other reason the trench is made wider at the top of the water main than specified above, permission shall first be secured from the Engineer before that construction is undertaken. No additional payment will be made for any increase in trench width.

The amount of trench to be opened in advance of the pipe laying shall be determined by the Engineer, but in no case shall it exceed 300 feet without permission. After each block is completed, the street surface shall be restored in good condition and all surplus material and rubbish from that section shall be immediately removed, unless otherwise ordered by the Engineer.

When excavating under concrete or bituminous pavements, the pavement shall be cut with a masonry saw. The saw cut must be a minimum of 3 inches in depth, after which the pavement may be broken out with air hammer or a pavement breaker.

The breaking out of the pavement must be done in a manner that will not damage the remaining pavement, and care must be used to avoid unnecessary damage to driveways, sidewalks, and other surface structures.

The Contractor will not be responsible for the permanent pavement restoration of the streets or sidewalks included in this project. However, the Contractor shall place a temporary surface consisting of a minimum thickness of three (3) inches of cold mix bituminous material on top of the trench the same day the trench is backfilled. Cold mix material is available at the Municipal Garage for said temporary surfacing of trenches. The Contractor is responsible for the cost of cold mix bituminous material.

#### C. USE OF SHOE

Where conditions require the use of a shoe or where its use, in the judgement of the Engineer, would result in greater safety, less inconvenience, or appreciable savings to the City, the Contractor shall use a shoe of suitable design for the depth of trench and size of pipe being installed. Maximum and minimum trench widths required elsewhere in these specifications shall also apply when a shoe is used. It shall be of the length and type which meets the Federal Occupational Safety and Health Act (OSHA) Specifications.

Before the shoe is moved, bedding material shall be placed and compacted. As the shoe is moved, the bedding material at the down grade end of the shoe must be immediately tamped in place to fill any voids resulting from the movement of the shoe.

D. SHEETING, SHORING AND BRACING

The Contractor shall furnish, install and maintain such sheeting, bracing and shoring as may be required to support the sides of the excavation and to prevent any movement of earth which would damage or delay the work or cause damage to adjacent pavement, buildings or other structures. If in the opinion of the Engineer, sufficient or proper supports have not been provided at any point, he may order additional supports placed at the expense of the Contractor, and neither the placing of such additional supports by the order of the Engineer, nor the failure of the Engineer to order such additional supports, shall relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside the sheeting, but if voids are formed, they shall immediately be filled and compacted to the satisfaction of the Engineer. Damages resulting from failure of improper sheeting, shoring and bracing shall be the sole responsibility of the Contractor.

Trench sheeting shall not be pulled unless the pipe strength is sufficient to carry trench loads based on the trench width to the back of the sheeting at the top of the pipe. All sheeting and bracing which is not left in place in the trench, shall be removed in such manner as not to endanger the installed pipe or other structures, utility conduits or property, whether public or private. All voids left or caused by the withdrawal of the sheeting shall be immediately refilled with backfill material by ramming with tools adapted for that purpose, by watering, or as may be directed by the Engineer.

E. AUGERING AND TUNNELING

Augering may be required and will be permitted in certain instances in preference to opening the street, with the Engineer's approval. Augering shall be done in accordance with Section 1003 (E.) of these specifications.

Where the depth is too great, or because of other circumstances involved, tunneling may be permitted after prior approval of the Engineer. Tunneling shall be done in accordance with Section 1003 (F.) of these specifications.

F. DISPOSAL OF EXCESS MATERIAL

Excavated materials unacceptable for backfilling and all materials in excess of that required for backfilling to the level specified shall be hauled away at the Contractor's expense. Excess material shall not be deposited along the work but shall be removed as soon as it is apparent that it cannot be used for backfilling.

Upon the completion of the backfill, the Contractor shall remove all debris and surplus materials and leave the surface of the street or right-of-way and all other places disturbed or affected by the work, as nearly as possible in the same condition as before starting the work and shall maintain it in such condition until its final completion and acceptance.

#### G. DEWATERING

The Contractor shall provide and maintain adequate dewatering equipment to keep the trench and other excavations free of ground water, sewage, or storm water during the progress of the work. Dewatering shall be in accordance with Section 1003 (I.) of these specifications.

#### H. BEDDING

Bedding material shall consist of an approved sand material as described herein. It shall be carefully placed and compacted six inches under, over, and around the pipe. Said material shall be distributed along both sides of the pipe uniformly and simultaneously to prevent lateral displacement of the pipe. All the work of providing proper pipe bedding shall be considered an integral part of installing the pipe and shall be completed immediately after the pipe is laid to the correct alignment and grade.

Whenever it is necessary due to the nature of the material on the bottom of the trench to excavate below grade, the Contractor shall remove said material to the required depth below grade and fill in with 1 1/2" crushed stone, all as directed by the Engineer. Payment for the excavation below grade shall be considered incidental and included in the unit price for 1 1/2" Crushed Stone Base. If, in the opinion of the Engineer, further means of support are necessary, such as piling, sheeting-in-place or concrete, the Contractor shall excavate for and put same in position at his contract price for timber, sheeting or concrete.

Cost for sand bedding material shall be included in the unit bid prices for the various items it is required for.

#### I. LAYING DUCTILE IRON PIPE

The ductile cast iron pipe shall be laid encased in polyethylene tubing in the trench previously specified and to the line and grade shown on the plans. It shall be laid substantially in a straight line, both horizontally and vertically, except that straight pipe may be used for a change in any direction, in which case the deflection shall not exceed 75 percent of that recommended by the manufacturer. Where greater deflections are necessary, the proper fittings shall be used.

Where the laying length of the pipe is greater than 2 1/2 feet, it is essential that the bed upon which the pipe is laid conforms to the circumference of the pipe. It should be truly parallel to the grade line and free of irregularities that may result in a beam load upon the pipe when backfilled.

#### J. WATER LATERALS

Water laterals shall be installed at the locations shown on the plans and at such other locations as the Engineer may direct. Water laterals shall be laid in open trenches where street crossings are not involved. Where street crossings are involved the laterals shall be installed in augered holes as hereinafter specified unless the lateral can be installed in the same trench and at the same time as a sewer lateral.

New water laterals shall be of a size equal to that existing, as shown on the plans, except that no lateral shall be less than 1 inch in size.

For 1", 1 1/2", and 2" laterals, the Contractor's bid prices per foot for water laterals shall include placing the corporation stop, the copper water piping, the curb stop and curb box and shall include all necessary excavation, labor, tools, equipment, augering, grouting, backfilling, restoration and reconnection to the existing lateral.

For 4" and 6" laterals, the Contractor's bid prices per foot shall include placing the tee, valve, valve box and ductile iron piping and shall include all necessary excavation, labor, tools, equipment, augering, grouting, backfilling, restoration and reconnection to the existing lateral. New curb stops shall normally be installed six feet from the lot line.

#### K. RELAY AND TRANSFER SERVICES

The Green Bay Water Department will supply the tapping machine and labor for making the taps. The Contractor shall be responsible for all other necessary excavation, backfill, etc., to relay and transfer the services. All 3/4 inch leads shall be relayed as one inch copper services.

#### L. CONNECTIONS TO EXISTING MAINS

Connections of new water mains to existing mains shall be made in such a manner and at such a time as to cause as little inconvenience to existing services as possible.

The Contractor shall contact the Engineer concerning scheduling of any shutdown of a part of the existing water system to make a new connection. The operation of any valves or other equipment of the existing system shall be handled by the Utility only.

The Contractor shall not make any connections or flush any lines without first securing permission to do so from the Engineer. If necessary for traffic safety, fire protection or reservoir capacity; connections of new mains shall be made at night when use is low.

Wherever possible, connections shall be made under pressure utilizing tapping sleeves and valves. These are shown on the plans.

Old mains to be abandoned shall not be plugged or valved off until the new main has been pressure tested, disinfected and is ready for service.

Water mains to be abandoned and any other pipe or conduit exposed in the water main excavation which has been previously abandoned by others shall be bulkheaded with concrete. The bulkhead shall be of a thickness equal to the internal diameter of the pipe but in no case less than 12 inches.

Branch connections are to be made along the water main at the locations shown on the plans and as staked by the Engineer.

M. BLOCKING TEES AND CROSSES

All tees and all ends of crosses not connected to existing mains shall be blocked with either timber or poured concrete blocking supported on firm earth and braced against the walls of the trench of firm earth. Materials for all blocking installations will be furnished by the Contractor and the manner and procedure of blocking will be performed by the Contractor as directed by the Engineer.

N. PLUGGING EXISTING MAINS

Portions of the existing water main system shall be plugged after the new mains have been installed and placed in service. The plans indicate the locations where plugs are to be installed.

Where new plugs are required adjacent to new tapping sleeves and valves, the Contractor shall, after the new main is in service, cut and plug the existing main adjacent to the new tapping sleeve. The cost of installing these plugs shall be included in the bid price for the tapping sleeve and valve.

Where new plugs are required at locations remote from other work, the Contractor shall remove pavements and make such excavations as are necessary to properly perform the work. The total cost of removing pavement, excavating, installing the plug, backfilling and surface restoration shall be included in the Contractor's bid price for this item.

All plugs shall be restrained with tie rods and clamps.

The installation of all plugs shall be coordinated with the Water Utility.

O. THRUST BLOCKS

All tees, bends and crosses, unless there are four pipe lines connecting to a cross, shall be provided with a concrete thrust block or rods and clamps to prevent any movement of the fittings.

The thrust block shall be concrete poured between the fitting and undisturbed bank. Where in contact with the fitting, it shall not interfere with any part of a joint. The minimum size at the fitting shall be 6" x 12" and at the bank 18" x 18".

Thrust blocks shall conform to the details shown on the plans.

If tie rods and clamps are used, they shall be as specified under materials.

P. HYDRANT INSTALLATION

Hydrants shall be installed at the locations shown on the plans in the exact position fixed in the field by the Engineer. The hydrant shall be supported on a firm concrete slab or stone foundation with one (1) cubic yard stone drain pocket. The hydrant shall be set truly vertical and braced to support it during backfilling.

The plans indicate the elevation of the existing ground and established grade where the established grade is different than the existing ground. Hydrants shall be installed with the ground line mark at the established grade elevation.

All hydrant installations shall include a 6-inch water valve on the hydrant lead. This valve shall be installed as close as possible to the water main.

On long lead, over 18 feet, mechanical joint or push-on joint pipe shall be used with the final two pipe lengths or a minimum of 30 feet whichever is longer, restrained by rods and clamps.

In general, hydrants shall be installed in accordance with the details included in the plans.

Q. INSTALLING VALVES AND VALVE BOXES

Valves shall be installed at the locations shown on the plans in position fixed in the field by the Engineer. Valves shall be

firmly supported on wooden blocking embedded in the bedding material. Blocks shall be of ample size to support the valve.

Valve boxes shall be installed over the valves and the valve, and valve boxes shall be truly vertical with the valve box centered over the valve. The valve box shall be supported separate from the valve on blocking. Backfilling around the valve and valve box must be carried out in such a manner as will not disturb the setting of either. When the backfilling has been completed and compacted, the box shall be in a vertical position, centered on the valve.

Tapping valves shall be installed in accordance with the manufacturer's specifications. Blocking of the tapping valve and sleeve is required. Contractor will provide all labor for installation of tapping sleeve and valve. The Contractor will provide tapping machine and make tap.

Valves installed on dead ends shall be restrained by installing one nominal length of water main pipe, with end plugged as herein specified, beyond the valve. The length of pipe shall be included in the payment measurement for water main.

#### R. REMOVING HYDRANTS

At the locations shown on the plans, existing hydrants are to be removed and their leads abandoned.

Hydrants shall be excavated, disconnected and delivered to the Water Department's pipe yard without being damaged. Hydrant leads shall be abandoned as hereinafter specified.

The Contractor's bid price for this item shall include all labor, excavation, backfill, restoration and transportation to remove and deliver the hydrant as herein specified.

#### S. ABANDONING WATER MAINS AND BULKHEADING PIPE LINES

Water mains to be abandoned and any other pipe or conduit exposed in the water main excavation which has been previously abandoned by others shall be bulkheaded with concrete. The bulkhead shall be of a thickness equal to the internal diameter of the pipe but in no case less than 12 inches.

#### T. CROSSING EXISTING SEWERS

Where the new water main crosses below or closer than 18 inches clear distance over existing sanitary or storm sewers or drains, the Contractor shall center one full length of water main pipe on the sewer or drain to make the adjustment joints as remote as possible. When the water main is in final position and properly bedded, no part of the water main shall be in contact with any

part of the sewer or any appurtenance thereto. Extreme care shall be exercised to insure that no damage is done to the sewer and that it is not disturbed from grade. Timbers or supports that may be required shall be supplied by the Contractor at his own expense.

#### U. BACKFILLING

##### (1) General

All trenches and excavations shall be carefully backfilled with excavated material or specified backfill materials. All material used for backfill shall be free from cinders, ashes, organic material, boulder stones, or rocks larger than six inches in diameter, frozen material or other material which in the opinion of the Engineer, is unsuitable.

In backfilling the trench, the Contractor shall take all necessary precautions to protect the pipe from any damage or shifting of the pipe. No walking on the pipe or backfilling by machine methods shall be permitted until a minimum of 6 inches of material has been placed by hand over the top of the pipe. In general, backfilling shall be performed by pushing the material from the end of the trench into, along and directly over the pipe so that the material will be applied in the form of a rolling slope rather than by side filling which will damage the pipe. Backfilling from the sides will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as the Engineer may approve.

The surplus material on the traveled roadway shall be removed and the street left in a neat and passable condition. In the event that the Contractor neglects to comply with the aforesaid conditions within five (5) days after the trench has been backfilled, the City Street Department will do such work as necessary and the cost of such work will be deducted from any money due the Contractor.

The backfilling of tunnels and shafts for tunneling and jacking operations shall be in accordance with the requirements specified in the contract. Where not specified in the contract, such backfilling shall be as directed by the Engineer.

Backfilling of the trench shall be considered incidental to the contract.

A pressure test hereinafter described will be made on the completed pipelines, but the Contractor will be permitted to backfill the trench at his own risk, if he so chooses, immediately after the installations of pipe are completed. This prior backfilling will in no way relieve the Contractor of his responsibility for obtaining a watertight job as proved by the subsequent pressure test. Certain specified and predetermined locations shall not be backfilled until after sterilization tests have been made. These points will be determined by the Engineer before backfilling operations are commenced.

The backfilling of tunnels and shafts for tunneling and jacking operations shall be in accordance with the requirements specified in the contract. Where not specified in the contract, such backfilling shall be as directed by the Engineer.

(2) Gravel Backfill

Gravel backfill will be used for any construction on any street open to traffic and for an additional distance of 5 feet from the back of the proposed back of curb and at driveway or alley crossings. (See Sewer Standard page 215)

(3) Granular Backfill

Granular backfill will be used for any construction on a proposed street and for an additional distance of 5 feet from the back of the proposed back of curb. (See Sewer Standard page 215)

(4) Natural Backfill

Natural backfill may be used in trenches which are not in the limits as specified in (2) Gravel Backfill, or (3) Granular Backfill.

V. COMPACTION OF TRENCH BACKFILL

(1) Methods

(a) Flushing

Jets shall be inserted at not more than four foot intervals as measured in any direction through the entire width of the top of the trench backfill. Penetration shall be to the top of the pipe, to native ground on side slopes, and to the preceding lift. The jetting operations shall be completed as closely as practicable to the pipelaying and backfilling operation. In excessively deep trenches and where the Engineer may direct, the backfill shall be placed in two or more lifts and each shall be jetted separately.

Where the backfill has been placed and traffic has compacted the surface, the Contractor shall loosen and shape the surface before water settling is begun. Ponding will be required after the jetting only if and whenever the Engineer deems it to be necessary.

Hydrant settling water shall be utilized when hydrants or other sources of water exist.

Hauled settling water shall be utilized when water from hydrants or other sources is not available.

(b) Mechanical

Mechanical compaction of trench backfill shall consist of depositing, spreading and leveling trench backfill in layers not exceeding 12" in thickness and compacting by means of mechanical tamping, vibratory compaction, etc. to the following specifications.

- a. The top three feet, as measured from finished grade, shall be compacted to a minimum of 95 percent of Modified Proctor (AASHTO Designation T180-61); and
- b. The remaining layers, down to the spring line of the pipe, shall be compacted to a minimum of 90 percent of Modified Proctor (AASHTO Designation T-180-61).

(2) Compaction Method for Specified Backfill

- (a) Granular backfilled trenches may be flushed or mechanically compacted.
- (b) Mechanical compaction is required of all gravel backfilled and natural backfilled trenches.

(3) Damage Caused by Improper Compaction

The Contractor shall be responsible and liable for failure in the replaced driveway, pavement or sidewalk for a period of 5 years when, in the opinion of the Engineer, said failure is due to improper compaction of the backfilled trench.

W. PRESSURE TEST AND STERILIZATION

Whenever any section of main has been completed and is ready to be tested, the Contractor shall flush the main to remove all sand, dirt, debris, etc. The water will be supplied by the Water Department without cost but the flushing shall be done under the direction of a representative of the Water Utility and at a time approved by the Water Utility to suit City water demands.

When a section of main is ready for a test, static pressure of the distribution system shall be applied for a period of not less than 4 hours. The section under test shall then be isolated from the distribution system and a pressure of 150 p.s.i. applied by means of a pump supplied and installed by the Contractor. This pressure shall be maintained for one hour after which the pressure pump shall be stopped and the drop in pressure noted. Any leaks or excessive loss of pressure during the test shall be repaired by the Contractor and the test repeated. The cost of water required for any subsequent tests made, due to faulty main installation, shall be borne by the Contractor. All equipment required for these tests shall be supplied by the Contractor.

NOTE: The suitability of the test from the standpoint of leakage shall be based on the allowable leakage set forth in Table 3 of AWWA Specifications C600.64.

More specifically, this leakage allowance is:

24" pipe - 4.11 gal./hr./1,000 ft.  
20" pipe - 3.42 gal./hr./1,000 ft.  
16" pipe - 2.74 gal./hr./1,000 ft.  
12" pipe - 2.06 gal./hr./1,000 ft.  
10" pipe - 1.71 gal./hr./1,000 ft.  
8" pipe - 1.37 gal./hr./1,000 ft.  
6" pipe - 1.03 gal./hr./1,000 ft.

Mains shall be sterilized by the Contractor who shall put enough H.T.H. or liquid chlorine in the main for a concentration of 30 p.p.m. to 50 p.p.m. of chlorine. Mains shall be disinfected by the Contractor prior to pressure testing.

Sterilization should be repeated if samples taken and submitted to the Bureau of Standards and Water Surveys do not prove safe for drinking. The Contractor shall pay for all water used for flushing and disinfection after the initial tests have been made. Any material that becomes contaminated with dirt or other foreign material must not be used in the work.

#### X. DAMAGE TO EXISTING STRUCTURES

The Contractor shall, at his own expense, shore up or otherwise protect and make good all fences, sidewalks, walls, buildings, bridges, railroad tracks, water, gas or sewer pipe and all other property, public or private, that may be destroyed or damaged by the progress of the work, and shall be held responsible for all damage of whatsoever nature caused by the neglect of protection or from any other source connected with the prosecution of this work.

SECTION 1104.

MEASUREMENT AND PAYMENT

A. WATER MAIN

The length of water main to be paid for in the various sizes shall be determined by measuring along the centerline of the main from the center of fitting to center of fitting or from connection point to end of pipe. No deduction or addition will be made for fittings (crosses, ties, or bends). Fittings are included in the price per foot for the various sizes of water main. The payment measurement for water main shall include the laying length for valves. The length of main laid vertically shall be measured before backfilling and shall be included in the payment measurement. Water main in tubing shall include the cost of installing the tubing and the water main therein. Water main in augered hole shall include the cost of the augered hole, the water main, and grouted backfill.

B. WATER VALVES

Water valves shall be paid for by the unit. Said unit to include the valve box associated with the valve. Tapping valves will include the placement of the tapping sleeve and valve. Payment measurement shall include the total number of valves installed in each size.

C. HYDRANTS

Hydrants shall be paid for by unit, including the cost of installation. Payment measurement shall be for the actual number of units installed.

D. HYDRANT LEADS

The length of hydrant lead to be paid for shall be determined by measuring the distance from the centerline of the water main to the center of the hydrant including vertical runs if used and will include either placement of mechanical joint tee and valve, or tapping sleeve and valve.

E. CRUSHED STONE BASE

The payment measurement for crushed stone base shall be the width equal to the outside diameter of the pipe plus 9 inches of each side, times the depth from the bottom of the trench to a plane lying 4 inches below the outside of the pipe barrel, times the length of trench ordered stabilized.

F. 1", 1 1/2", AND 2" WATER LATERALS

The length of water lateral to be paid for shall be determined by measuring the horizontal distance from the corporation cock at the main to the curb stop.

G. REMOVE HYDRANT

Hydrants removed by the Contractor shall be paid for on the unit basis. Payment measurement shall include all hydrants removed.

H. PLUGGING WATER MAINS

Where water mains are required to be plugged at locations remote from other work (requiring separate excavations), such plug shall be paid for under this bid item. The payment measurement shall include all remote plugs installed regardless of size of main.

I. 4" AND 6" WATER LATERALS

The length of water lateral to be paid for shall be determined by measuring the horizontal distance from the center line of the main to the connection point to the existing lateral.

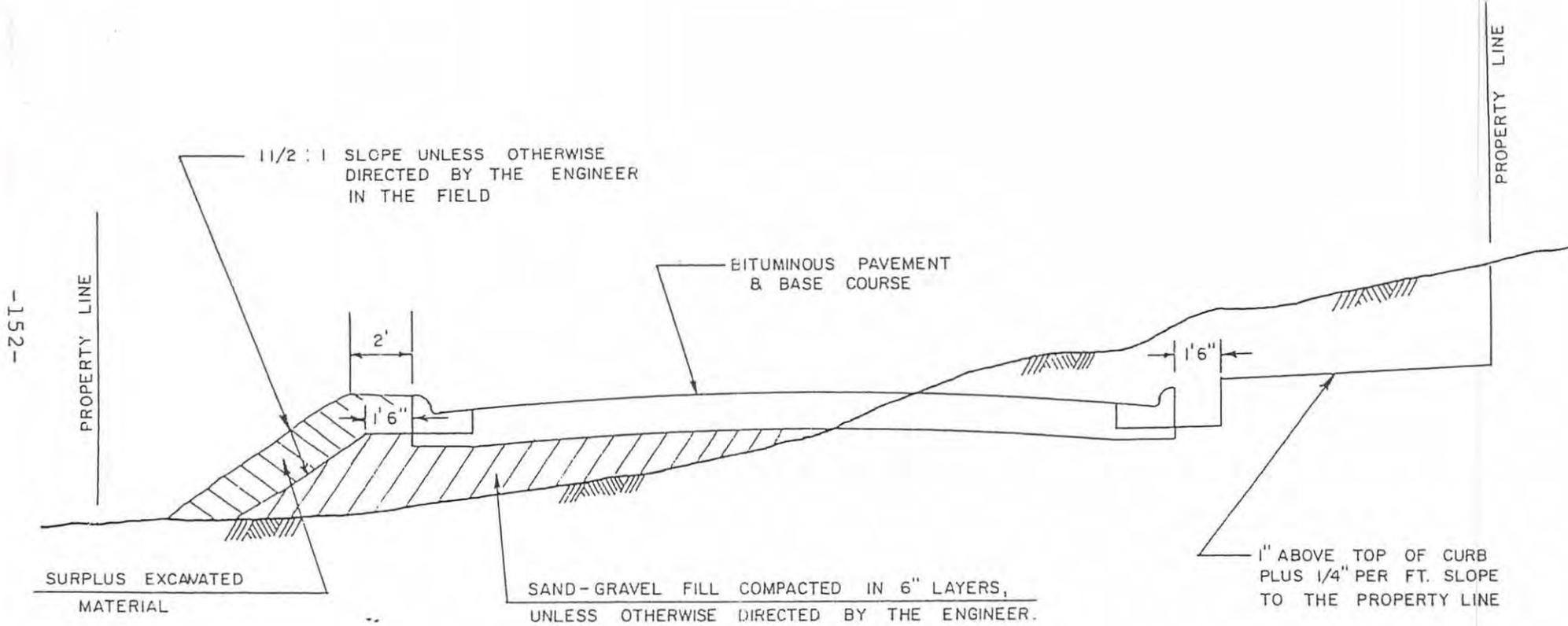
# PAVEMENT STANDARDS

PAVEMENT STANDARDS

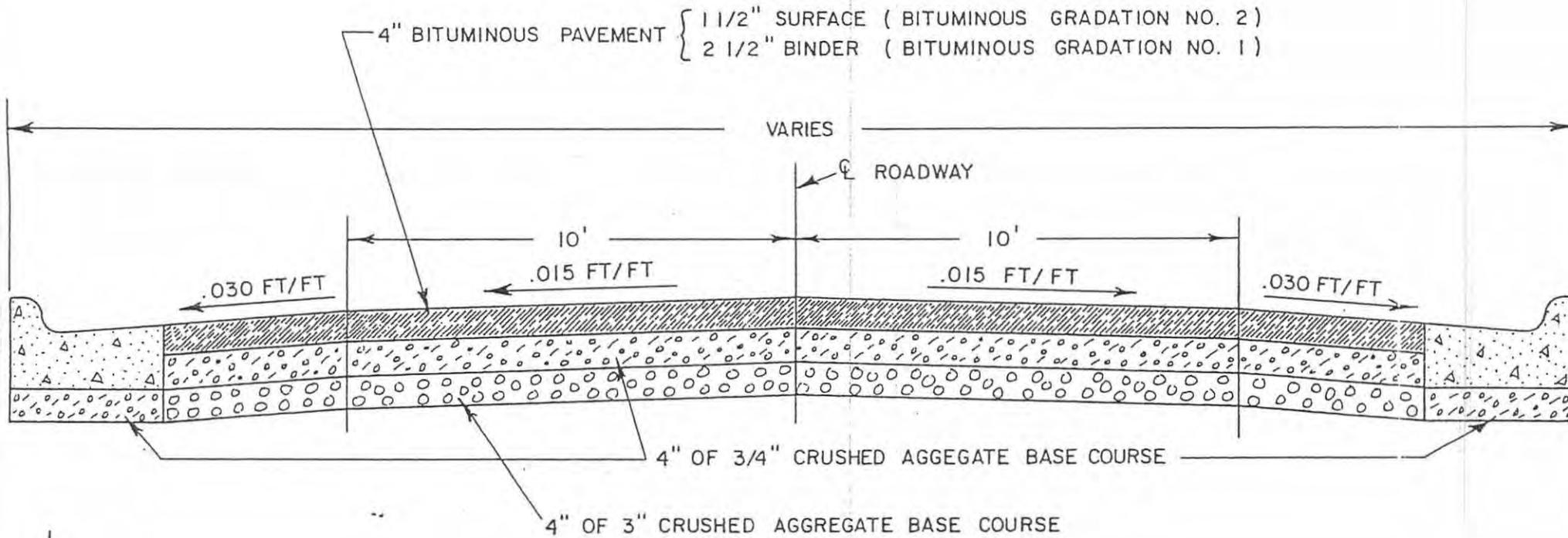
PAGE

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Detail of Bituminous Pavement	153
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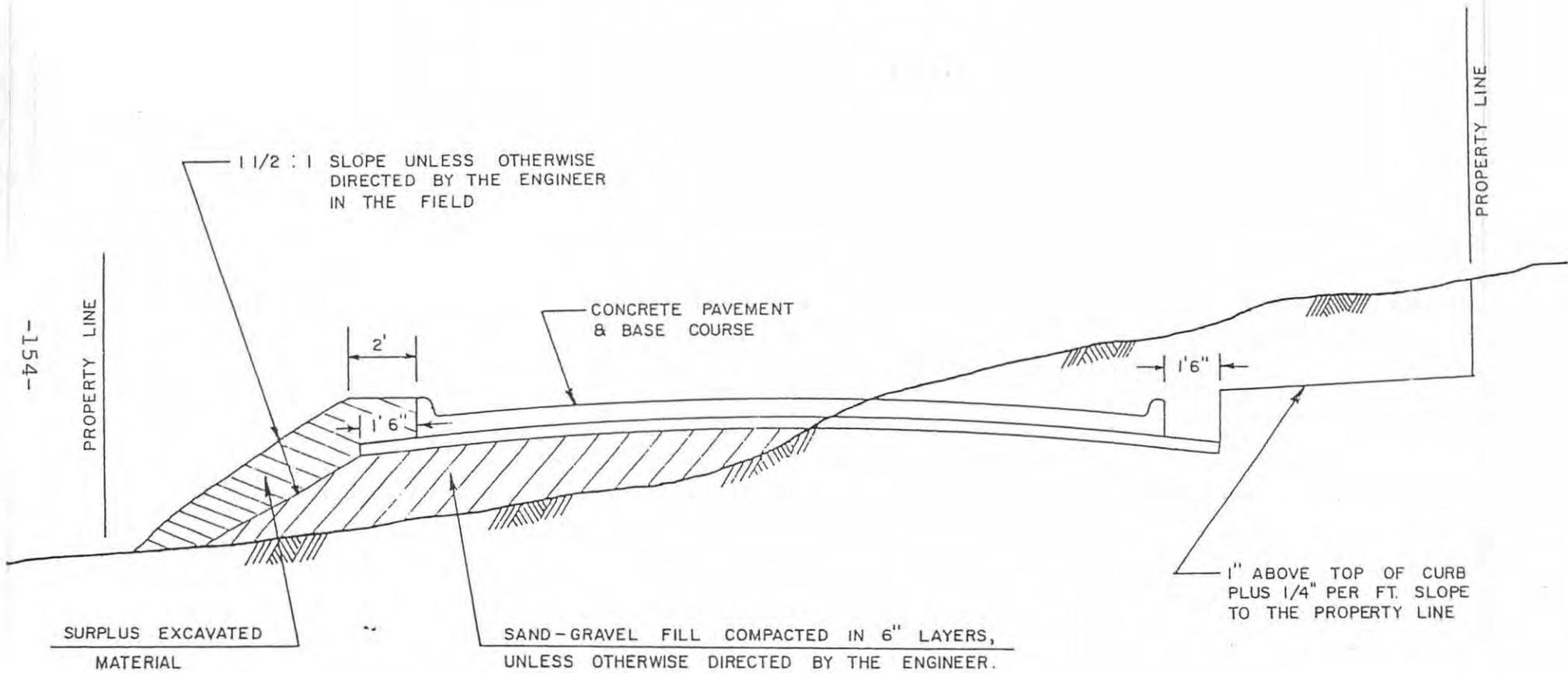
# TYPICAL CROSS SECTION FOR BITUMINOUS PAVEMENT



# BITUMINOUS PAVEMENT WITH CURB AND GUTTER

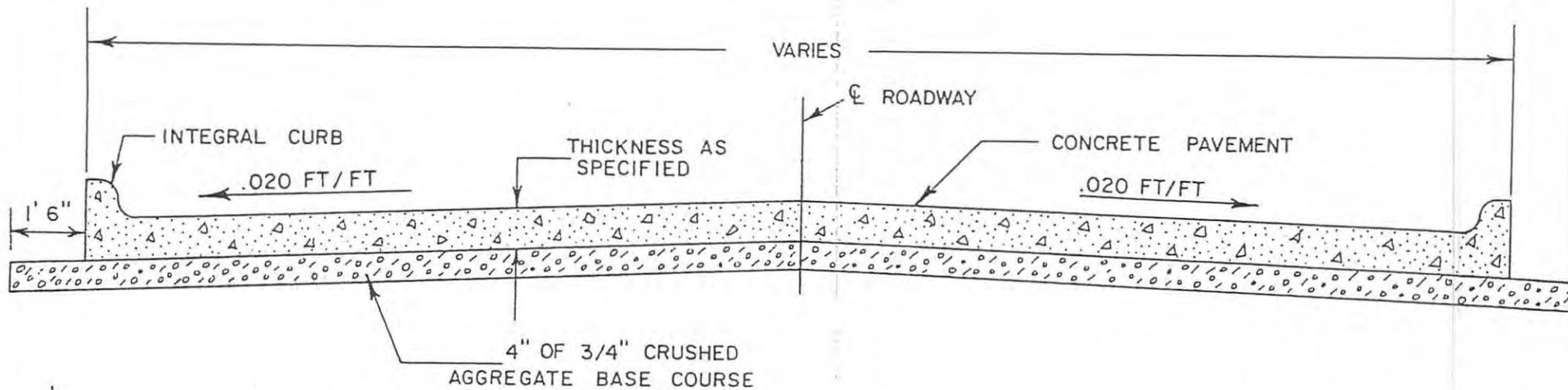


# TYPICAL CROSS SECTION FOR CONCRETE PAVEMENT



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# CONCRETE PAVEMENT WITH INTEGRAL CURB



-155-

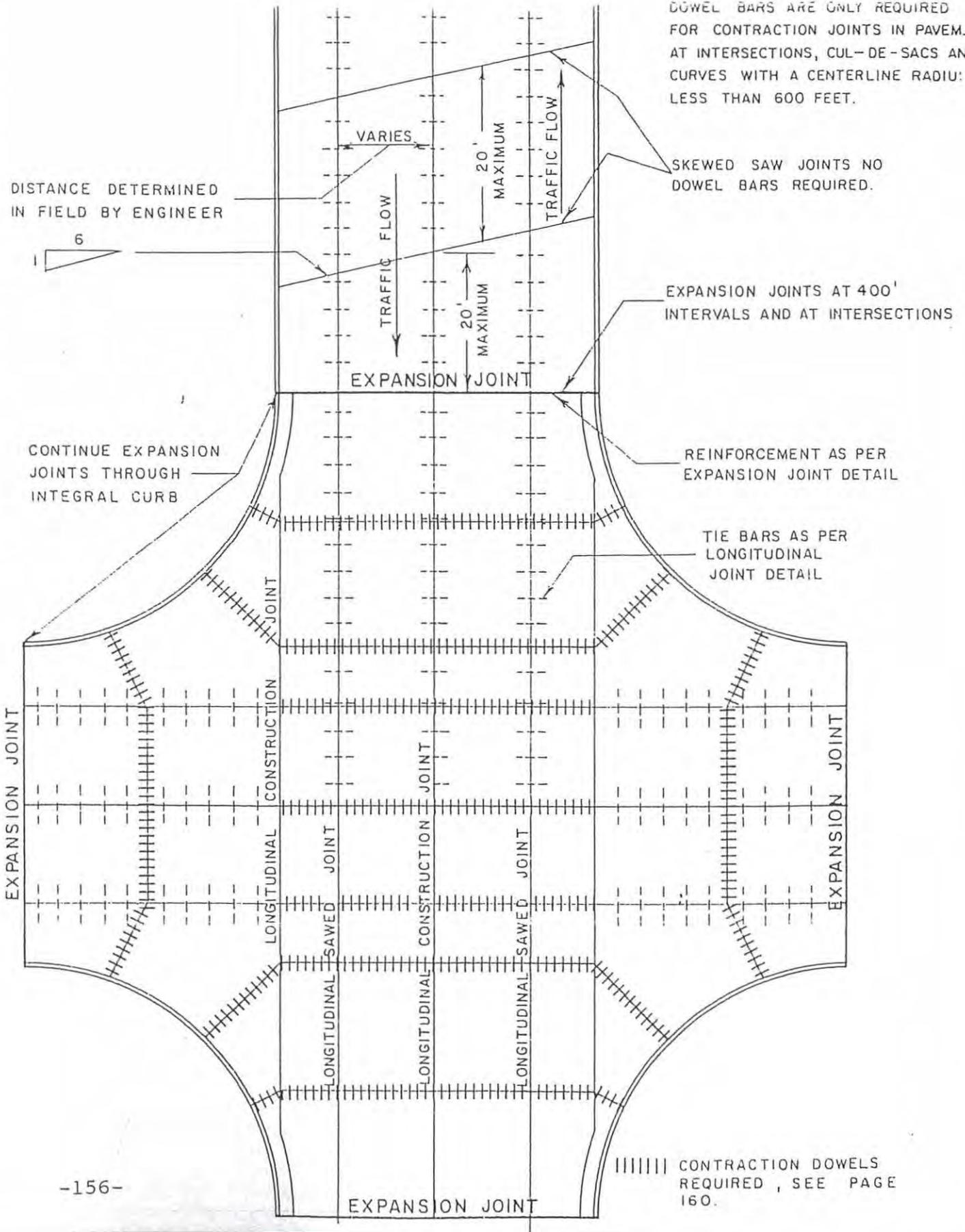
NOTE:

SEE INTEGRAL CURB  
STANDARD, PAGE 162.

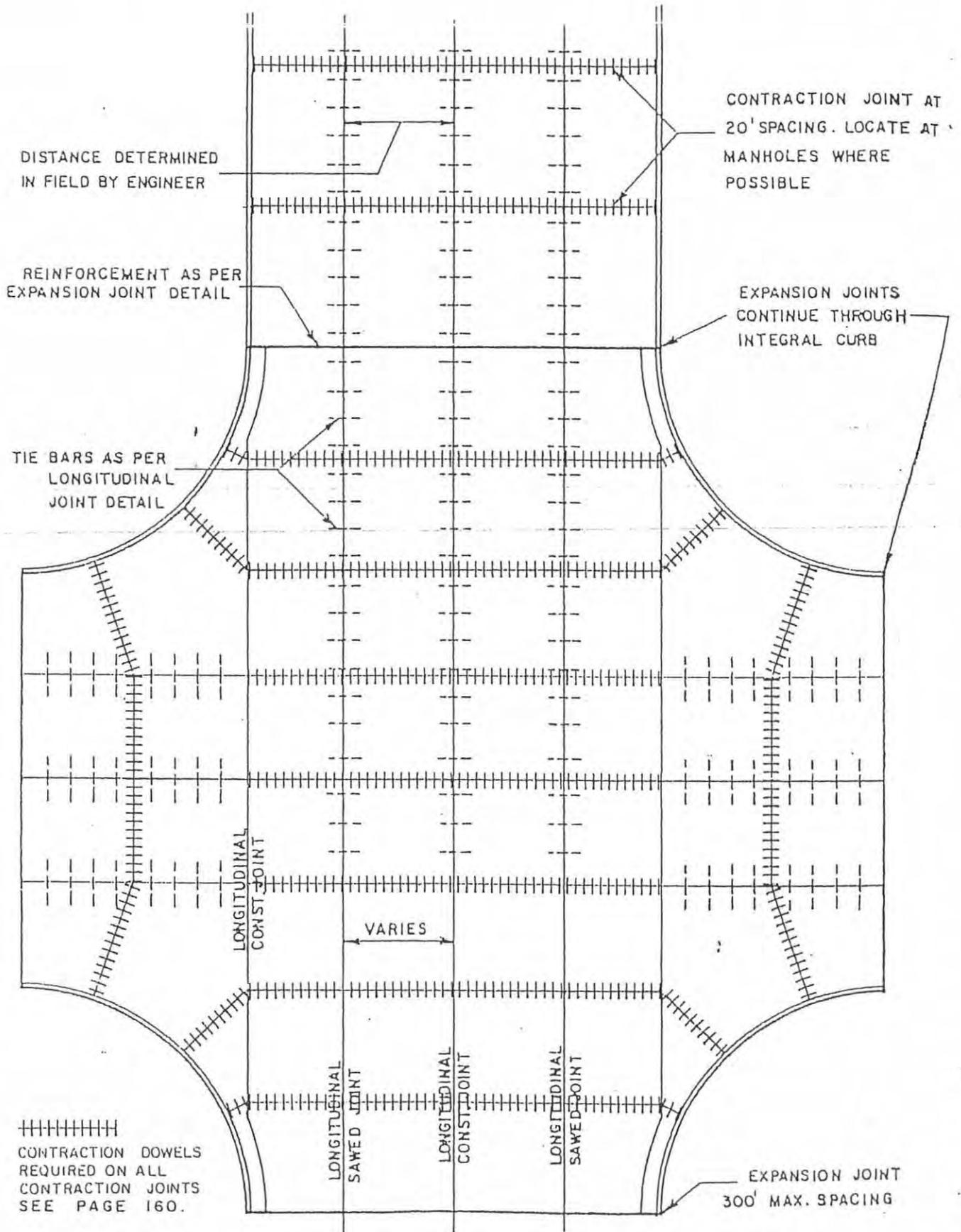
# JOINT LAYOUT CONCRETE PAVEMENT

NOTE:

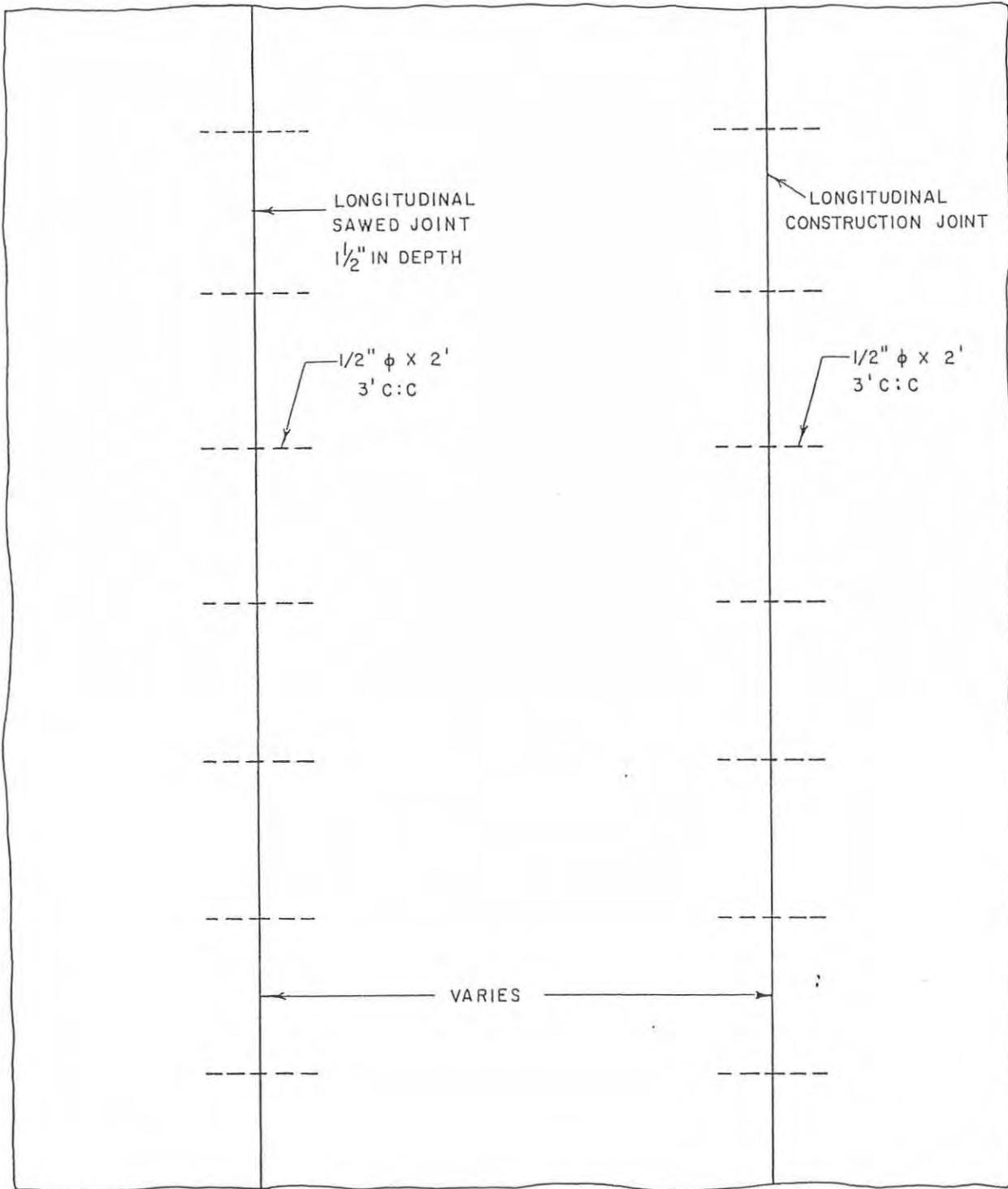
DOWEL BARS ARE ONLY REQUIRED FOR CONTRACTION JOINTS IN PAVEMENT AT INTERSECTIONS, CUL-DE-SACS AND CURVES WITH A CENTERLINE RADIUS: LESS THAN 600 FEET.



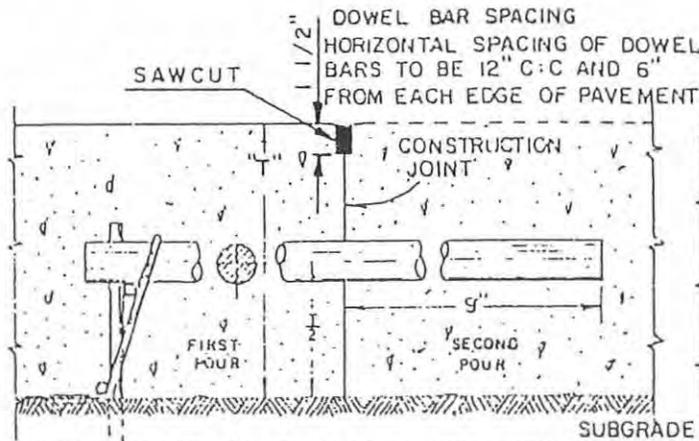
# OPTIONAL JOINT LAYOUT CONCRETE PAVEMENT WITH PERPENDICULAR TRANSVERSE JOINTS



# DETAIL OF LONGITUDINAL JOINTS CONCRETE PAVEMENT

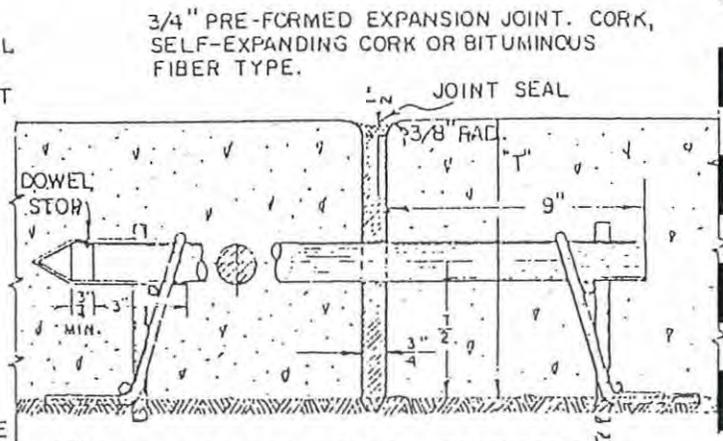


# TRANSVERSE CONSTRUCTION AND EXPANSION JOINTS CONCRETE PAVEMENT



1"  $\phi$  X 18" SMOOTH DOWEL BARS PAINTED WITH REDLEAD AND GREASED WITH HEAVY GREASE TO PREVENT BOND WITH CONCRETE. DOWEL ENDS SHALL BE FREE OF ALL BURRS OR PROTRUDING EDGES.

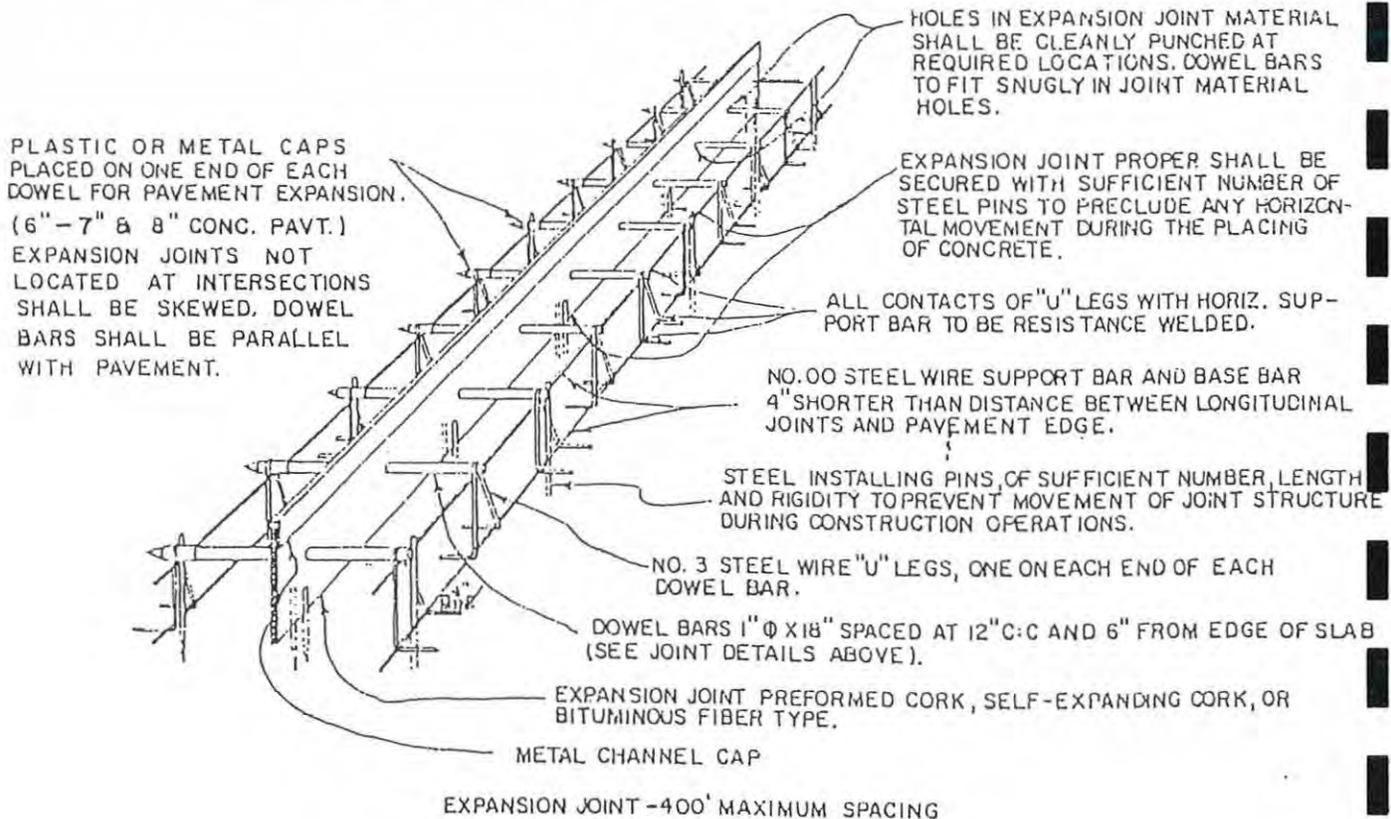
CONSTRUCTION JOINT



1-1/16" DIAM. 24 GA. METAL DOWEL SOCKET (CAP) CLOSED ON ONE END, TO BE PLACED AT ONE END OF EACH DOWEL AS REQUIRED FOR PROPER PAVEMENT EXPANSION.

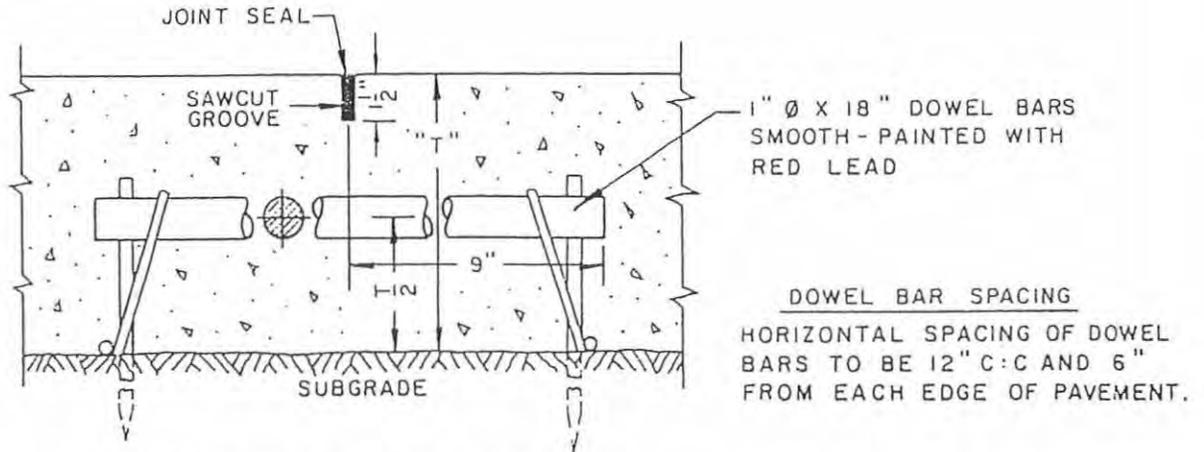
EXPANSION JOINT

## INSTALLING DEVICE FOR LOAD TRANSFER DOWELS & EXPANSION JOINT ASSEMBLY



# TRANSVERSE CONTRACTION JOINTS CONCRETE PAVEMENT

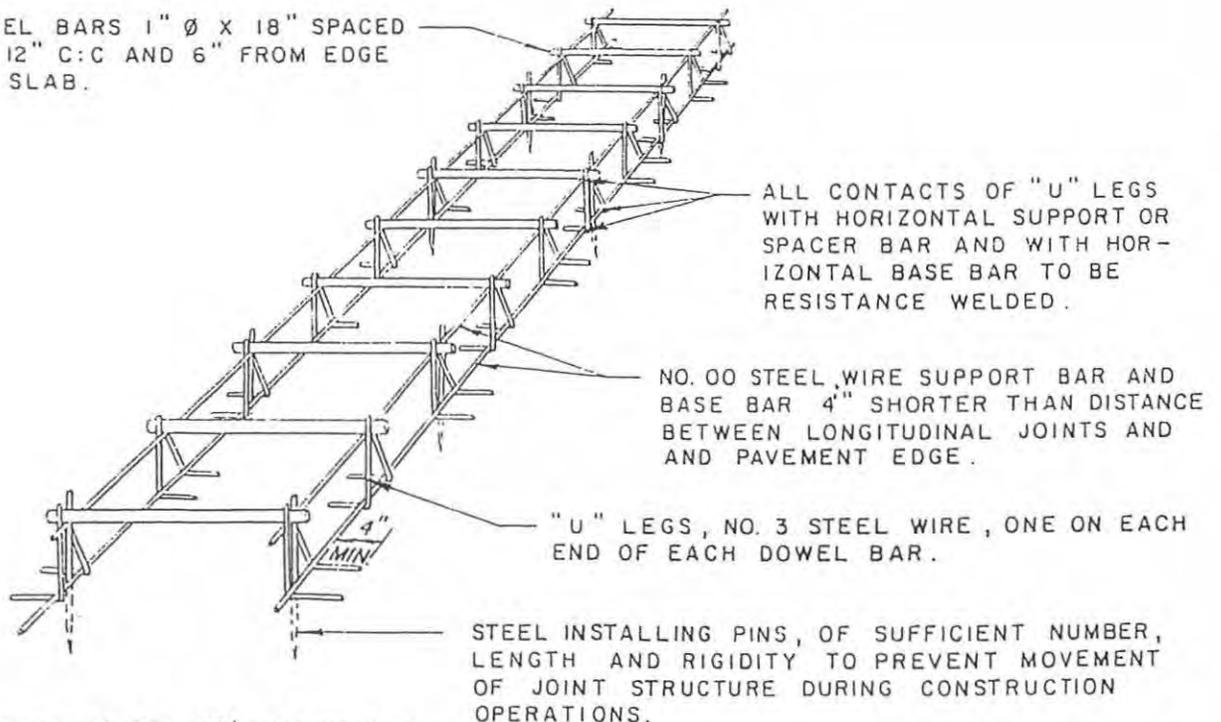
DOWEL BARS ARE ONLY REQUIRED FOR CONTRACTION JOINTS IN PAVEMENTS AT INTERSECTIONS, CUL-DE-SACS AND CURVES WITH A CENTERLINE RADIUS LESS THAN 600 FEET UNLESS OPTIONAL JOINT LAYOUT IS SPECIFIED.



CONTRACTION JOINT

## INSTALLING DEVICE FOR LOAD TRANSFER DOWELS FOR CONTRACTION JOINT

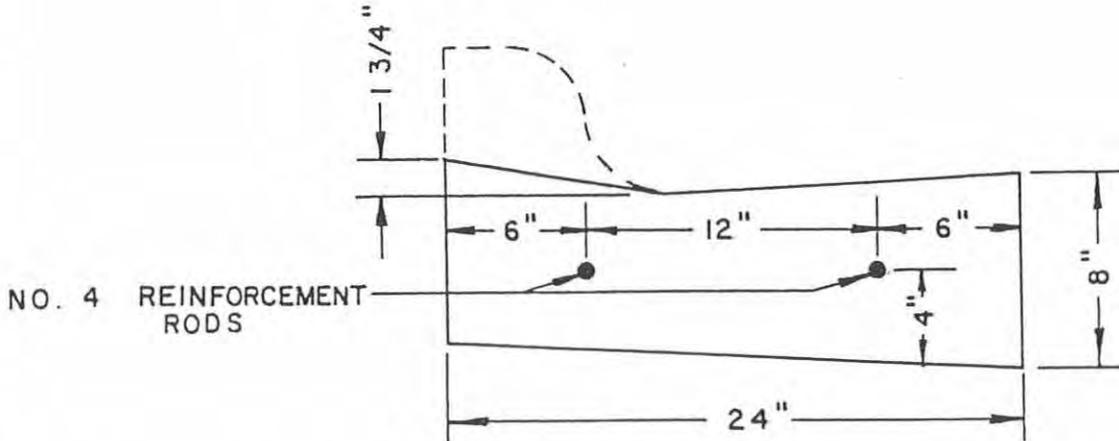
DOWEL BARS 1" Ø X 18" SPACED AT 12" C:C AND 6" FROM EDGE OF SLAB.



CONTRACTION JOINT - 20' MAX. SPACING

# STANDARD CURB & GUTTER

- AT DRIVEWAY OPENING -

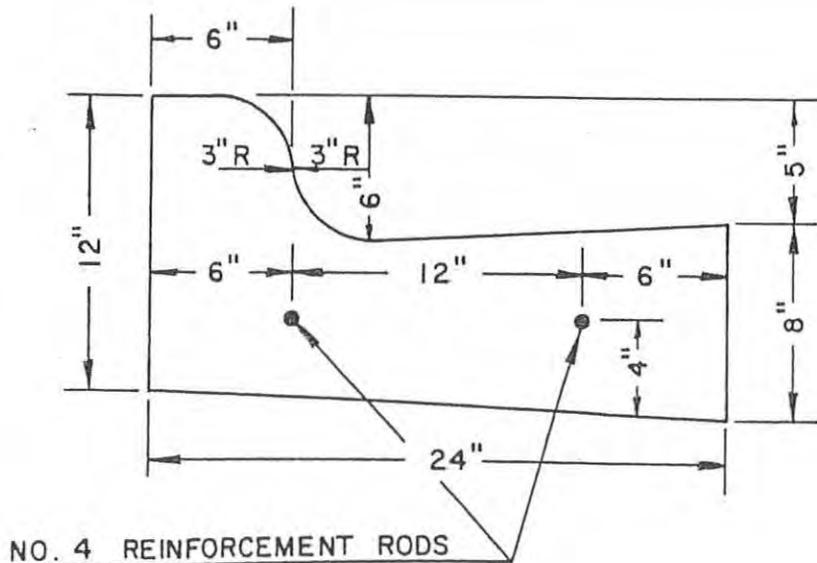


1/2" REINFORCEMENT RODS TO BE 32' LONG WITH A 3/4" EXPANSION TUBE REQUIRED ON ONE END AT EXPANSION JOINTS.

CONTRACTION JOINTS SHALL BE EVERY 20' OR AS DESIGNATED BY ENGINEER IN FIELD.

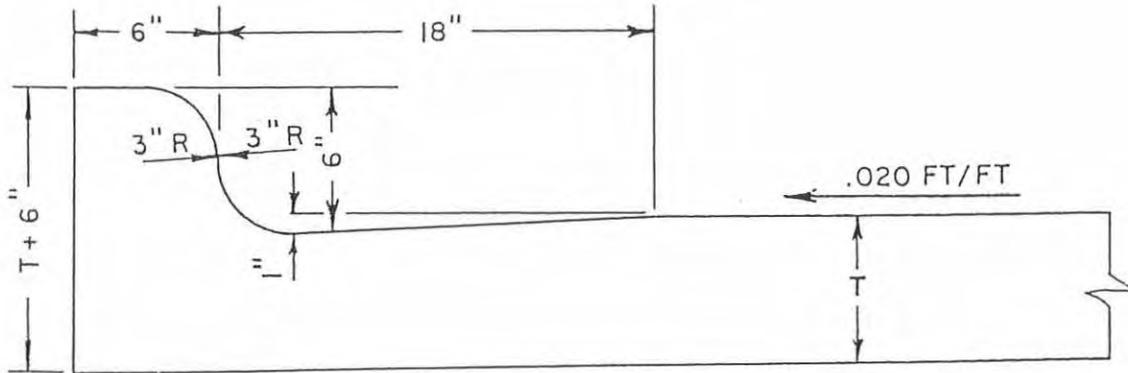
EXPANSION JOINTS SHALL BE PLACED AT UNIFORM INTERVALS OF NOT MORE THAN 120' AND WHERE TANGENT AND RADIAL CURB AND GUTTER MEET.

- NORMAL -

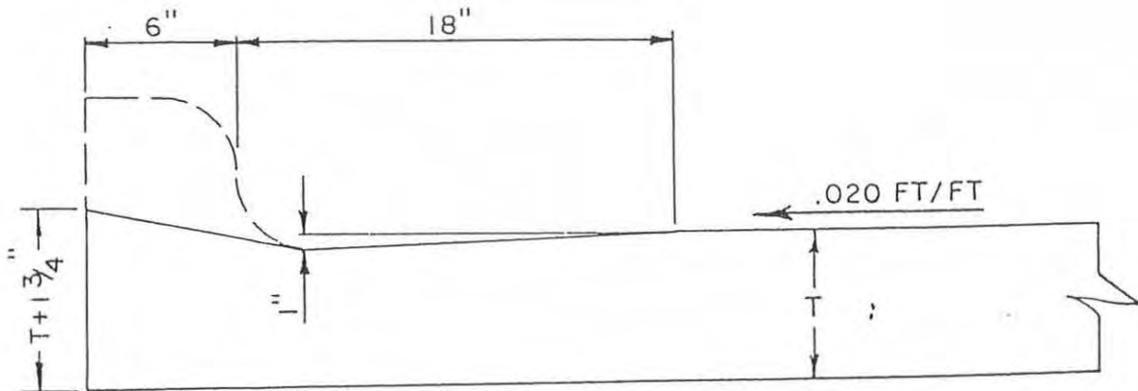


# STANDARD INTEGRAL CURB

- NORMAL -

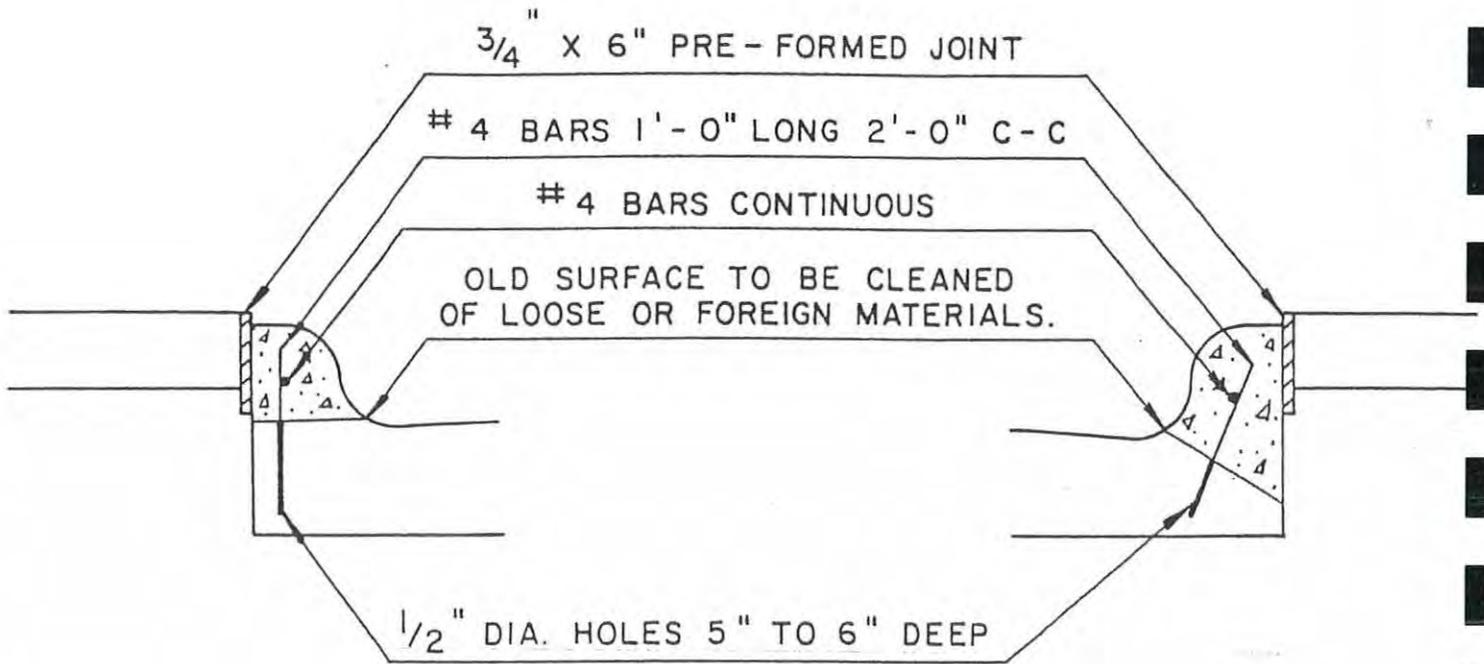


- AT DRIVEWAY OPENING -

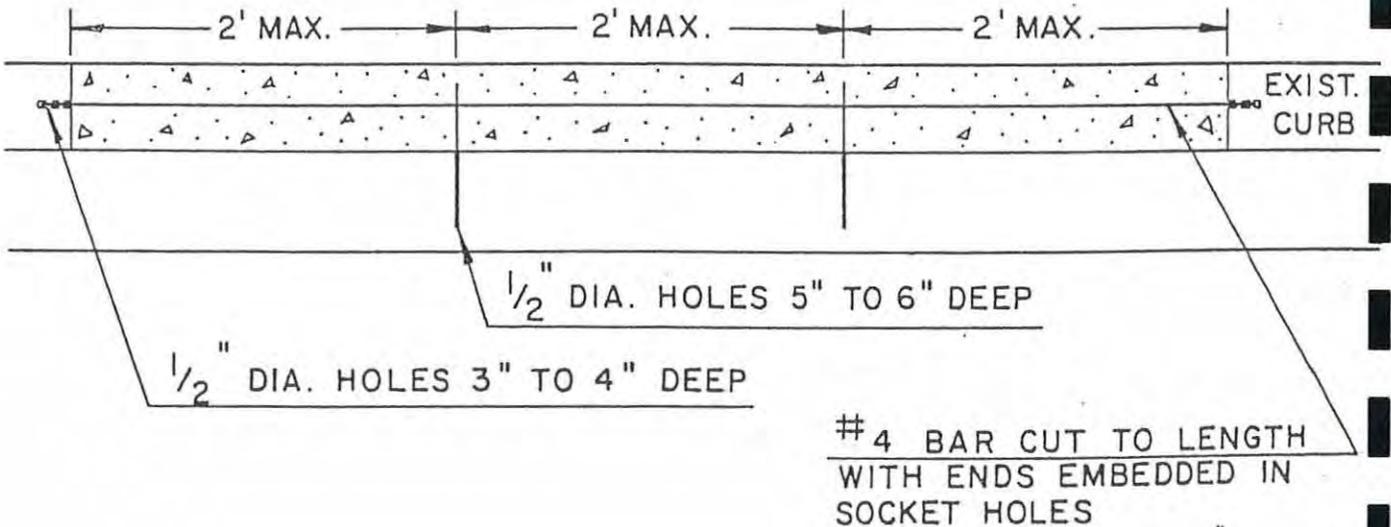


# SPECIAL CURB REPLACEMENT

## CROSS - SECTION



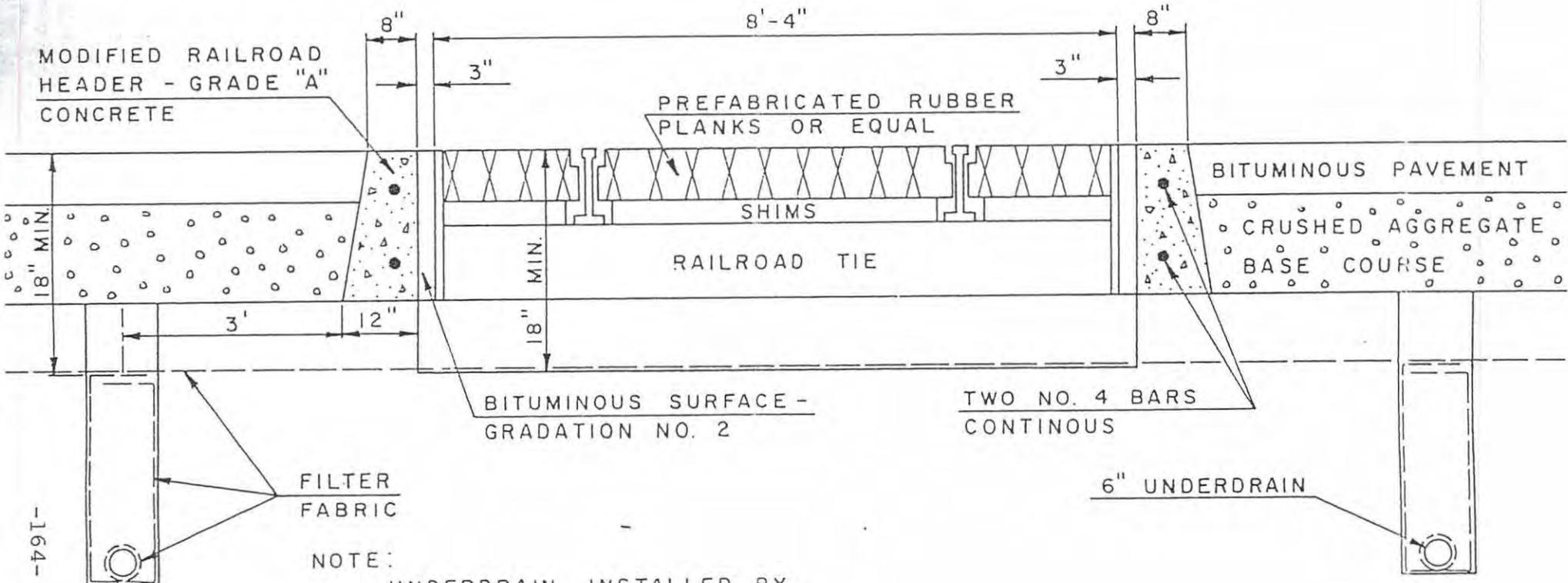
## LONGITUDINAL SECTION



# TRACK CROSSING - DETAIL

BITUMINOUS PAVEMENT

TYPICAL SECTION

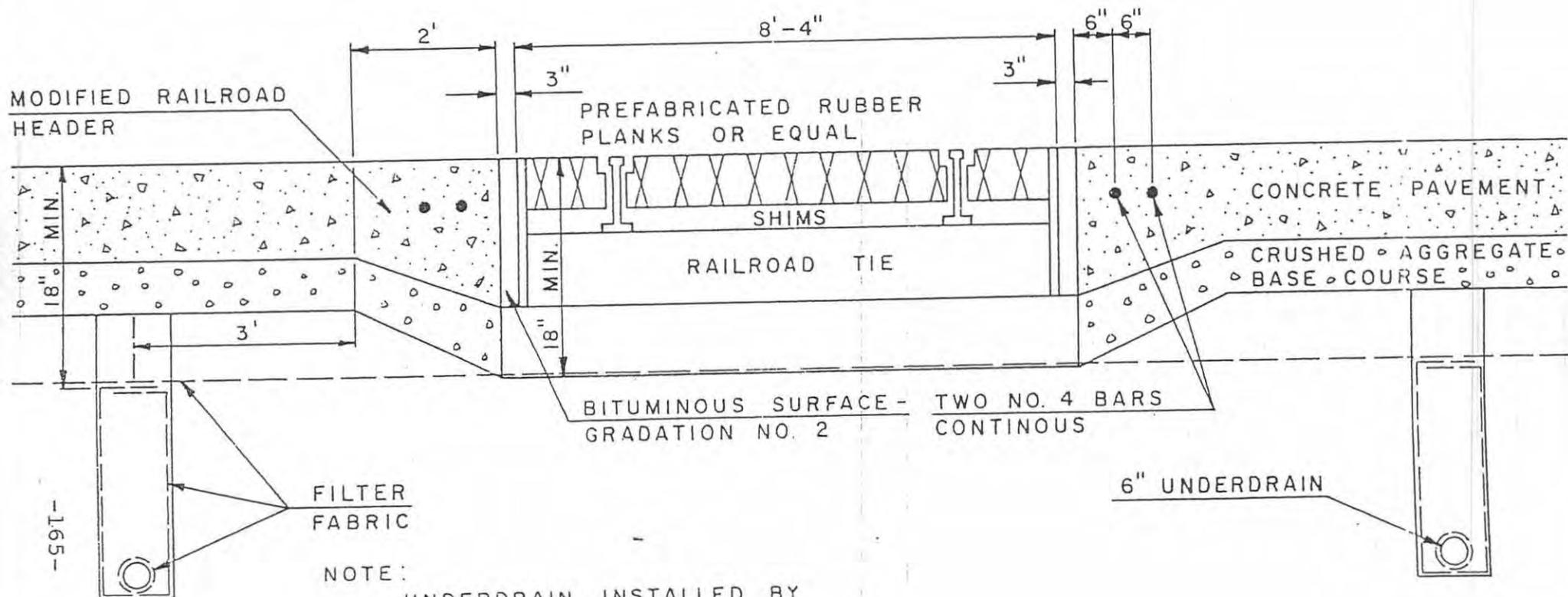


NOTE:  
UNDERDRAIN INSTALLED BY  
SEWER CONTRACTOR - SEE  
CONSTRUCTION STANDARDS,  
PAGE 208.

# TRACK CROSSING - DETAIL

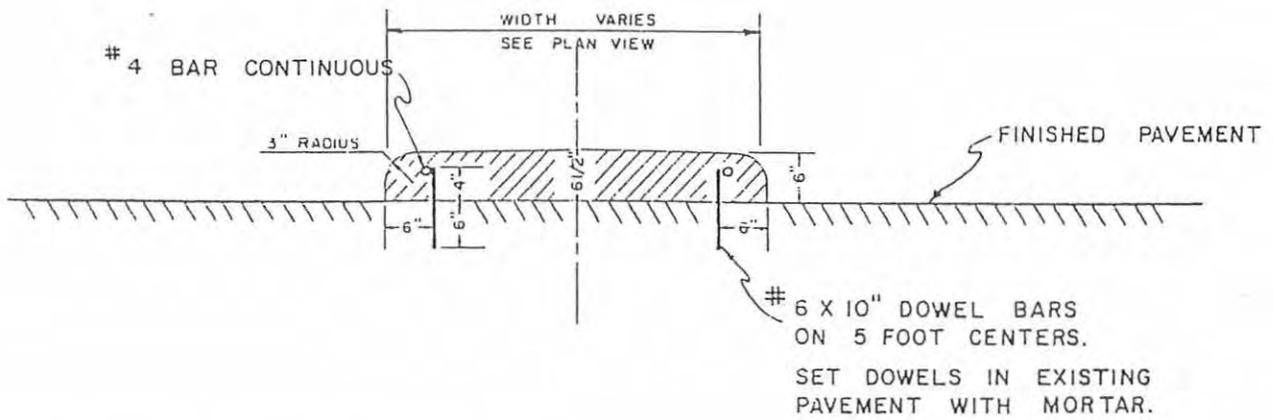
## CONCRETE PAVEMENT

### TYPICAL SECTION



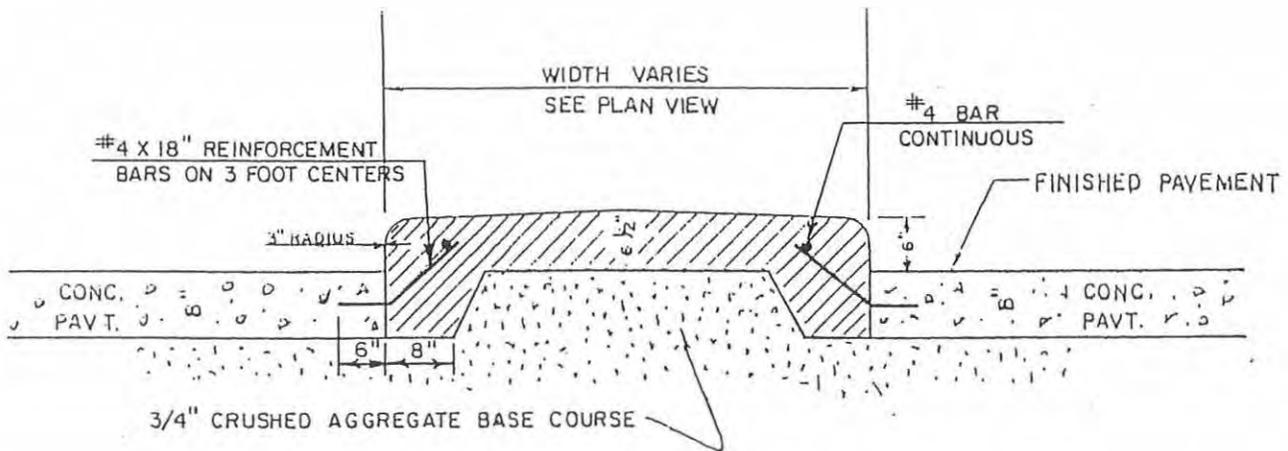
FILTER FABRIC

NOTE:  
UNDERDRAIN INSTALLED BY  
SEWER CONTRACTOR - SEE  
CONSTRUCTION STANDARDS,  
PAGE 208.

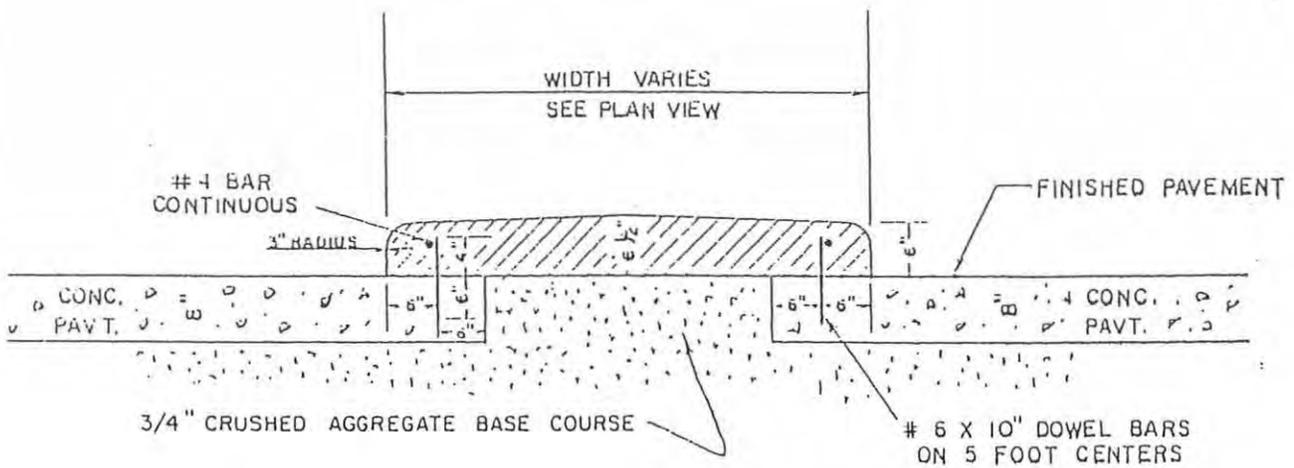


TRAFFIC ISLAND DETAIL  
ON EXISTING PAVEMENT

SCALE 1" = 2'



OR



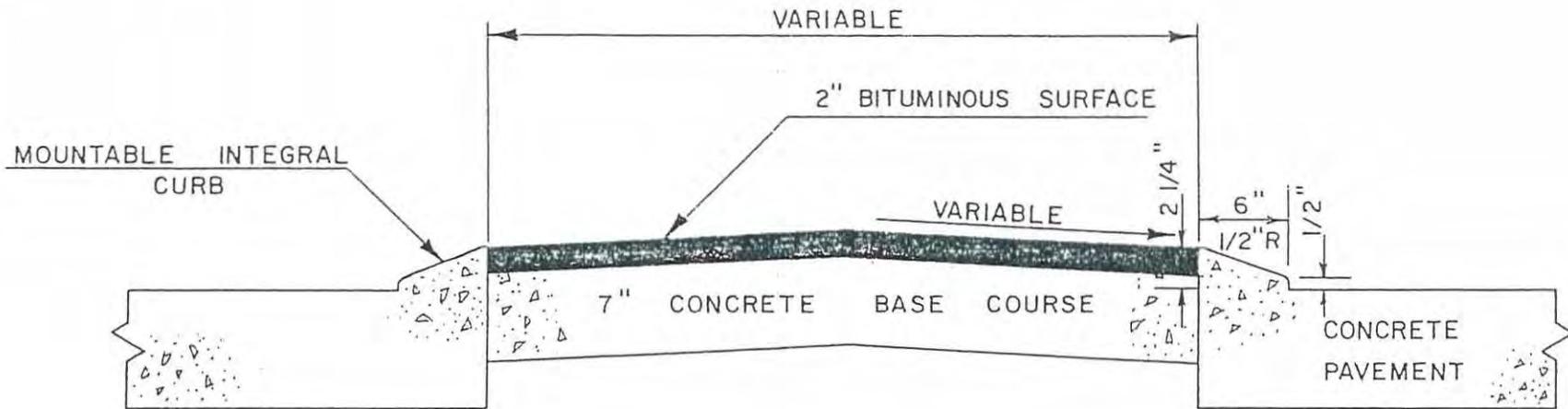
## TRAFFIC ISLAND DETAIL ON NEW PAVEMENT

SCALE 1" = 2'

# MOUNTABLE MEDIAN ON NEW PAVEMENTS

SCALE 1" = 1'

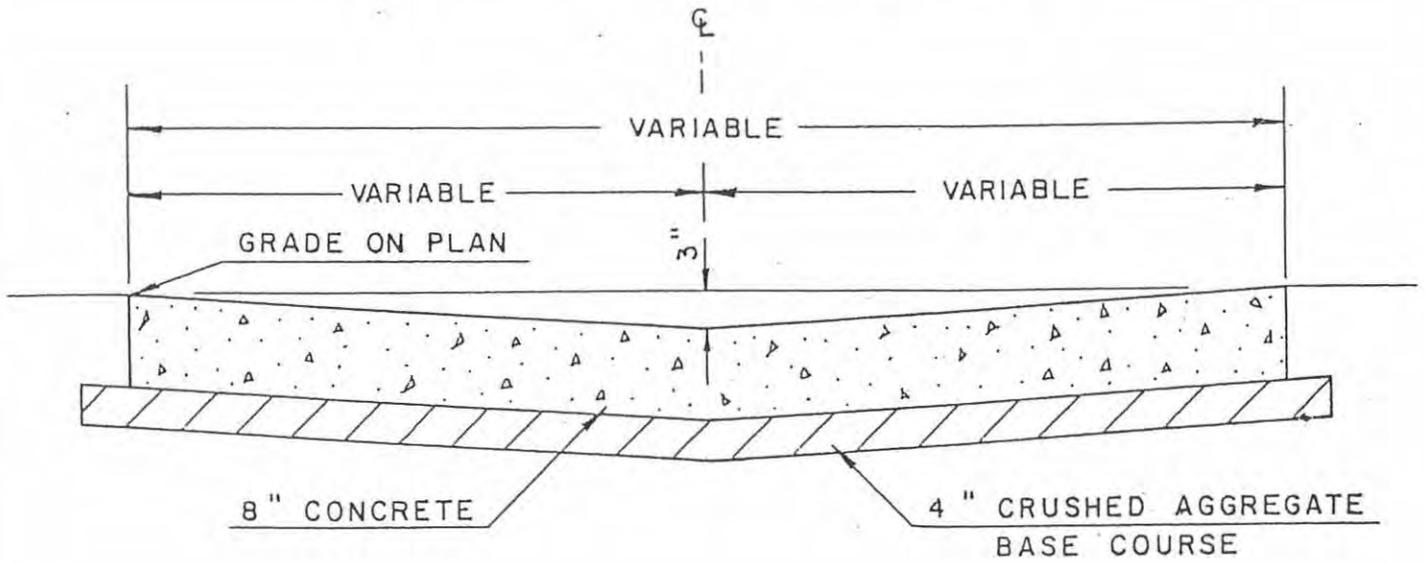
-168-



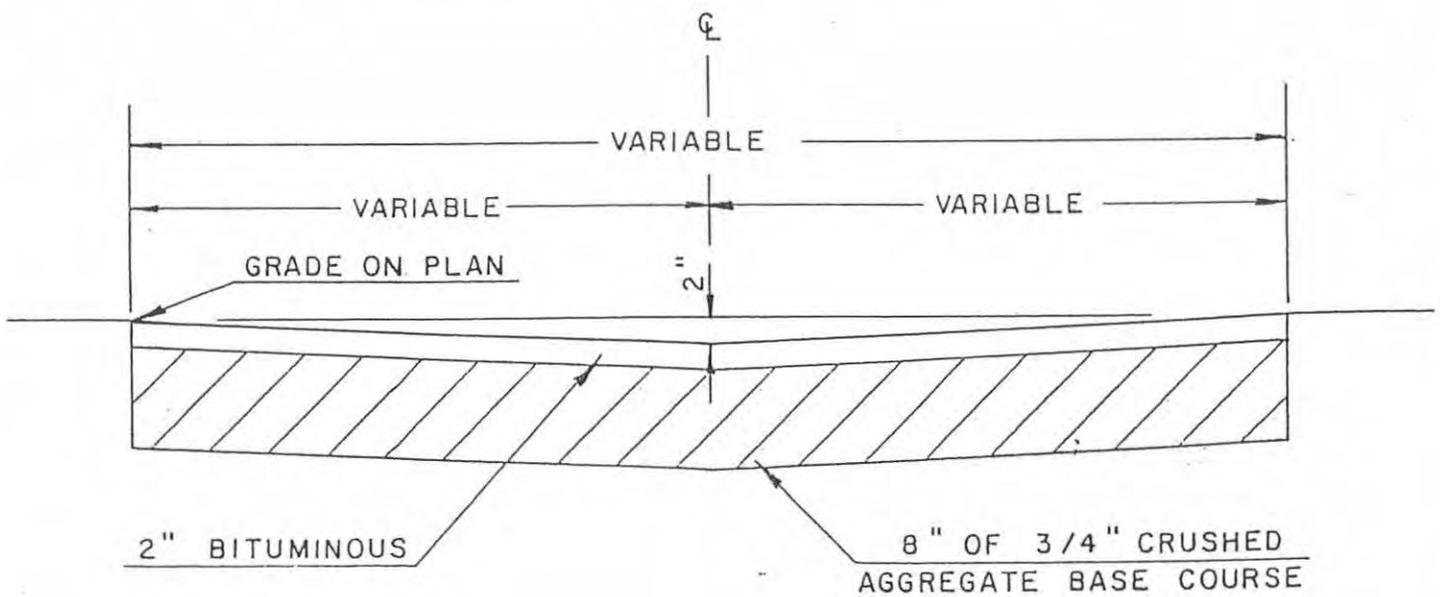
NOTE :

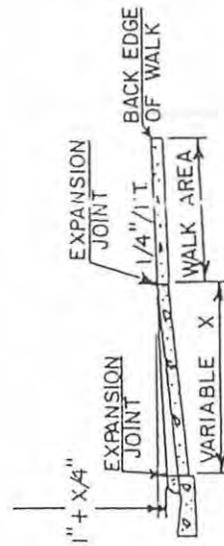
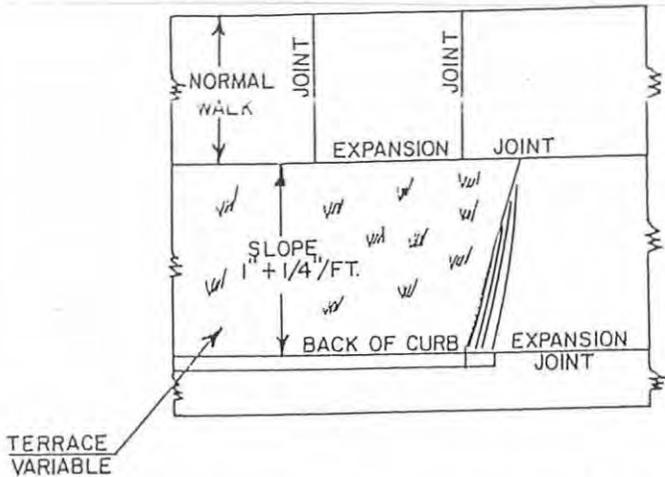
TRANSITION MOUNTABLE CURB  
TO MATCH UNMOUNTABLE MEDIAN  
HEIGHT IN  $\pm 2$  FEET.

# TYPICAL SECTION CONCRETE ALLEY PAVEMENT



# TYPICAL SECTION BITUMINOUS ALLEY PAVEMENT





SECTION PARALLEL TO  $\phi$  OF DRIVEWAY

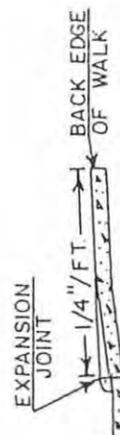
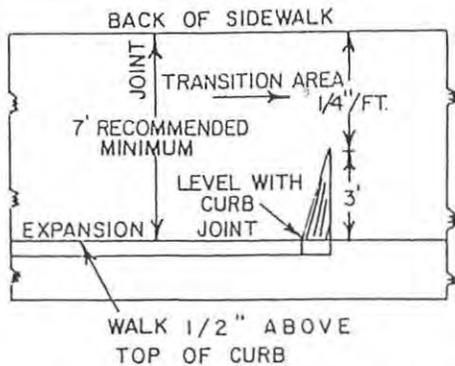
WHEN SIDEWALK IS SEPARATED FROM CURB BY PLANTING AREA

WIDTH OF DRIVEWAYS

WIDTH OF THE DRIVEWAYS MEASURED AT RIGHT ANGLES TO CENTERLINE OF DRIVEWAY AT CURB LINE

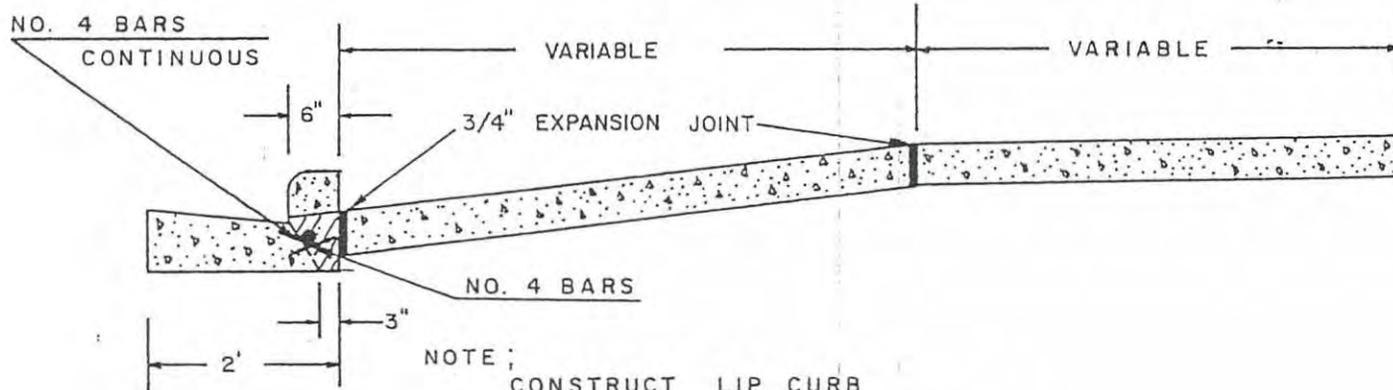
COMMERCIAL	TWO-WAY DRIVES	AUTOS & SINGLE AXLE TRUCKS — 30'	SEMI-TRAILERS — 35'
			ONE-WAY DRIVES ALL — 25'
RESIDENTIAL	DOUBLE DRIVE — 24'	SINGLE DRIVE — 16'	

ON CORNER LOTS THE END OF CURB OPENINGS SHALL NOT BE LESS THAN 25' FROM THE INTERSECTION OF RIGHT OF WAY LINES OR 35' FROM THE POINT OF INTERSECTION OF THE FACE OF CURBS WHICHEVER IS GREATER. EXACT LOCATION OF DRIVEWAYS TO BE DETERMINED BY ENGINEER IN FIELD.



SECTION PARALLEL TO  $\phi$  OF DRIVEWAY

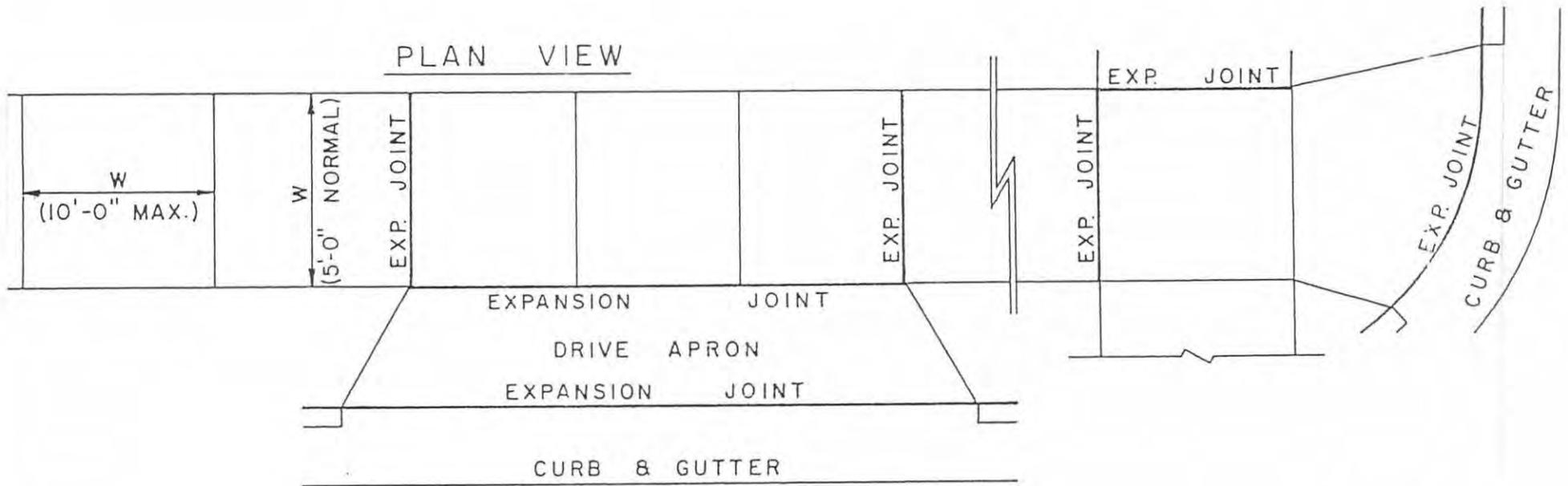
WHEN SIDEWALK IS IMMEDIATELY ADJACENT TO CURB



-171-

DRIVEWAY CONSTRUCTION DETAIL  
(WITH EXISTING CURB)

# SIDEWALK CONSTRUCTION DETAIL



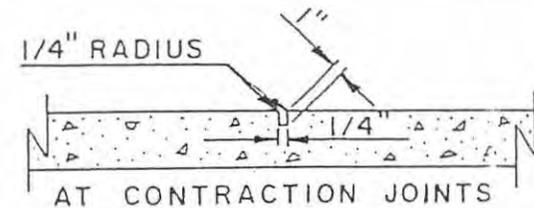
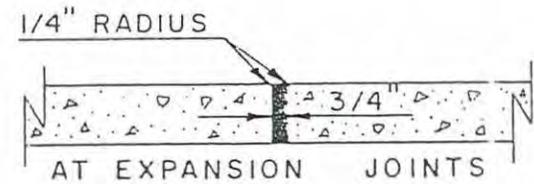
**NOTE:**

EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM SPACING OF 120', AT THE BACK OF CURB, AT THE FRONT EDGE OF WALK AT DRIVEWAY APRONS, AT THE INTERSECTION OF SIDEWALKS, AND AT ALL CHANGES IN DEPTH OF SIDEWALK, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

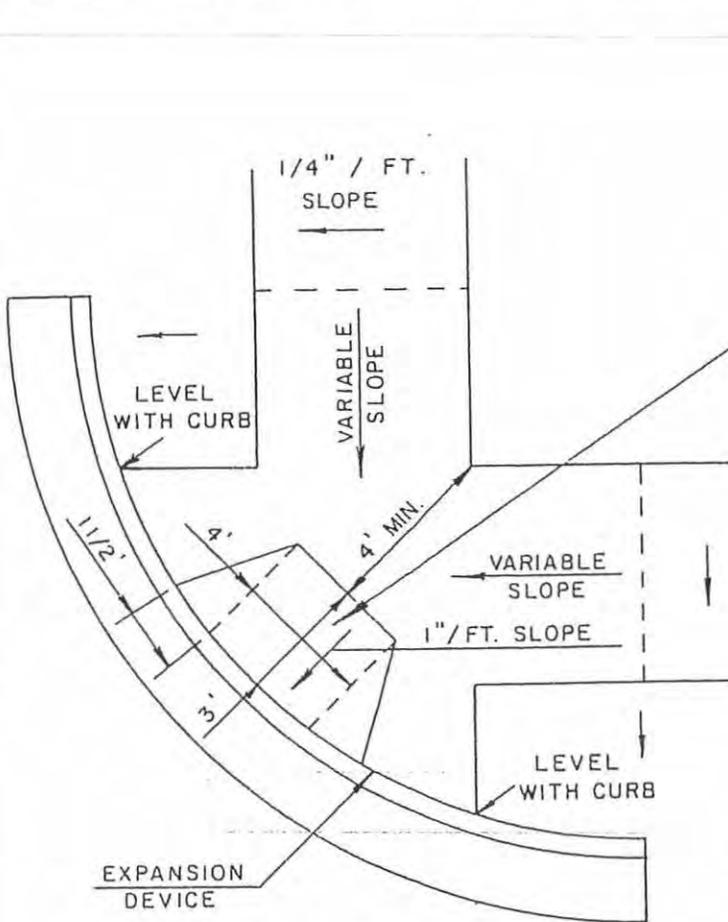
HANDICAP RAMPS ARE REQUIRED IN EACH QUADRANT OF ALL INTERSECTIONS.

THE EDGES OF SIDEWALK ALONG FORMS AND JOINTS SHALL BE ROUNDED WITH AN EDGER OF 1/4" RADIUS.

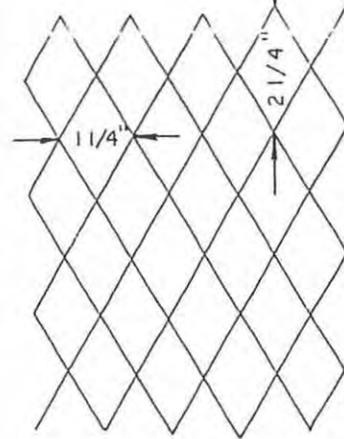
## LONGITUDINAL SECTION



# HANDICAP RAMP - TYPICAL DETAIL



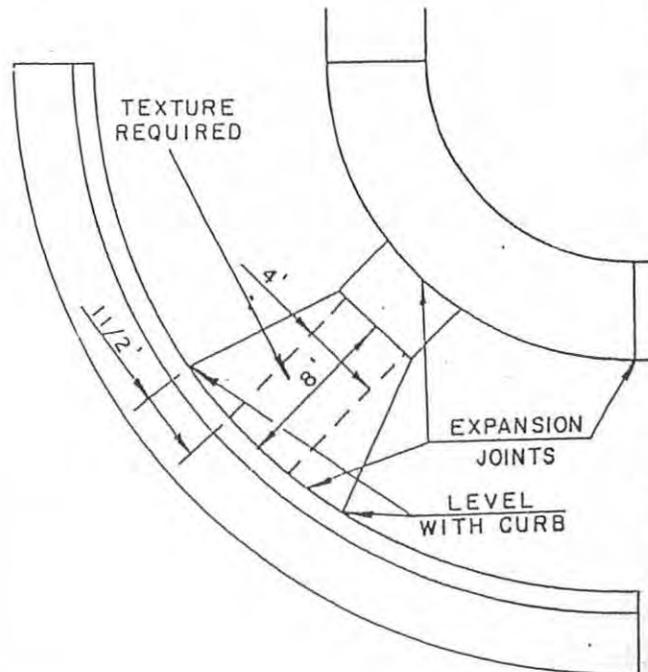
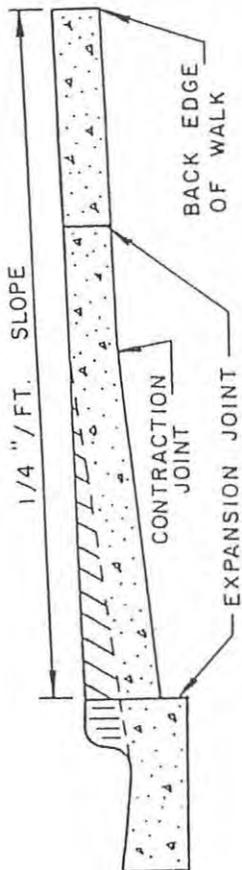
TEXTURE DETAIL



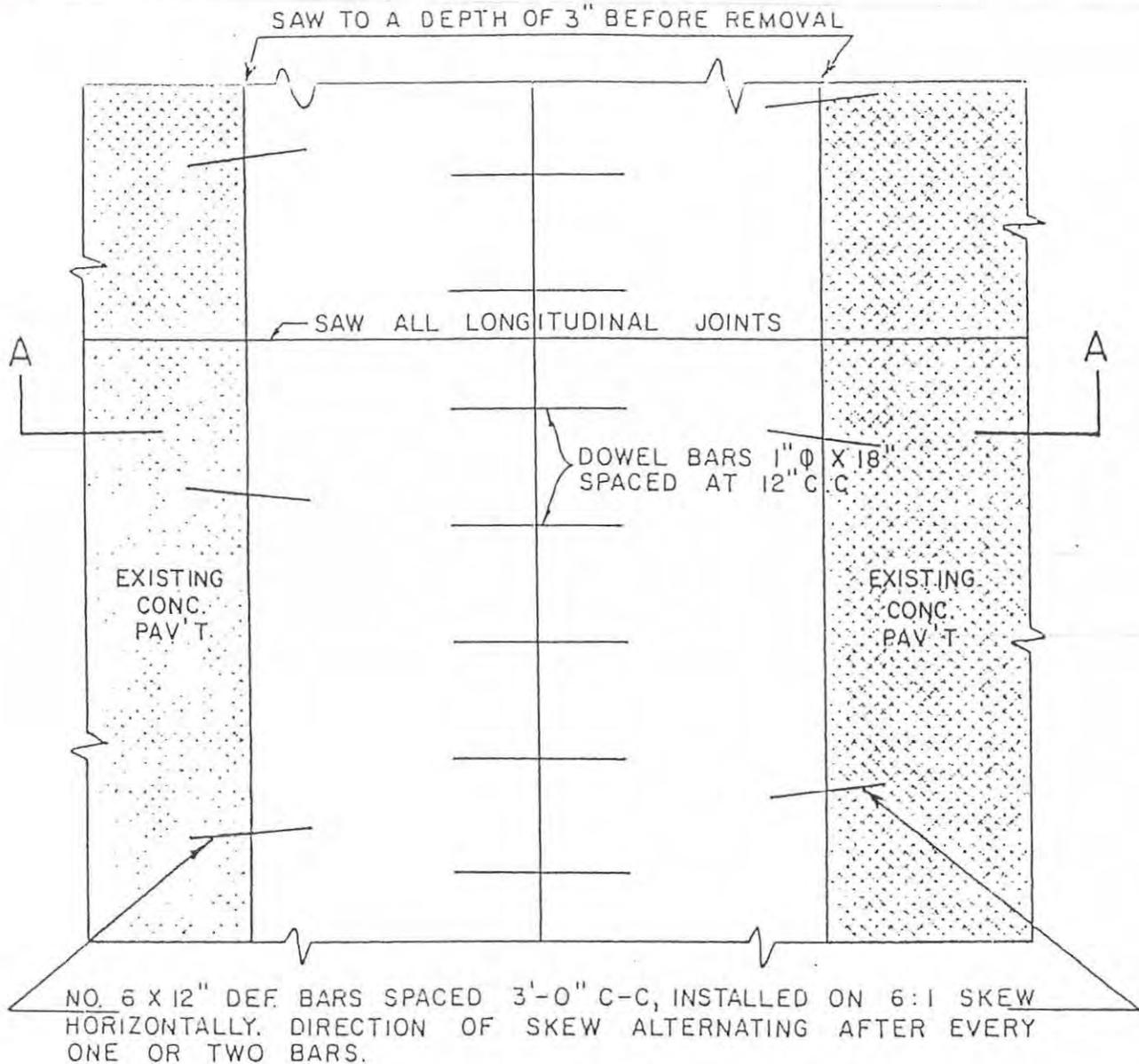
TEXTURING

THE SURFACE TEXTURING SHALL CONSIST OF LINEAR IMPRESSIONS 1/4" TO 3/8" DEEP ORIENTED TO PROVIDE A UNIFORM PATTERN OF DIAMOND SHAPES. THE DIAMOND SHAPES SHALL MEASURE APPROXIMATELY 1 1/4" WIDE BY 2 1/4" LONG, WITH THE LENGTH OF THE DIAMOND SHAPE PARALLEL TO THE DIRECTION OF PEDESTRIAN MOVEMENT. THE DIAMOND SHAPES SHALL BE SPACED 1/4" TO 3/8" APART. THIS SURFACE TEXTURE MAY BE ACHIEVED BY IMPRESSING AND REMOVING EXPANDED METAL REGULAR INDUSTRIAL MESH INTO THE SURFACE OF THE RAMP WHILE THE CONCRETE IS IN A PLASTIC STATE.

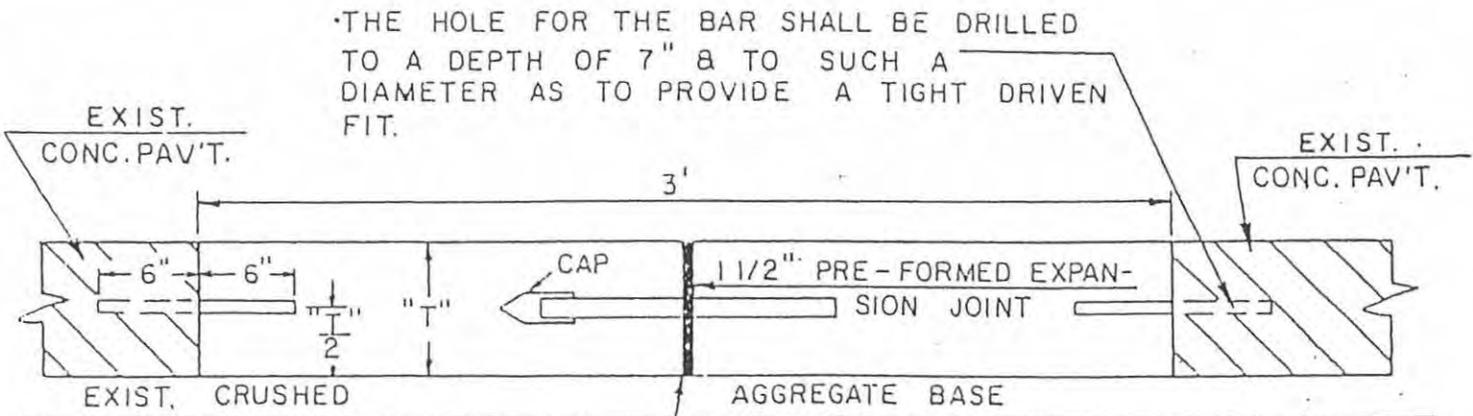
CROSS SECTION AT ♀ RAMP



# PAVEMENT REPAIR EXPANSION JOINT INSTALLATION



PLAN VIEW

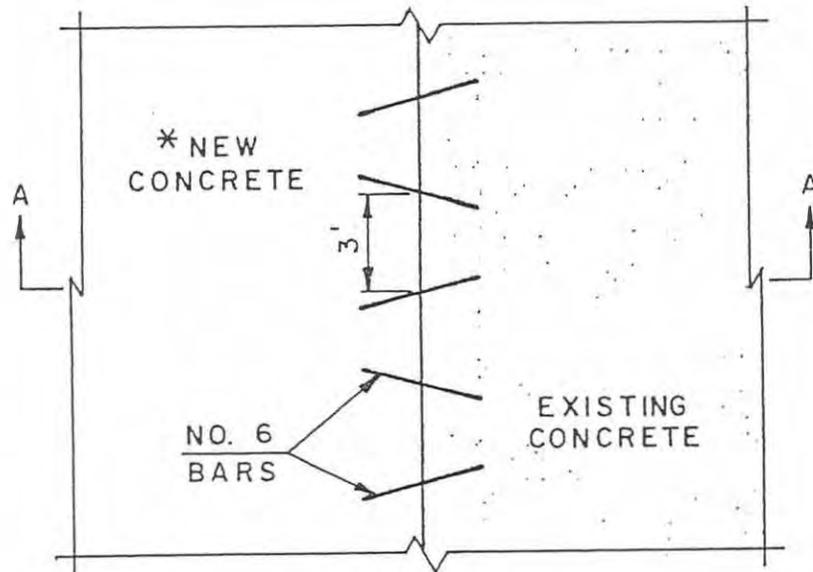


1 1/2" PRE-FORMED EXPANSION JOINT

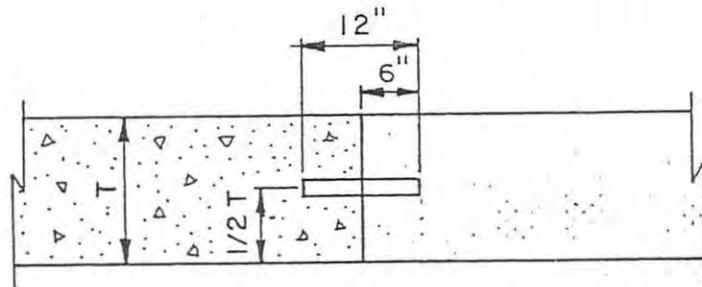
PAID FOR AS LINEAL FEET,      INSTALL EXPANSION JOINT

SECTION A-A

# PAVEMENT TIES



PLAN VIEW



SECTION A-A

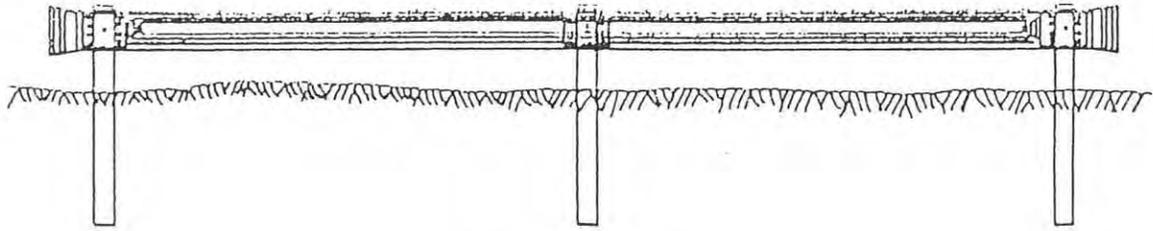
## NOTE:

\* NEW CURB & GUTTER, CONCRETE PAVEMENT OR OTHER NEW CONCRETE.

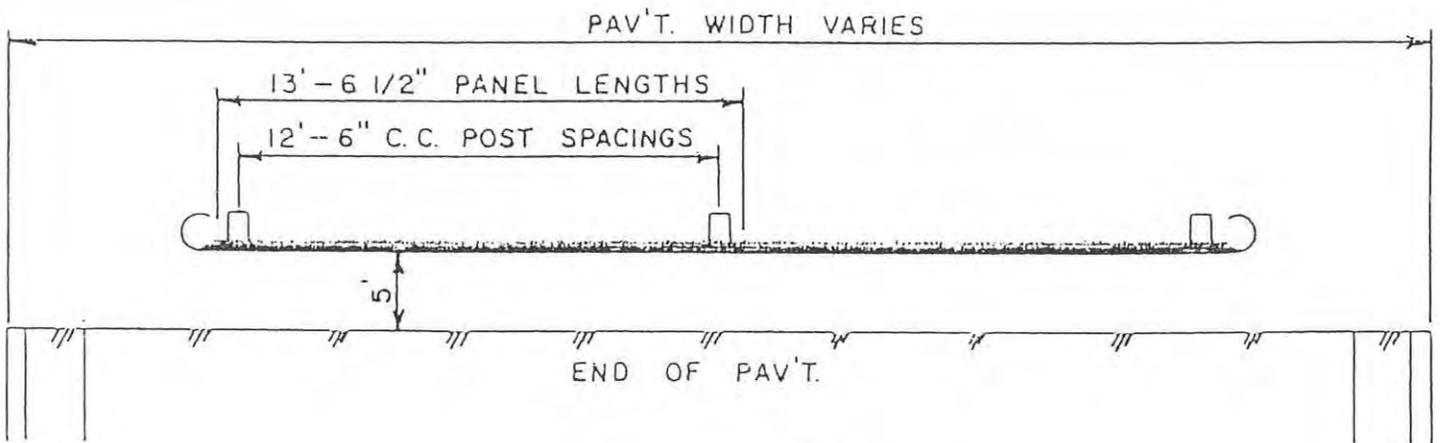
NO. 6 X 12" DEFORMED BARS SPACED 3'-0" C-C, INSTALLED ON 6:1 SKEW HORIZONTALLY. DIRECTION OF SKEW ALTERNATING AFTER EVERY ONE OR TWO BARS

THE HOLE FOR THE BAR SHALL BE DRILLED TO A DEPTH OF 7" AND TO SUCH A DIAMETER AS TO PROVIDE A TIGHT DRIVEN FIT.

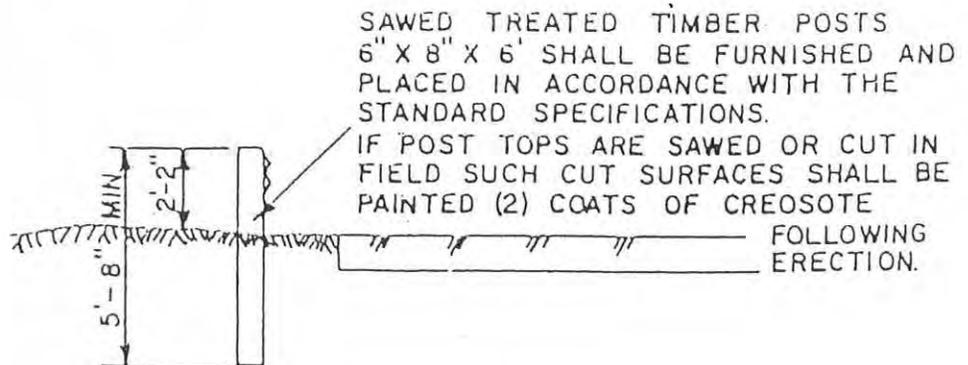
# STEEL PLATE BEAM GUARD



FRONT ELEVATION



TOP ELEVATION



SAWED TREATED TIMBER POSTS  
6" X 8" X 6' SHALL BE FURNISHED AND  
PLACED IN ACCORDANCE WITH THE  
STANDARD SPECIFICATIONS.  
IF POST TOPS ARE SAWED OR CUT IN  
FIELD SUCH CUT SURFACES SHALL BE  
PAINTED (2) COATS OF CREOSOTE  
FOLLOWING  
ERECTION.

END ELEVATION

**STREET LIGHTING  
AND  
TRAFFIC SIGNAL STANDARDS**

STREET LIGHTING AND TRAFFIC SIGNAL STANDARDS

PAGE

T-1 Base

178

T-2 Base

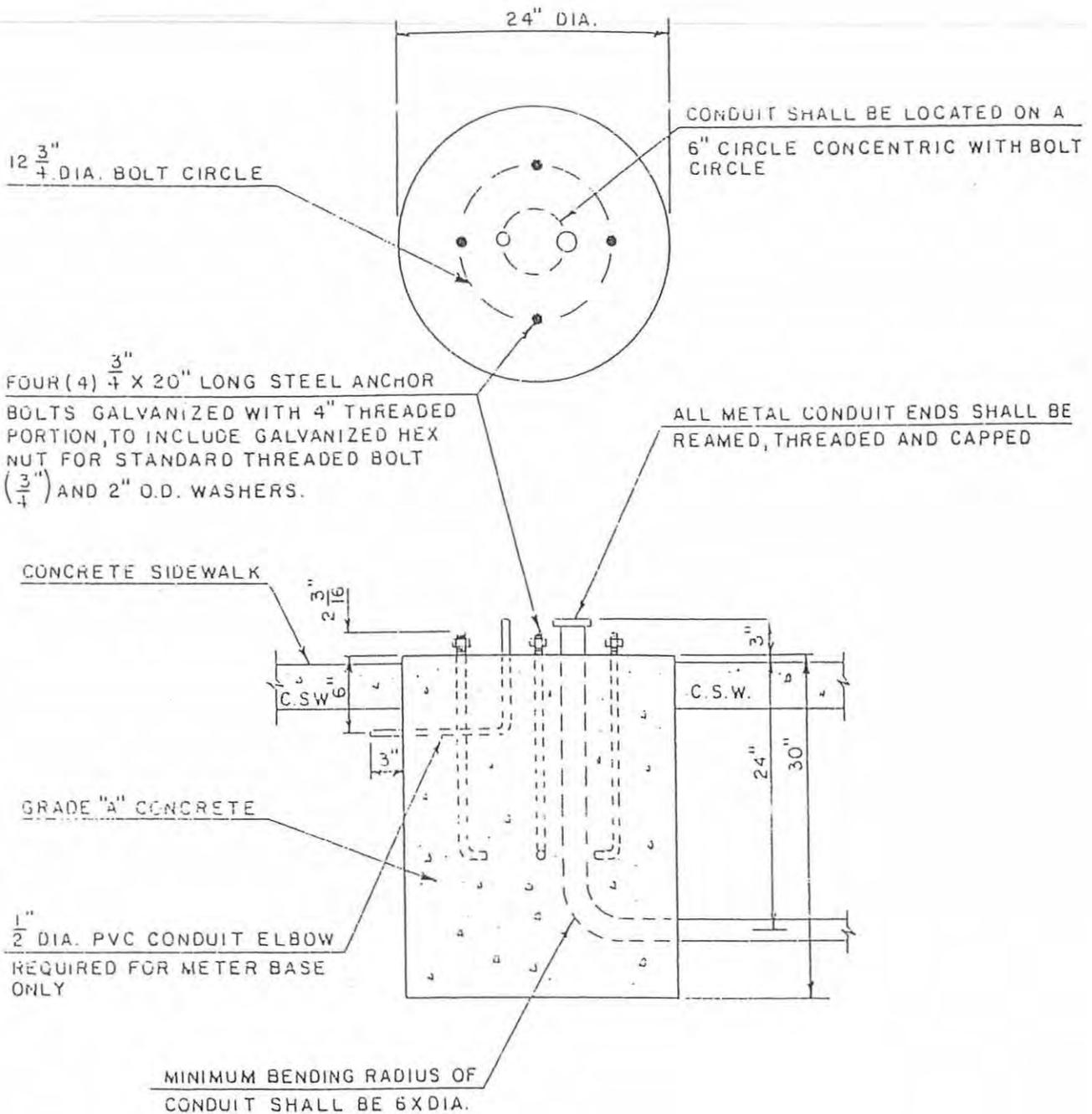
179

T-3 Base

180

Pull Box Detail

181



NOTES:

ANCHOR BOLTS SHALL BE ORIENTED PARALLEL TO ROADWAY.

LOCATION OF BASE SHALL BE A MINIMUM OF 26" FROM BACK OF CURB TO  $\phi$  OF BASE AND 30" FROM END OF RADIUS.

T-1 BASE

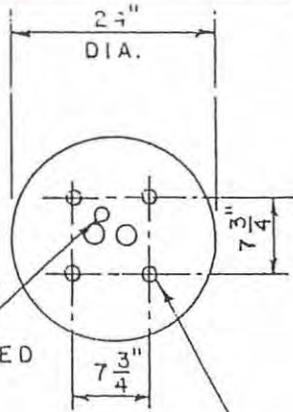
TRAFFIC SIGNALS, CONTROL CABINET  
& METER BASE

NOTES:

ANCHOR BOLTS SHALL BE ORIENTED PARALLEL TO ROADWAY.

LOCATION OF BASE SHALL BE A MINIMUM OF 24" FROM BACK OF CURB TO C OF BASE AND 30" FROM END OF RADIUS

WHEN METAL TRAFFIC CONDUIT IS REQUIRED, ENDS SHALL BE REAMED, THREADED AND CAPPED



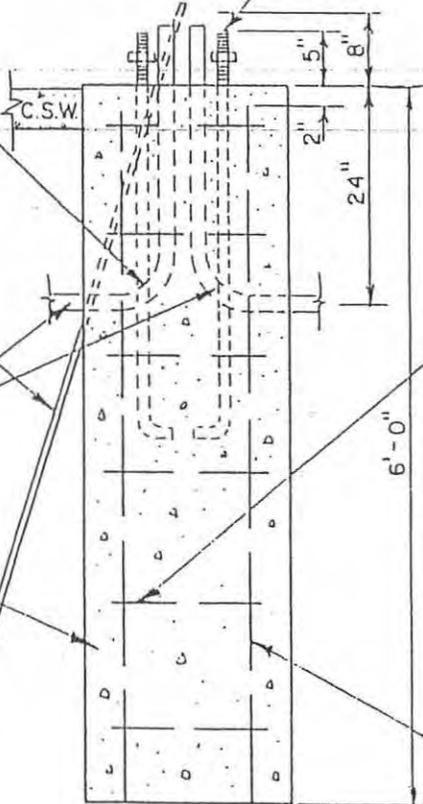
FOUR (4) 1 1/4" DIA. X 48" LONG STEEL ANCHOR BOLTS. 10" THREADED PORTION & NUTS GALVANIZED. 2 NUTS PER BOLT.

MINIMUM BENDING RADIUS OF CONDUIT SHALL BE 6 X DIAMETER

1/2" X 8' JOSLN OR EQUAL COPPER - WELD GROUND ROD

P. V. C. CONDUIT

GRADE "A" CONCRETE

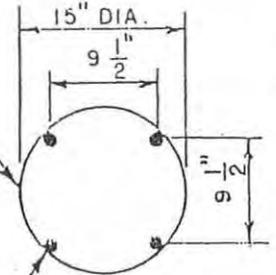


#3 Ø HOOP REINFORCING 12" O. C.

4 - #5 Ø X 70"

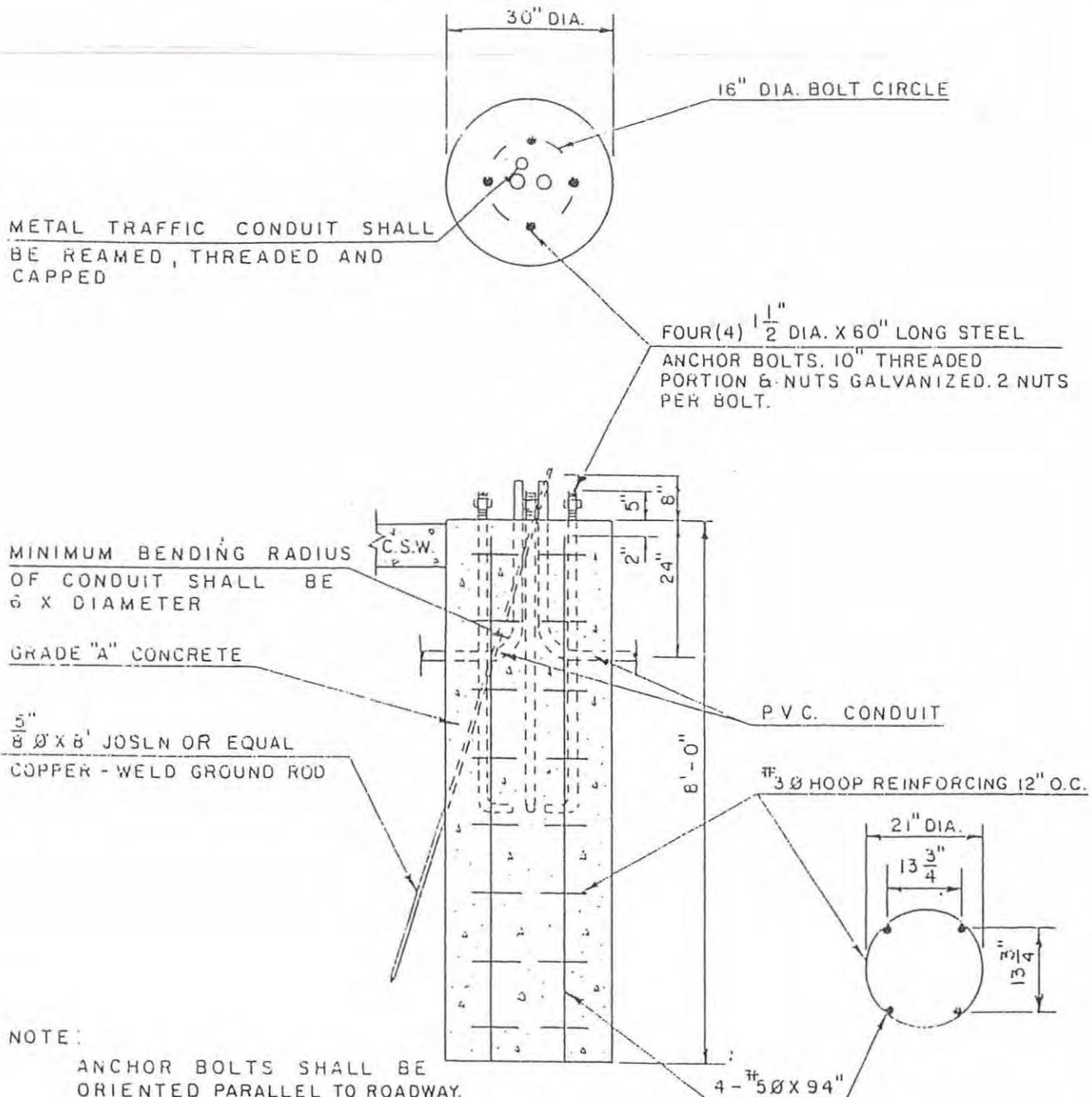
REINFORCING DETAIL

WELD HOOP TOP & BOTTOM REINFORCING TO VERTICAL STEEL REINFORCING OTHER HOOP REINFORCING MAY BE WIRED TO VERTICAL REINFORCING.



T-2 BASE

STREET LIGHTS & STREET LIGHTS WITH 15' MAST ARMS



NOTE:

ANCHOR BOLTS SHALL BE ORIENTED PARALLEL TO ROADWAY.  
 LOCATION OF BASE SHALL BE A MINIMUM OF 27" FROM BACK OF CURB TO C OF BASE AND 30" FROM END OF RADIUS.

REINFORCING DETAIL

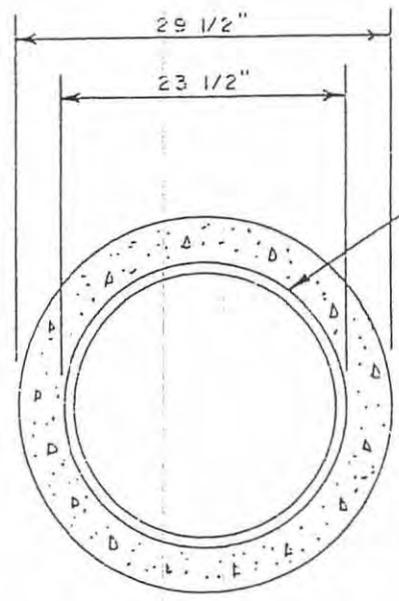
WELD HOOP TOP & BOTTOM REINFORCING TO VERTICAL STEEL REINFORCING OTHER HOOP REINFORCING MAY BE WIRED TO VERTICAL REINFORCING.

T-3 BASE

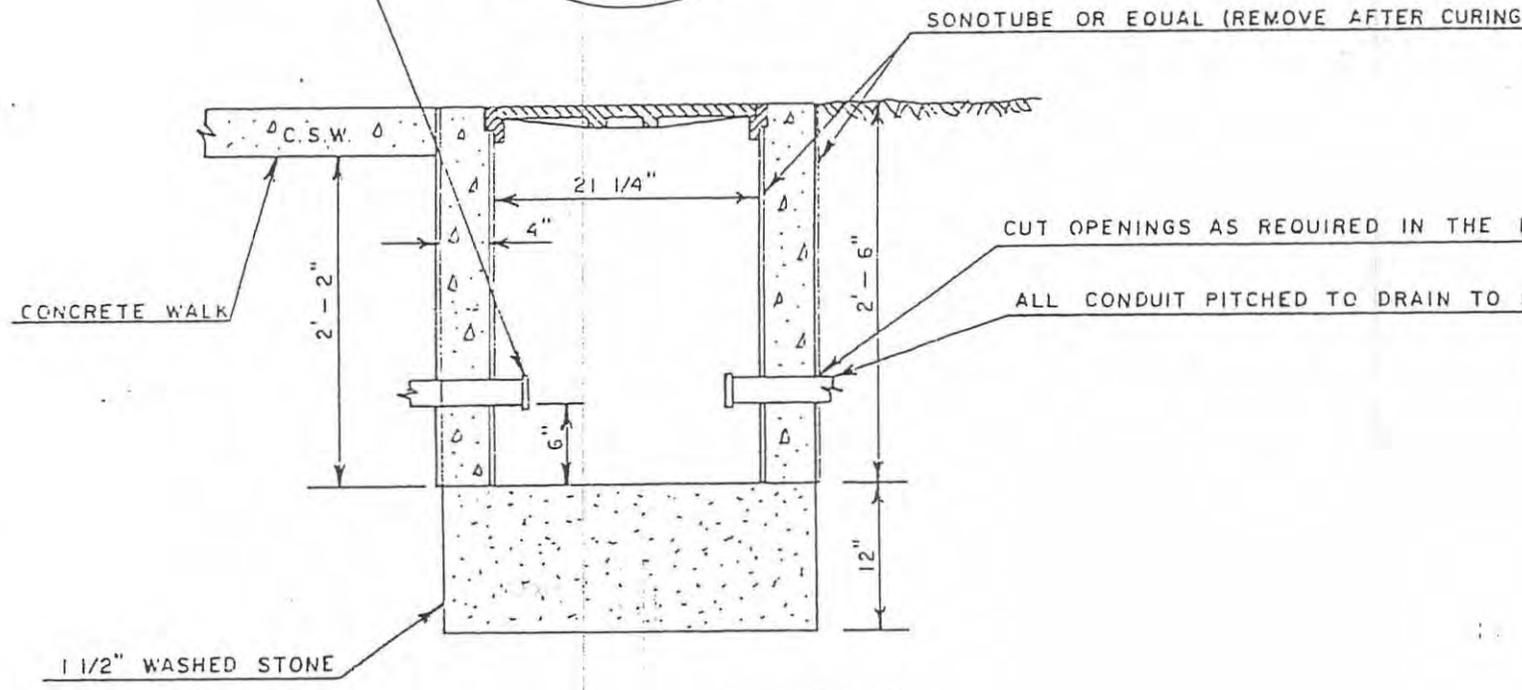
STREET LIGHTS WITH 25'  
 OR 30' MAST ARMS

-181-

ALL METAL CONDUIT ENDS SHALL BE REAMED, THREADED AND CAPPED



NEENAH ADJUSTMENT RING AND SOLID LID (NO. R-1979-A1) OR APPROVED EQUAL



SONOTUBE OR EQUAL (REMOVE AFTER CURING)

CONCRETE WALK

CUT OPENINGS AS REQUIRED IN THE F

ALL CONDUIT PITCHED TO DRAIN TO F

1 1/2" WASHED STONE

PULL BOX DETAIL

# SEWER STANDARDS

SEWER STANDARDSPAGE

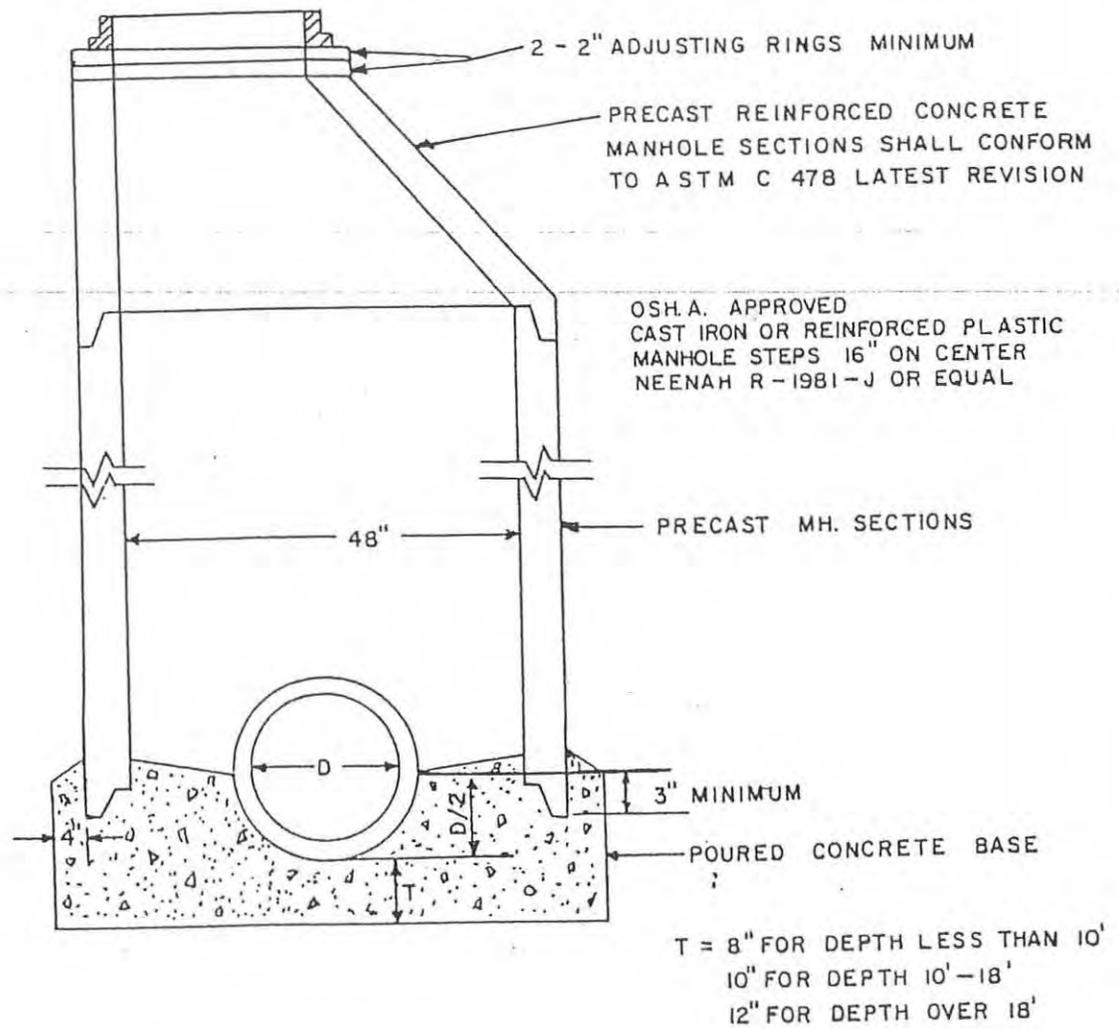
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SEWER STANDARDS - contd.

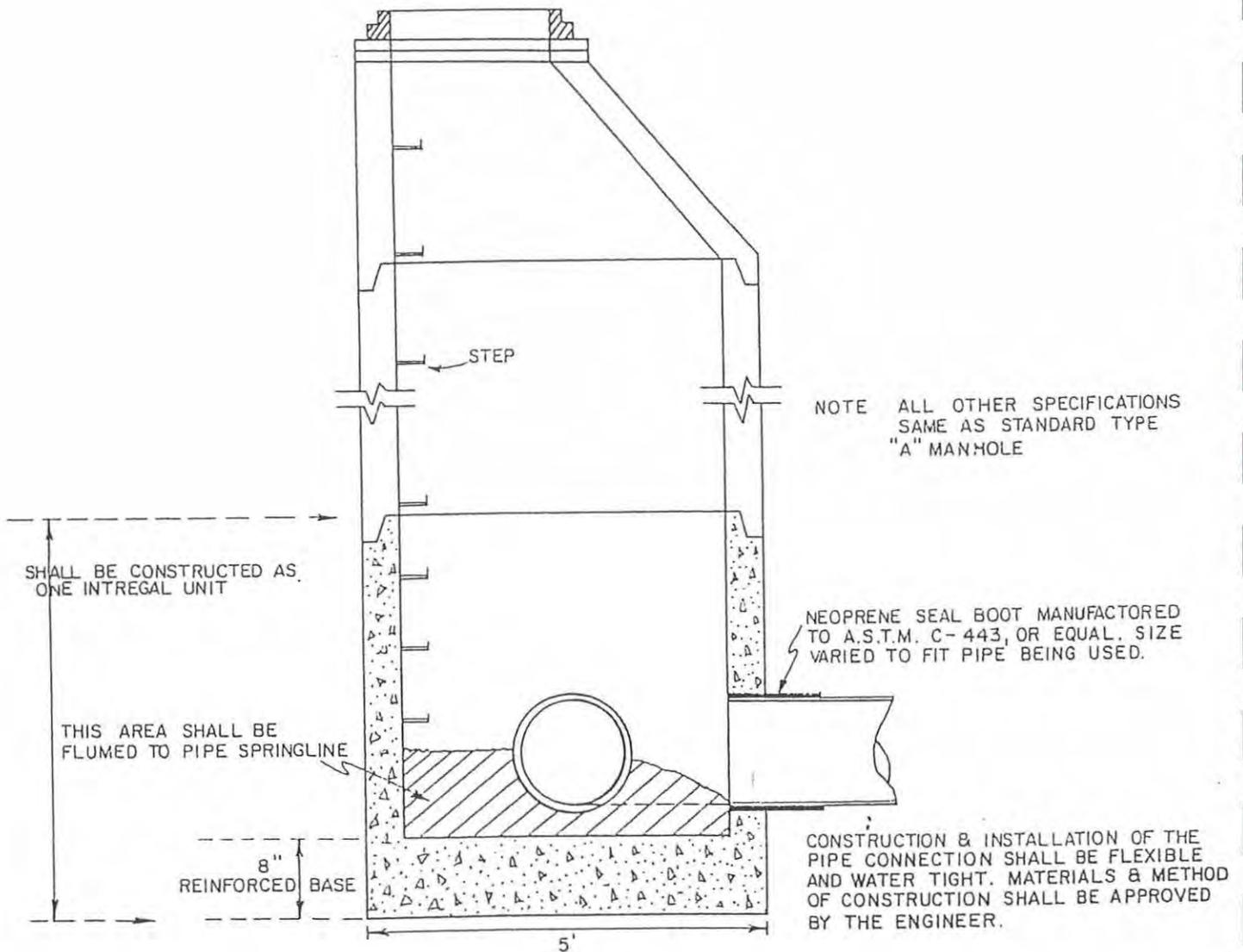
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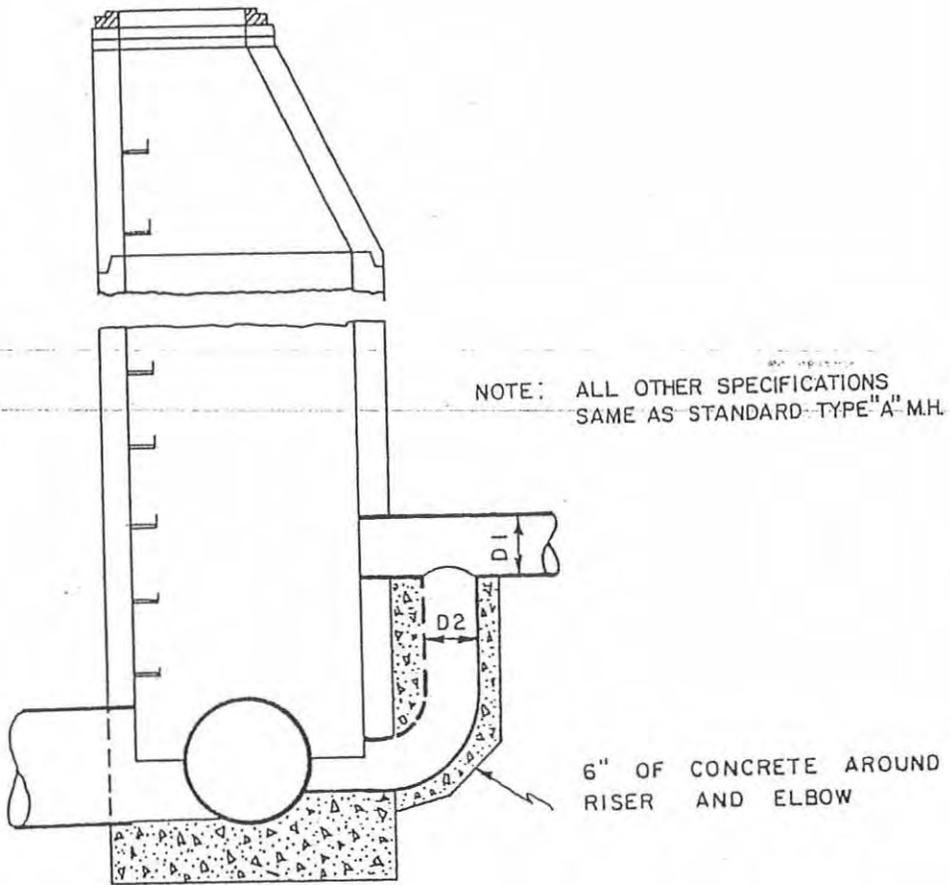
# STANDARD TYPE "A" SANITARY MANHOLE POURED CONCRETE BASE



# STANDARD TYPE "A" SANITARY MANHOLE PRECAST BOTTOM SECTION FOR P.V.C. OR A.B.S. PIPE

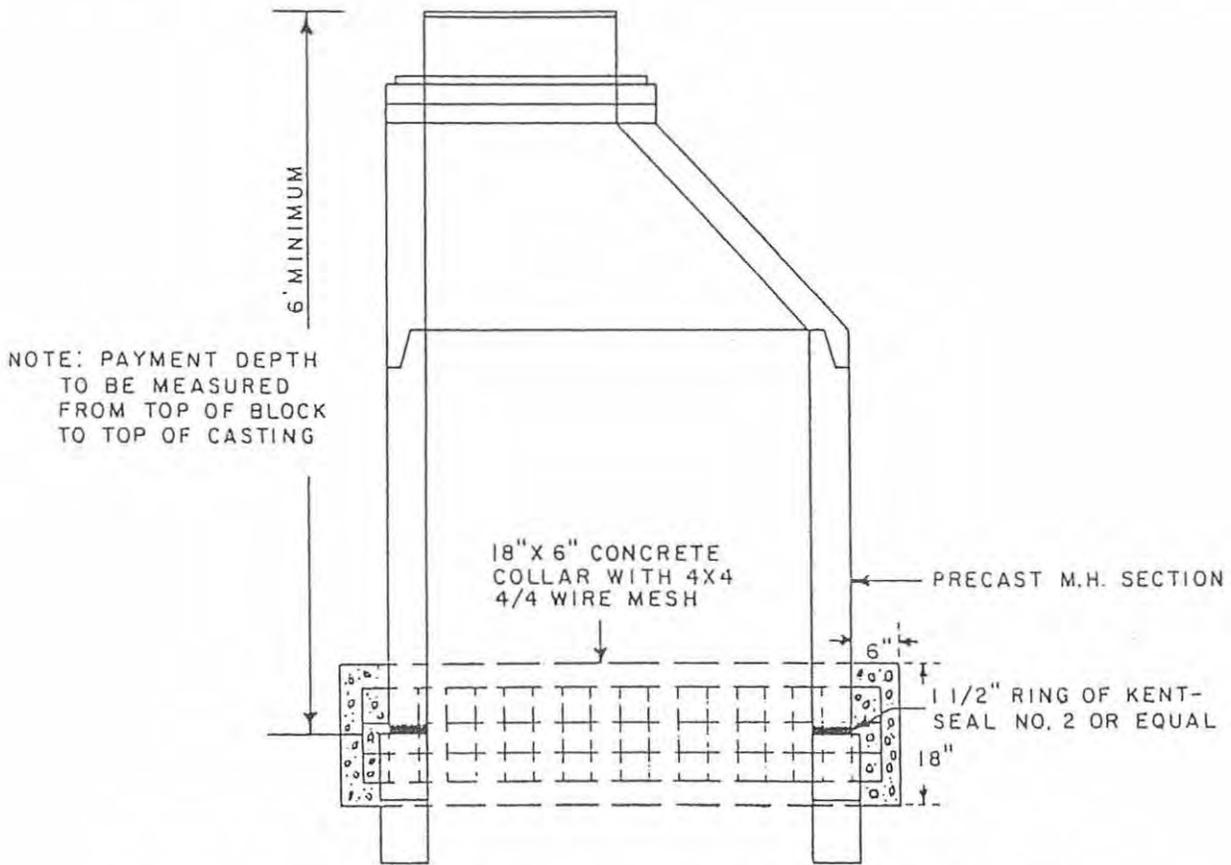


# STANDARD DROP MANHOLE

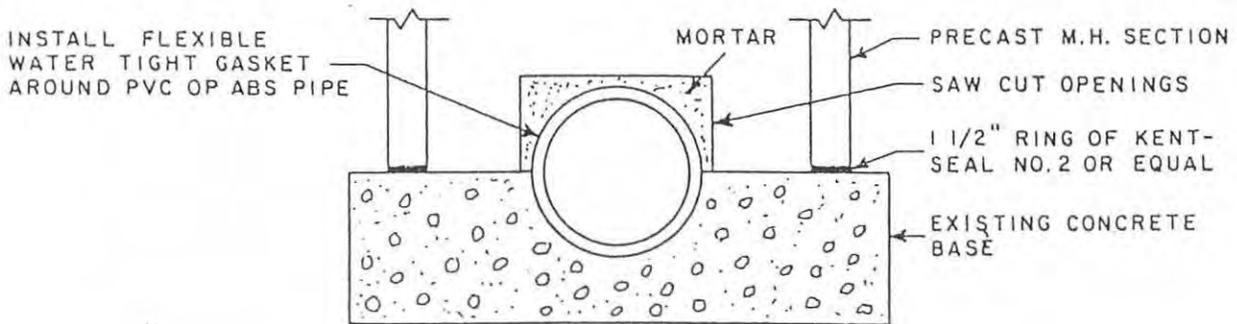


PIPE SCHEDULE FOR DROP MANHOLE	
LATERAL SEWER DIAMETER D1	DROP PIPE DIAMETER D2
24	18
21	15
18	12
15	10
12	10
10	8
8	8

REMOVE AND REPLACE STANDARD TYPE "A"  
 SANITARY MANHOLE UTILIZE EXISTING BLOCK  
 AND/OR BASE



EXISTING M.H. BLOCKS IN GOOD CONDITION



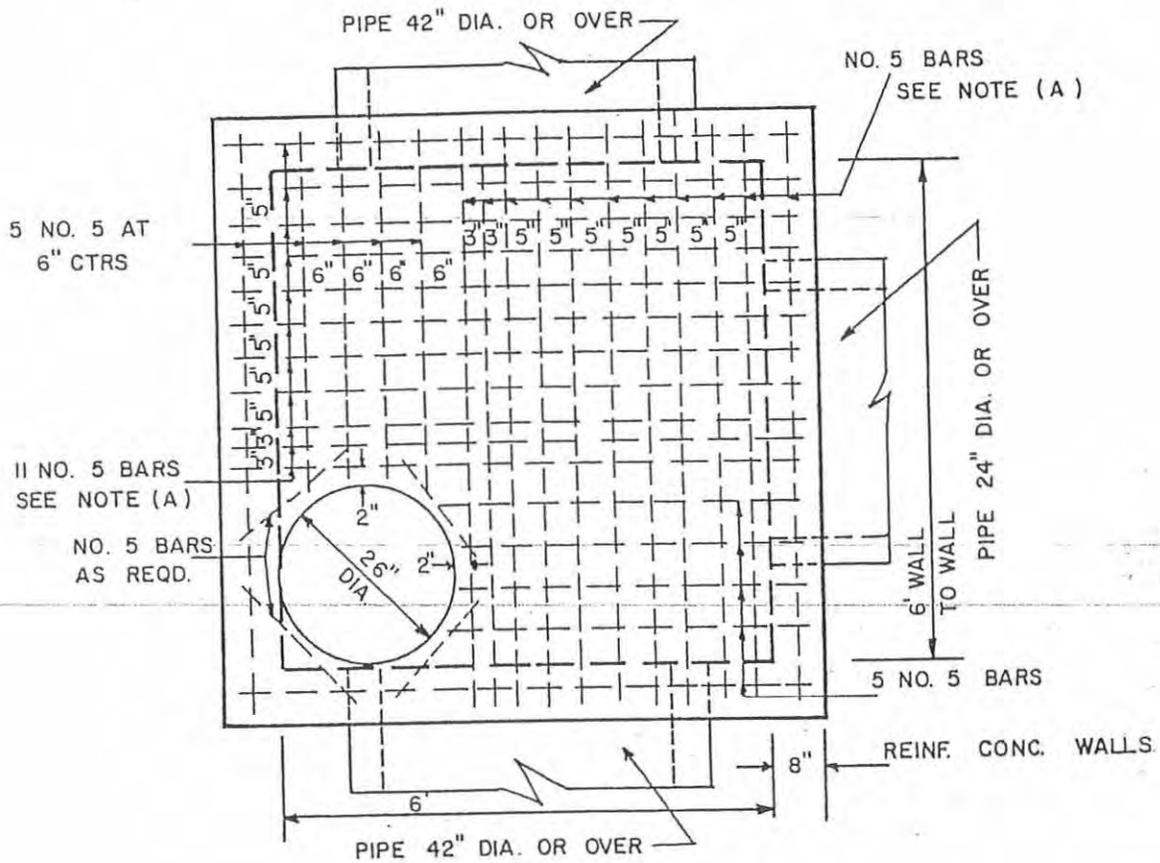
EXISTING CONCRETE BASE IN GOOD CONDITION

NOTE: PAYMENT DEPTH TO BE  
 MEASURED FROM TOP OF  
 CASTING TO INVERT





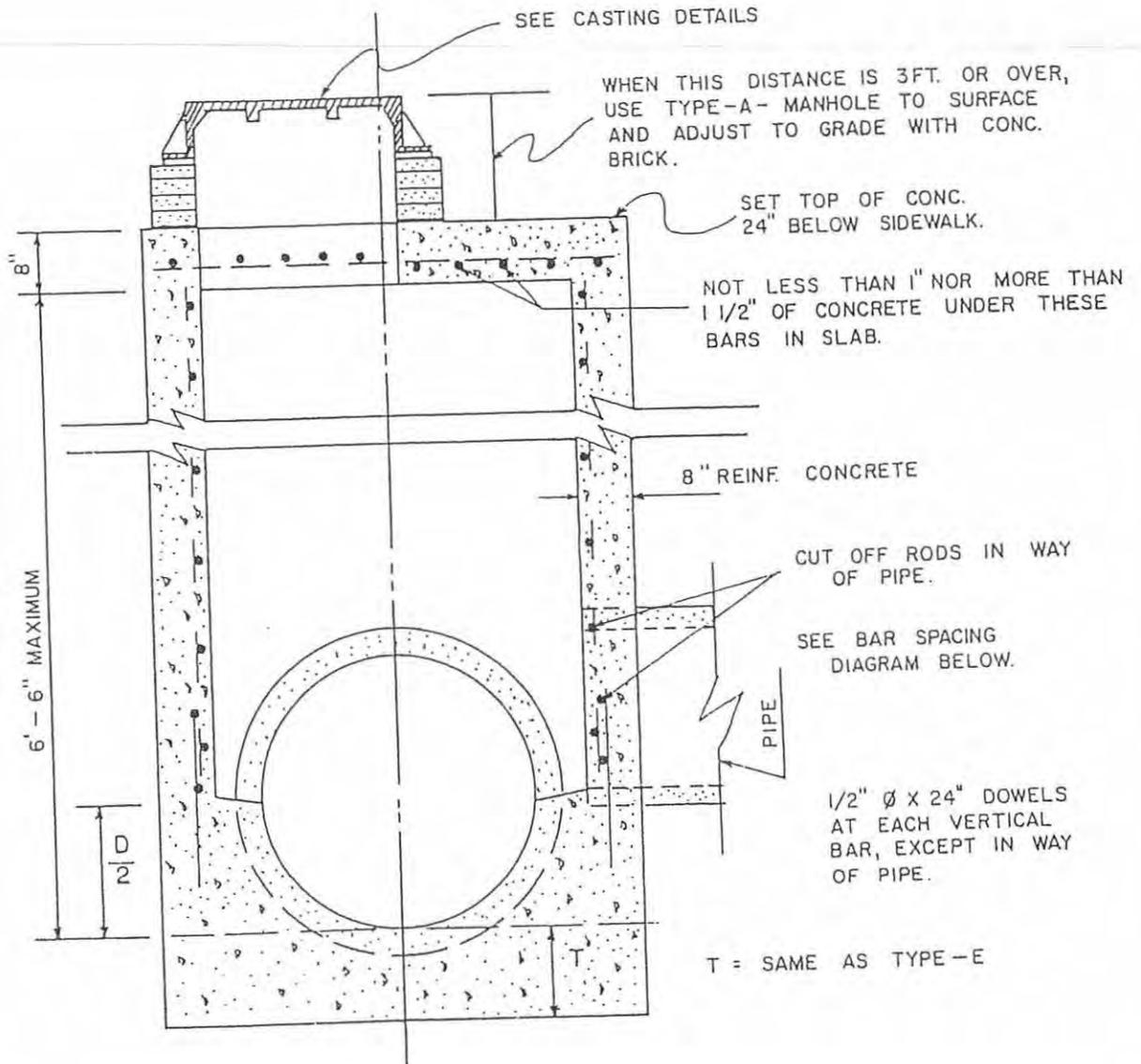
TYPE - D  
6' X 6' INSIDE DIMENS.



TOP VIEW

NOTE - (A)

THE FIRST BAR NEXT TO CIRCLE, SPACE 2" FROM EDGE, THE NEXT TWO 3" CENTERS, THE NEXT SEVEN BARS AT 5" CENTERS, AND THE LAST ONE PLACE OVER CENTER OF WALL. THIS IS TYPICAL OF ALL BARS SIMILARLY LOCATED IN SLAB.



TYPICAL "SECT. A-A"

(APPLYING TO)

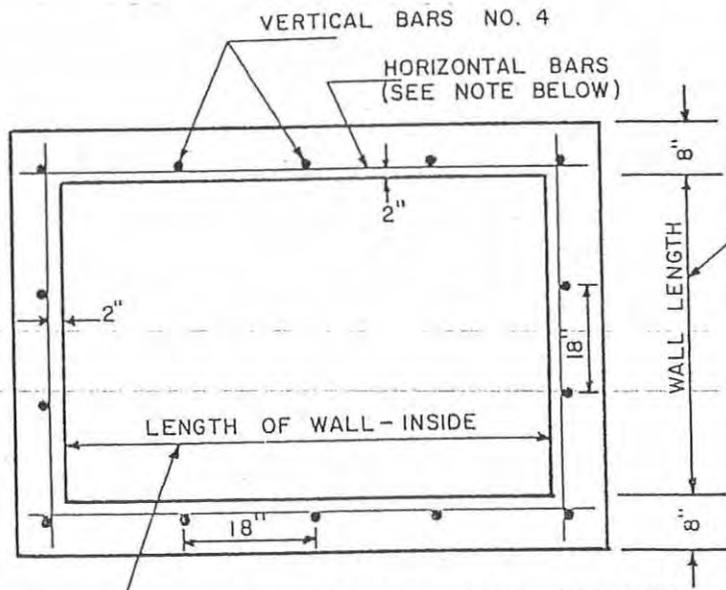
TYPES "B-C & D"

NOTE

WHEN PIPE OPENINGS ARE IN WAY OF BARS, CUT OFF BARS AT THE EDGES OF SAME AND WITHOUT ALTERING THEIR POSITION. KEEP BARS STRAIGHT AND NEVER BEND THEM AROUND PIPE OR OPENINGS

# TYPICAL WALL PLAN

(BAR SPACING DIAGRAM)  
TYPES B-C-D



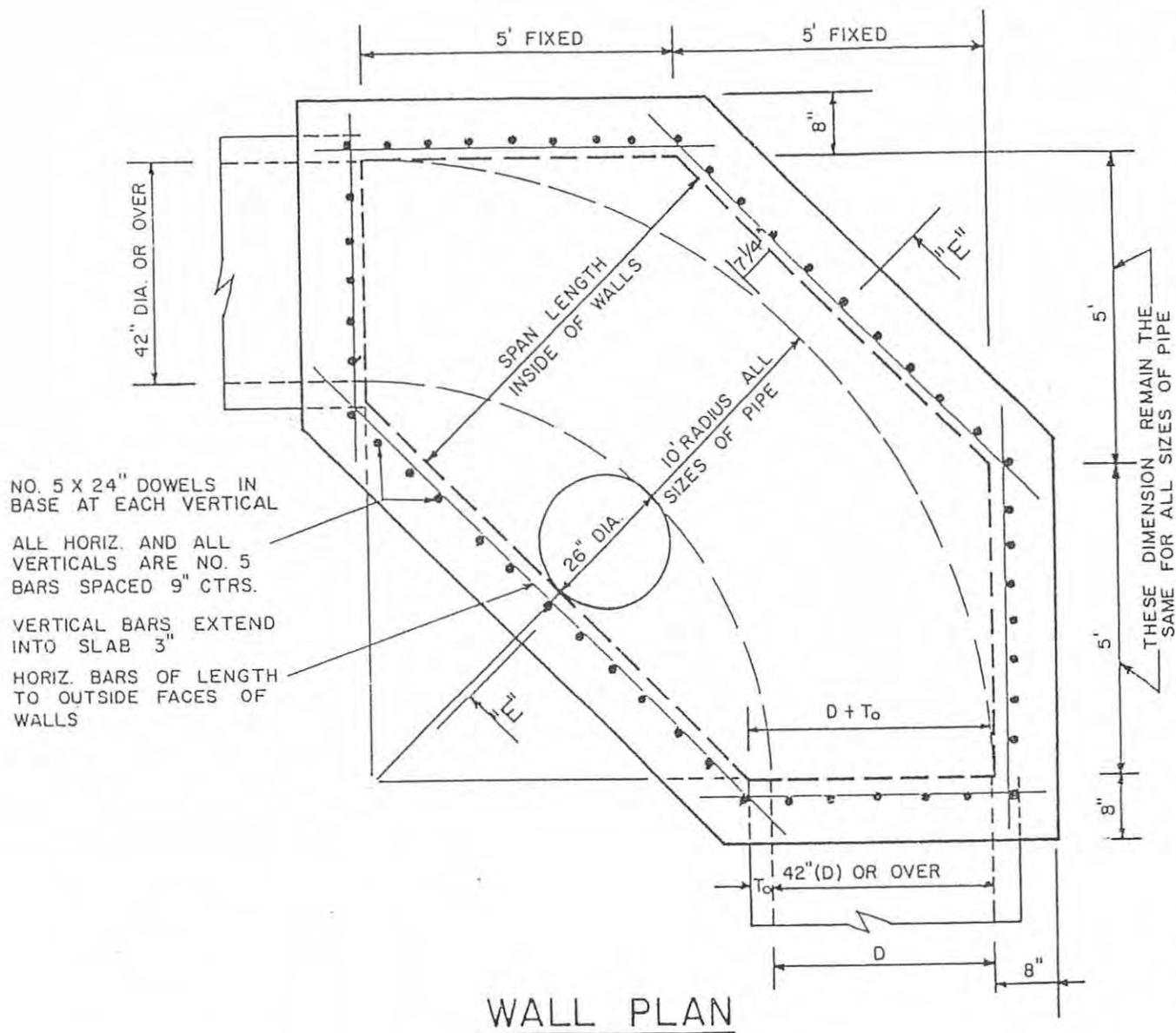
WHEN THIS LENGTH IS 4 FT., HORIZ.  
BARS SHALL BE SIZE NO. 4 AND  
5'-3" LONG AND SPACED 18" CTRS.  
ALL VERTICAL BARS SHALL  
EXTEND 3" INTO TOP OF SLAB

WHEN THIS LENGTH IS 6 FT., HORIZONTAL  
BARS SHALL BE SIZE NO. 5 AND 7'-3"  
LONG, AND SHALL BE SPACED 12" CTRS.  
ALL VERTICAL BARS SHALL BE SIZE NO. 4  
BARS IN WAY OF PIPE SHALL BE CUT  
CLOSE TO PIPE, DO NOT BEND AROUND.

## NOTE

WHEN DEPTH OF WALLS BELOW SURFACE EX-  
CEEDS 10 FT., THE ROD SPACING SHALL BE  
REDUCED AND TO BE DETERMINED BY THE  
ENGINEER.

# TYPE - E



NO. 5 X 24" DOWELS IN  
BASE AT EACH VERTICAL

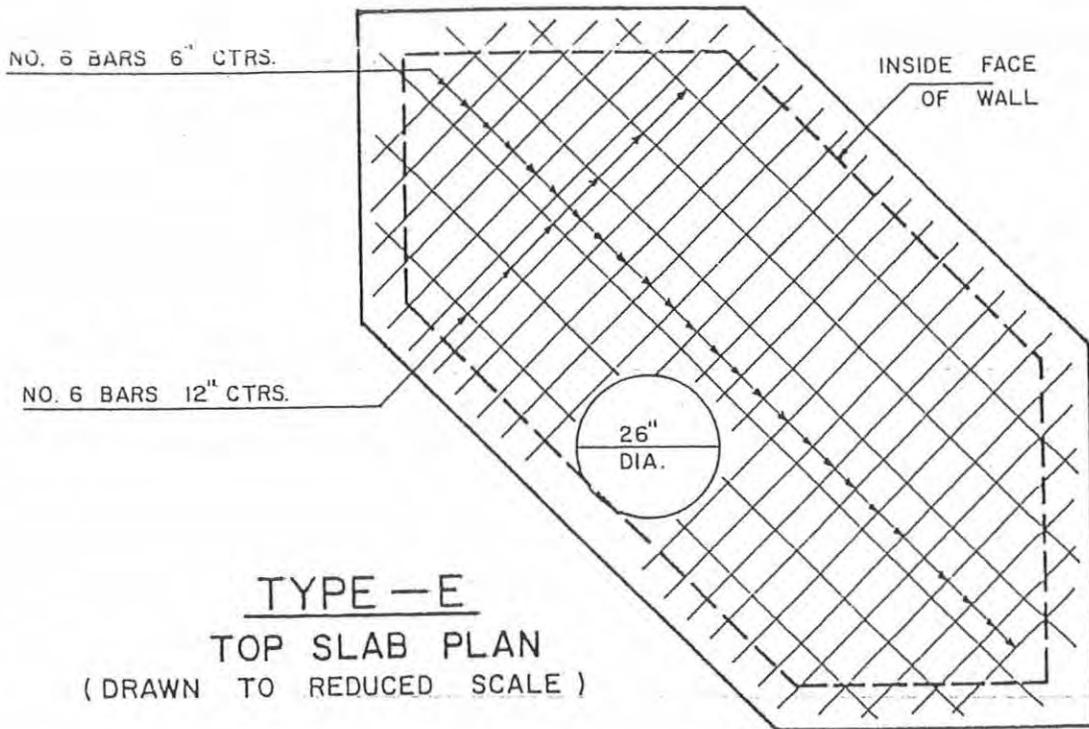
ALL HORIZ. AND ALL  
VERTICALS ARE NO. 5  
BARS SPACED 9" CTRS.

VERTICAL BARS EXTEND  
INTO SLAB 3"

HORIZ. BARS OF LENGTH  
TO OUTSIDE FACES OF  
WALLS

## NOTE

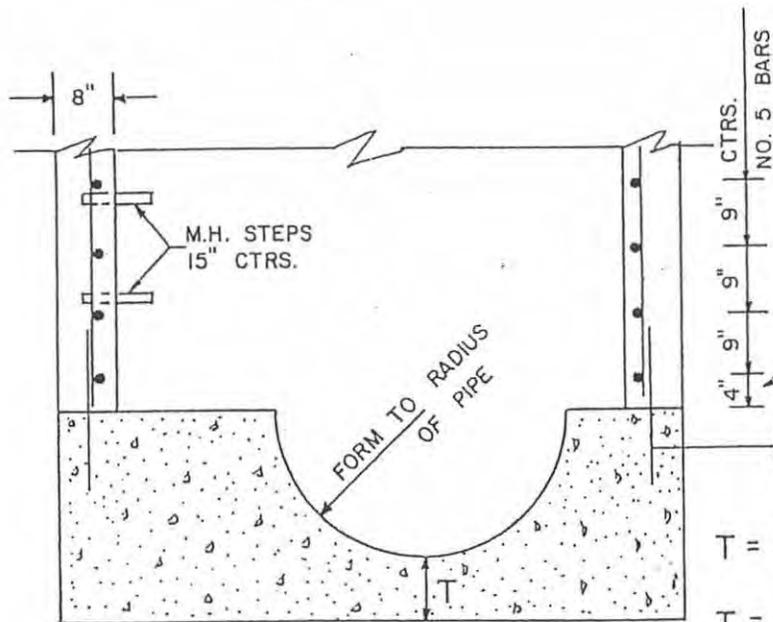
WHEN PIPE OPENINGS ARE IN WAY OF BARS, CUT OFF BARS AT THE EDGES OF SAME AND WITHOUT ALTERING THEIR POSITION. KEEP BARS STRAIGHT AND NEVER BEND THEM AROUND PIPE OR OPENINGS.



**TYPE — E**  
**TOP SLAB PLAN**  
 (DRAWN TO REDUCED SCALE)

TYPE — E  
 SLAB TO BE  
 10" THICK

NOT LESS THAN  
 1" OR MORE THAN  
 1 1/2" OF CONCRETE  
 UNDER BARS IN  
 SLAB.

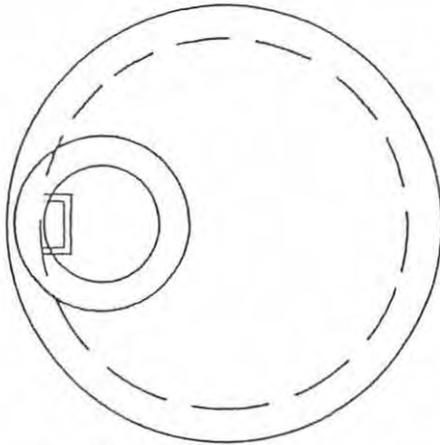


**TYPE — E**  
**PARTIAL SECT. "E-E"**

T = 8" FOR DEPTHS  
 LESS THAN 10'  
 T = 10" FOR DEPTHS  
 10' TO 18'  
 T = 12" FOR DEPTHS  
 OVER 18'

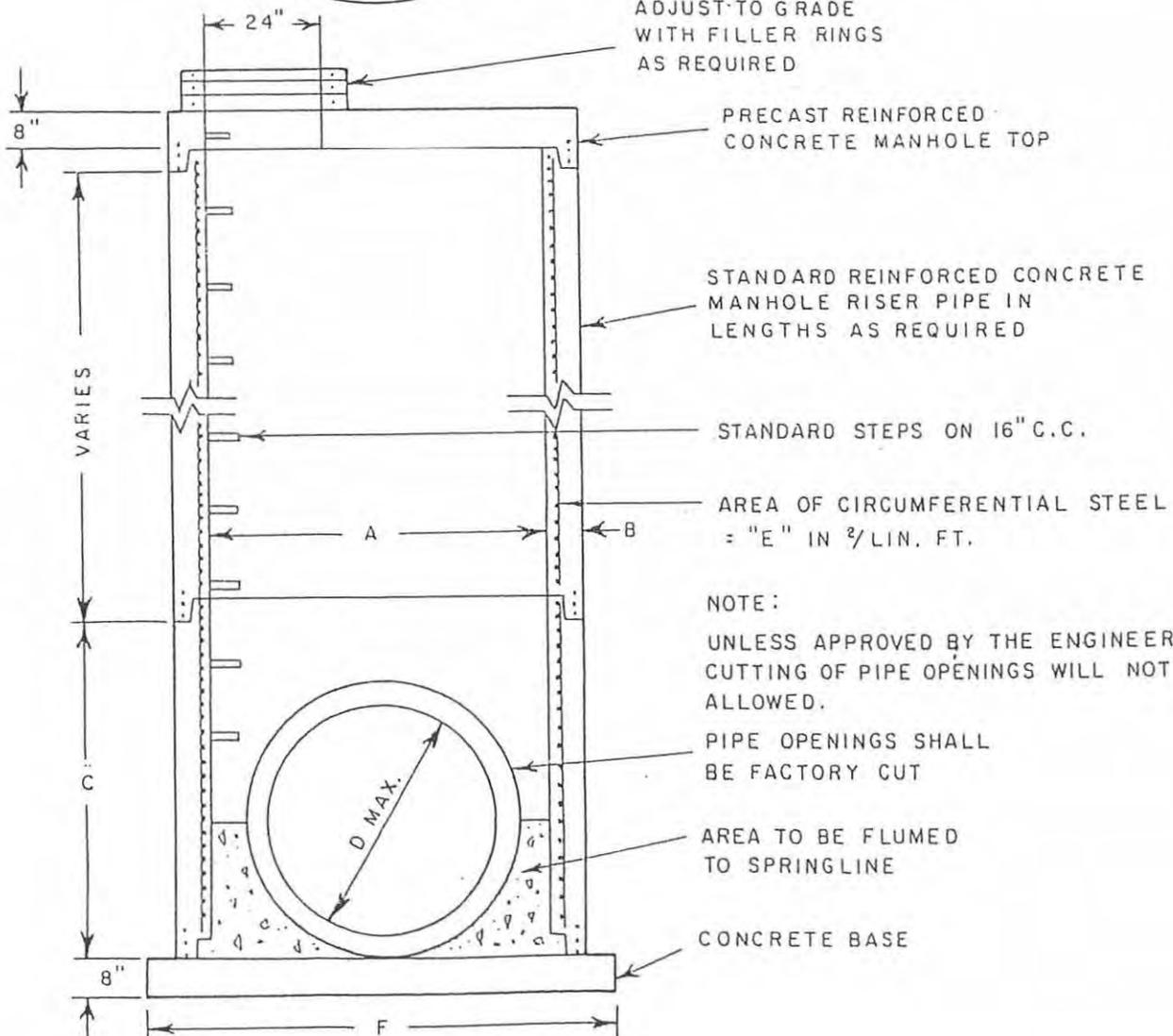
# TYPICAL PRECAST MANHOLE WITH FLAT TOP

( APPLYING TO )  
48", 60" & 72" DIAMETER



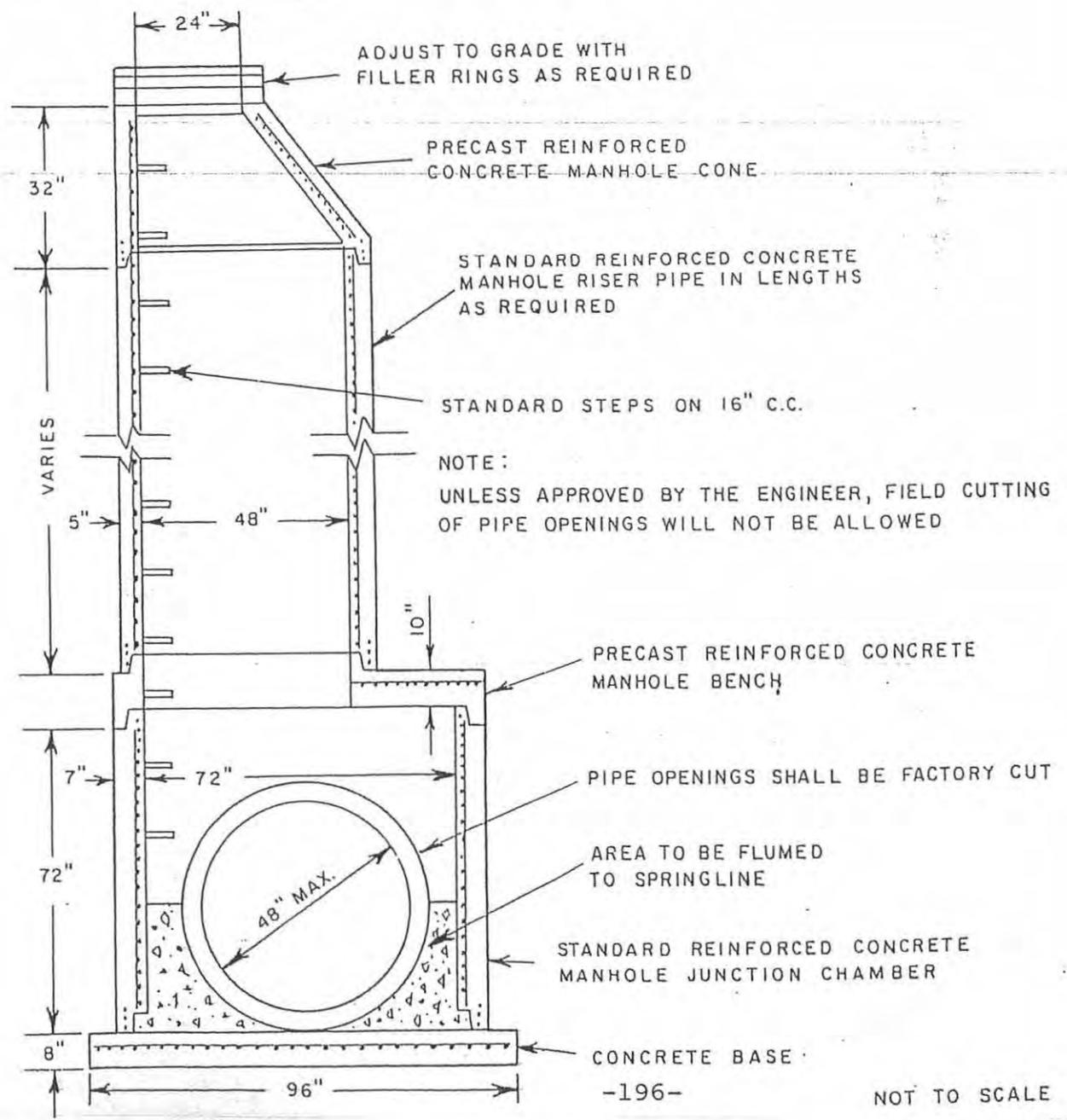
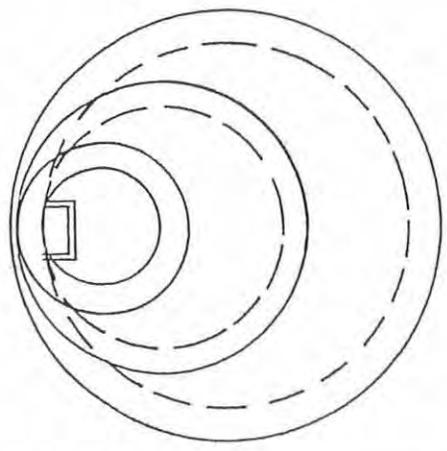
TABLE

A	B	C	D	E	F
48"	5"	4'-0"	24"	0.12	5'-8"
60"	6"	5'-4"	36"	0.17	6'-8"
72"	7"	6'-0"	48"	0.17	8'-0"



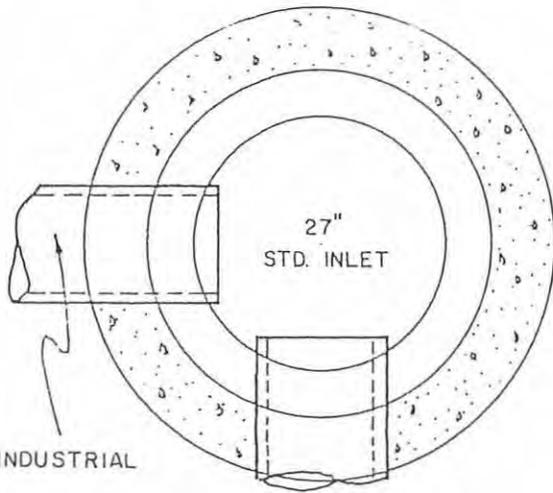
NOTE:  
UNLESS APPROVED BY THE ENGINEER, FIELD CUTTING OF PIPE OPENINGS WILL NOT BE ALLOWED.  
PIPE OPENINGS SHALL BE FACTORY CUT  
AREA TO BE FLUMED TO SPRINGLINE  
CONCRETE BASE

# STANDARD MANHOLE WITH JUNCTION CHAMBER



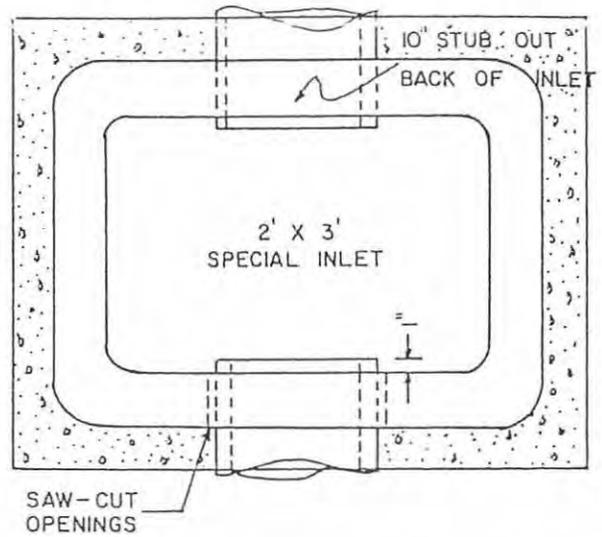
GB-120

NEENAH R-3080-GB TYPE DR OR DL GRATE  
OPEN CURB BOX  
SEMI ROLL 3" RADIUS OR EQUAL



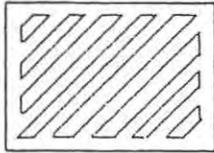
GB-140

NEENAH R-3246-GB OR EQUAL  
SLOTTED GRATE TYPE DR OR DL

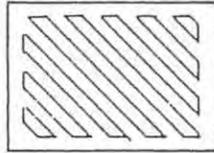


NOTE:

UNDERDRAIN REQUIRED SEE DETAIL  
"UNDERDRAIN FOR INLETS"



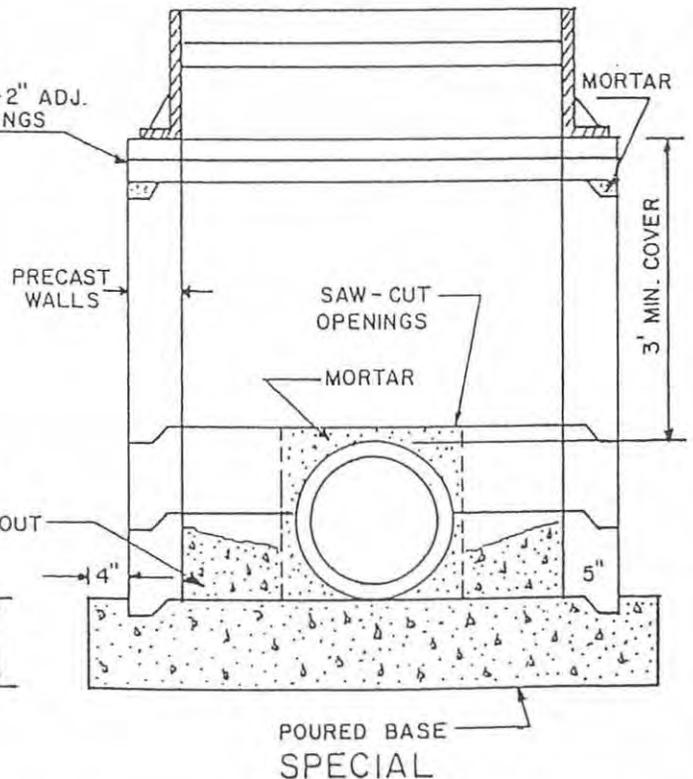
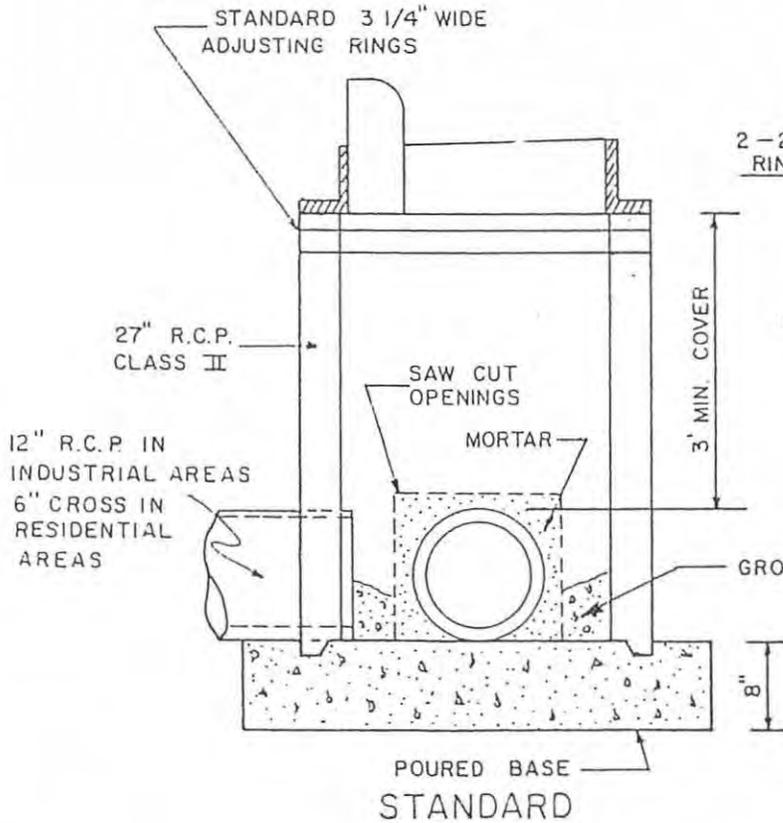
TYPE DR



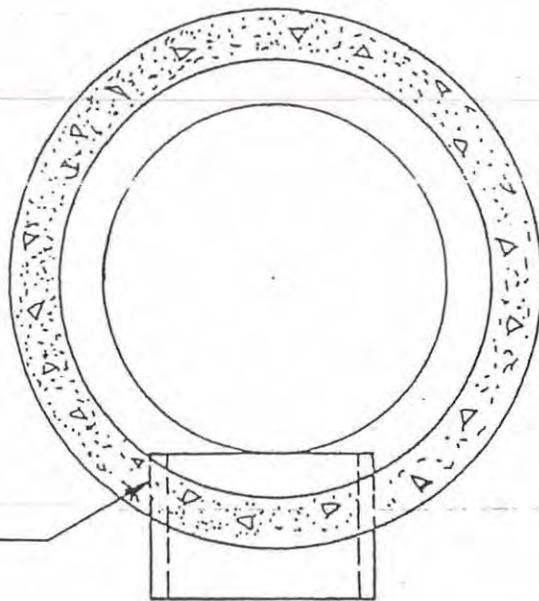
TYPE DL

NOTE:

ALL JOINTS TO BE MORTARED.



# INLETS

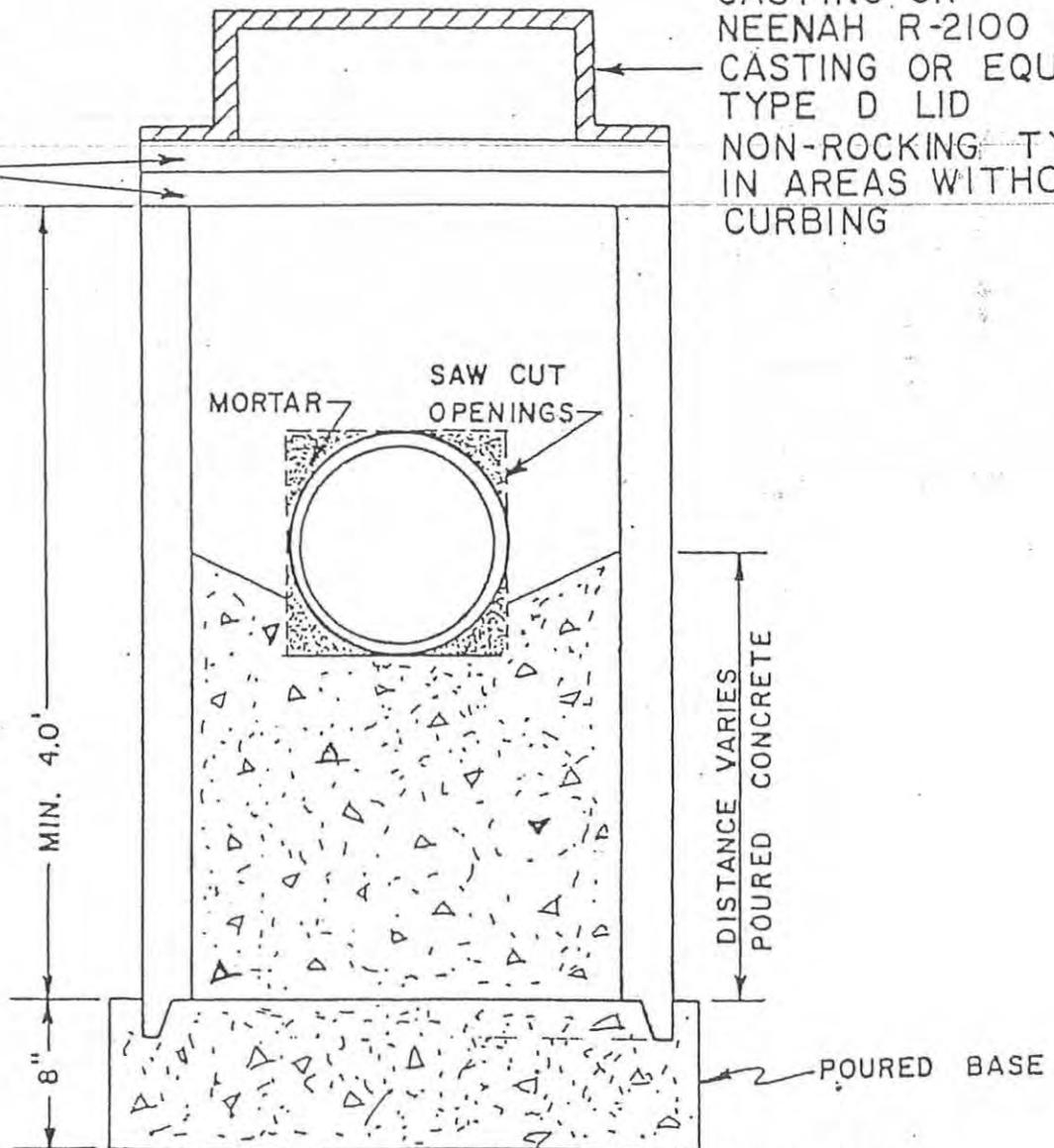


NOTE: UNDERDRAIN REQUIRED  
SEE DETAIL  
"UNDERDRAIN FOR INLETS"

SAW CUT  
OPENINGS

STANDARD CURB  
CASTING OR  
NEENAH R-2100  
CASTING OR EQUAL  
TYPE D LID  
NON-ROCKING TYPE  
IN AREAS WITHOUT  
CURBING

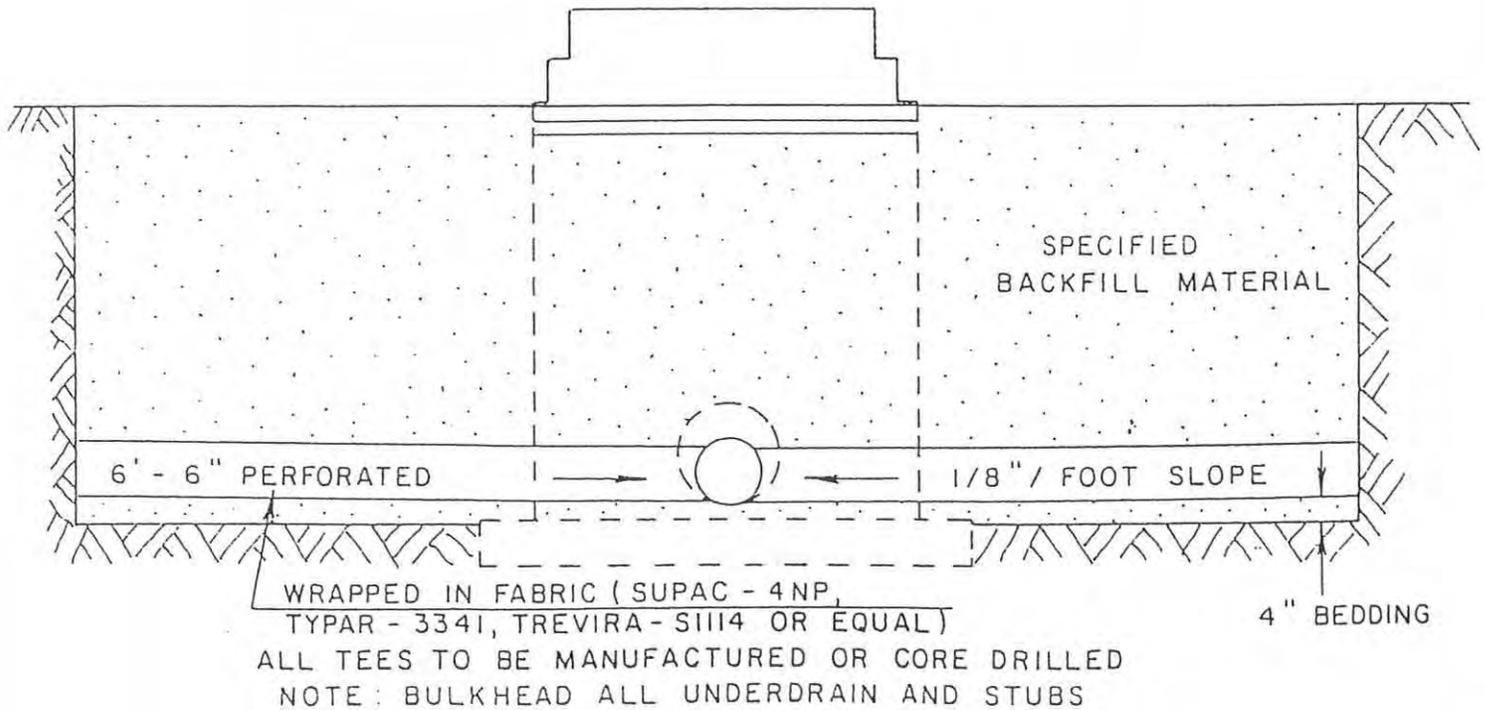
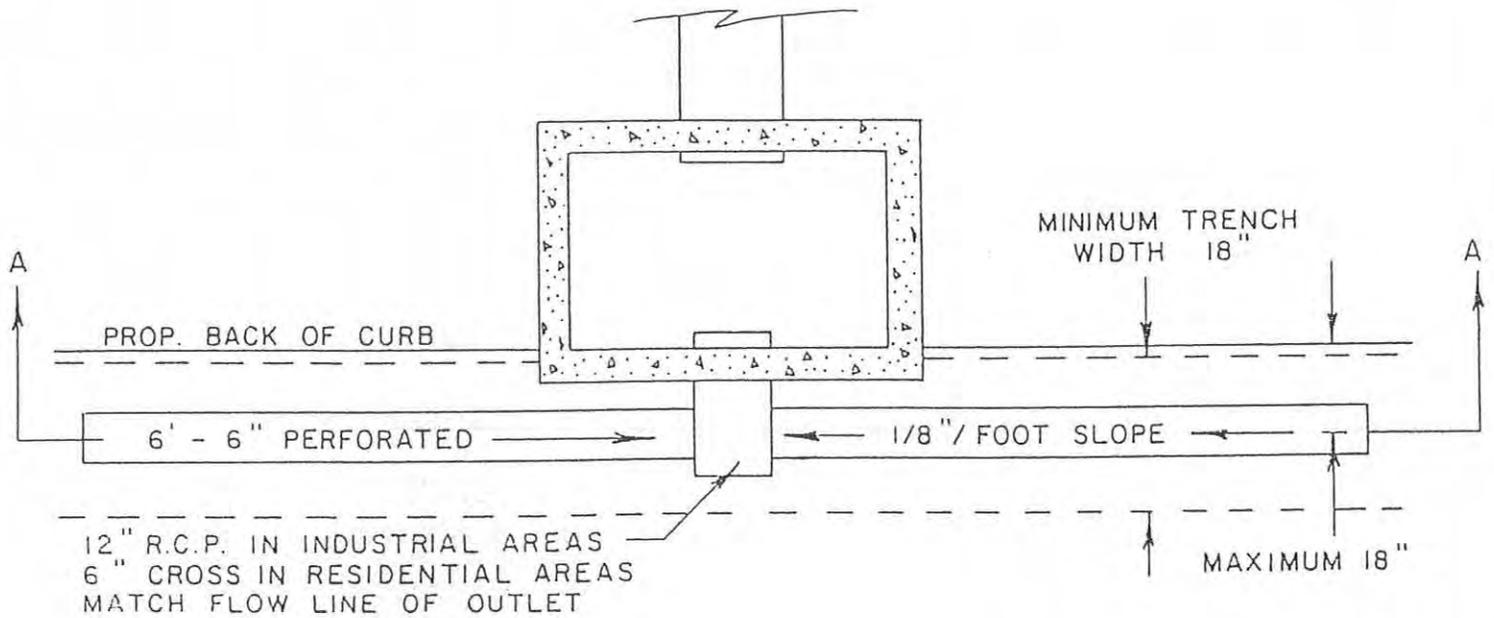
STD. M.H.  
ADJUSTING  
RINGS



MODIFIED STANDARD & SPECIAL  
INLET DETAIL

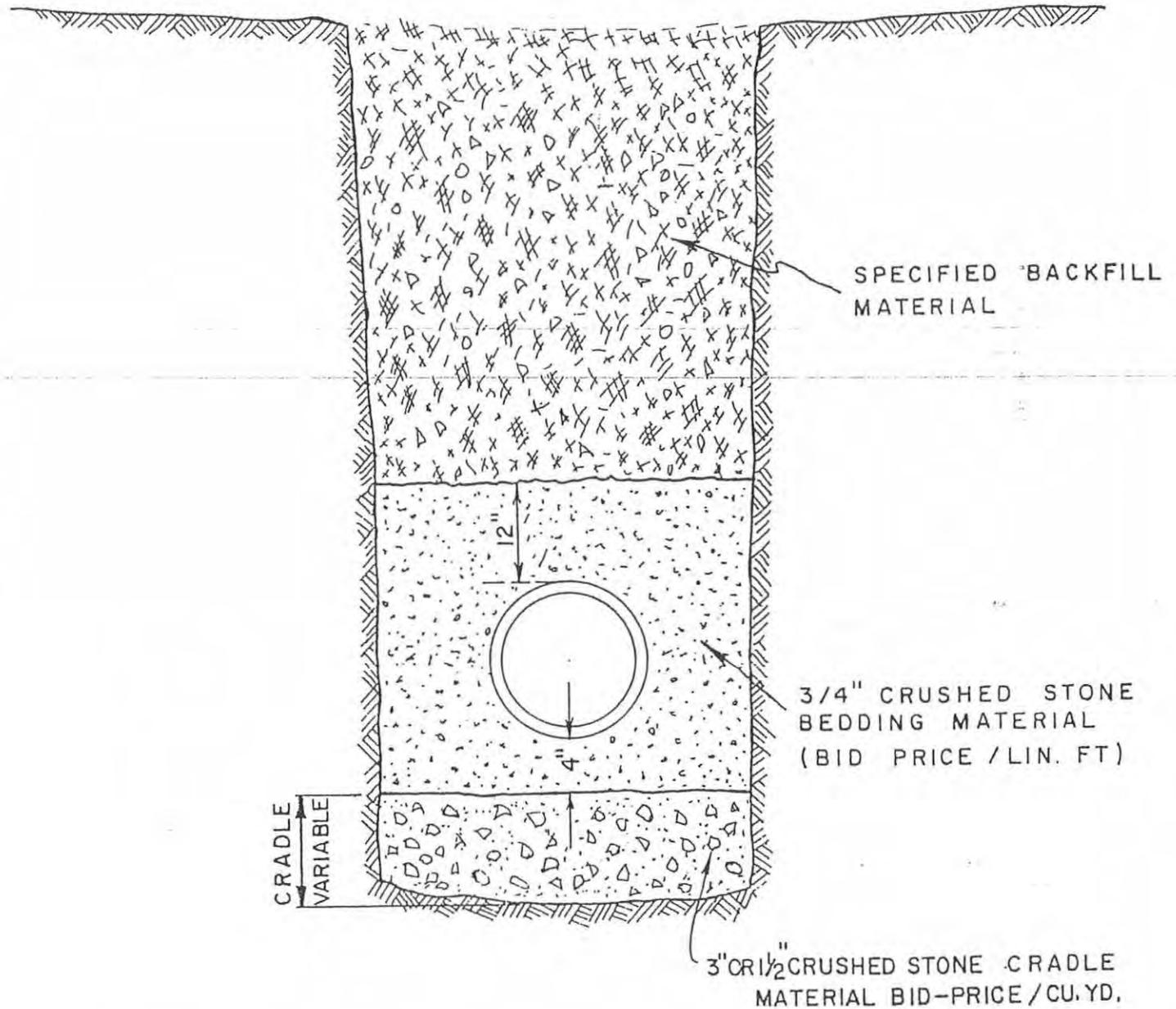
# UNDERDRAIN FOR INLETS

All standard and special inlets will be constructed with 6-inch perforated underdrain attached, as shown. Cost is to be included in the bid price of standard or special inlet.

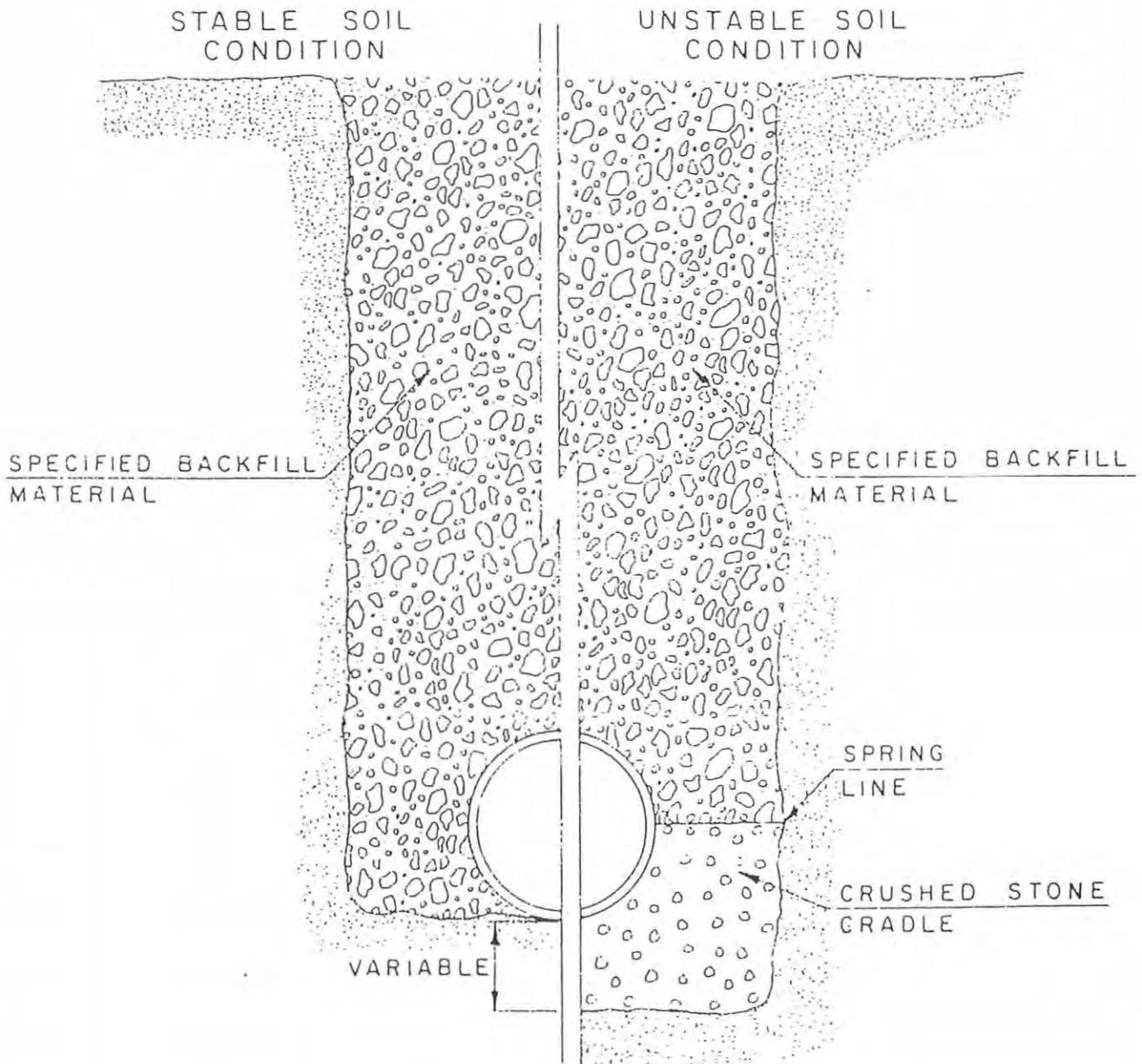


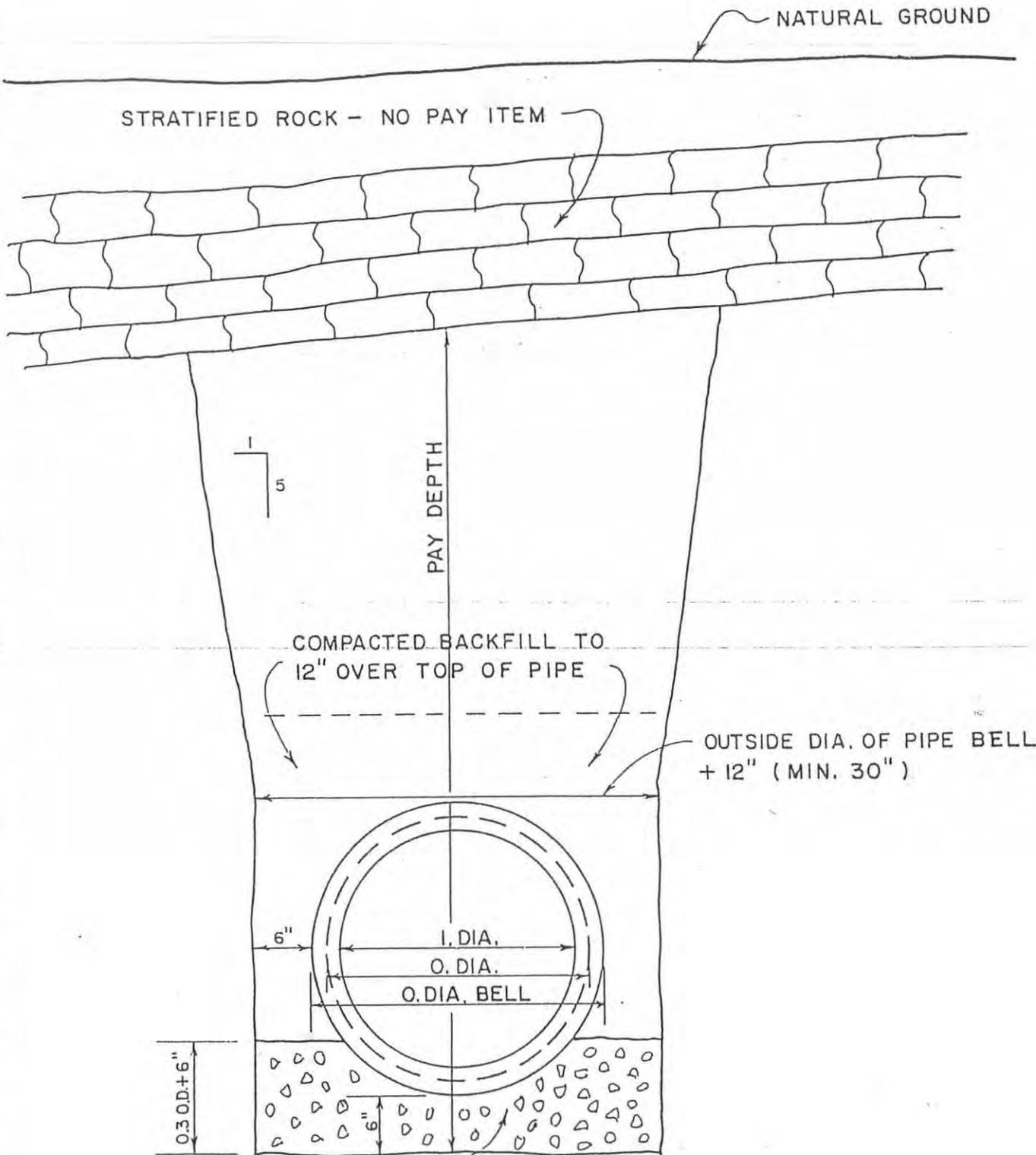
SECTION A - A

# CRUSHED STONE DETAIL FOR SANITARY SEWERS



# BACKFILL REQUIREMENT FOR STORM SEWER

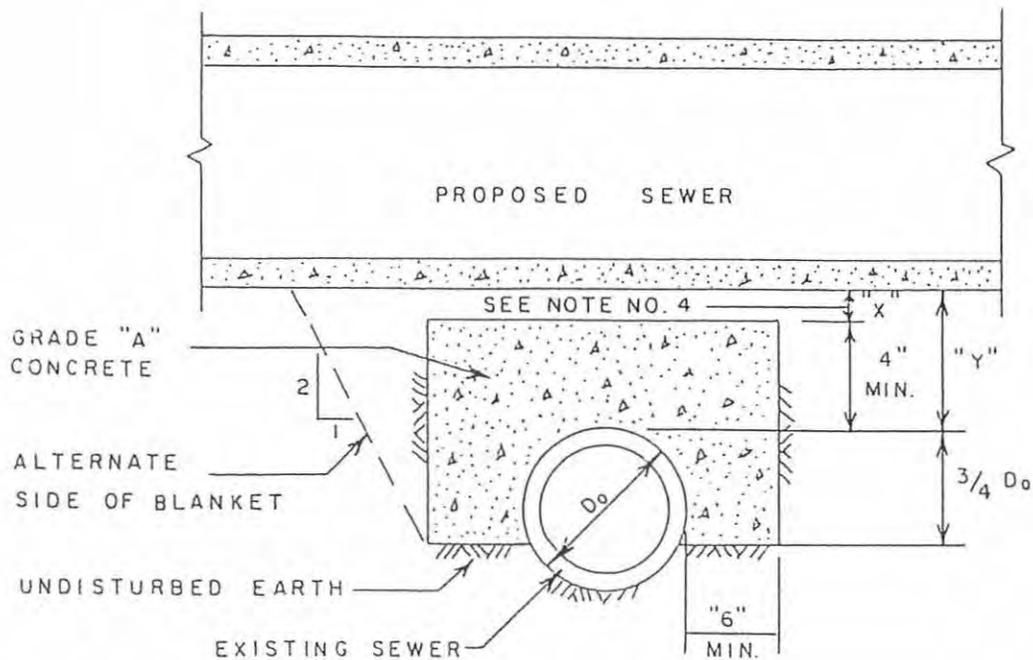




CRUSHED STONE OR PEA GRAVEL AS DETERMINED BY THE ENGINEER. COST OF CRUSHED STONE OR PEA GRAVEL CUSHION, IN PAID ROCK EXCAVATION AREAS, SHALL BE INCLUDED IN PRICE PER CU. YD. OF ROCK EXCAVATION.

## ROCK EXCAVATION DETAIL

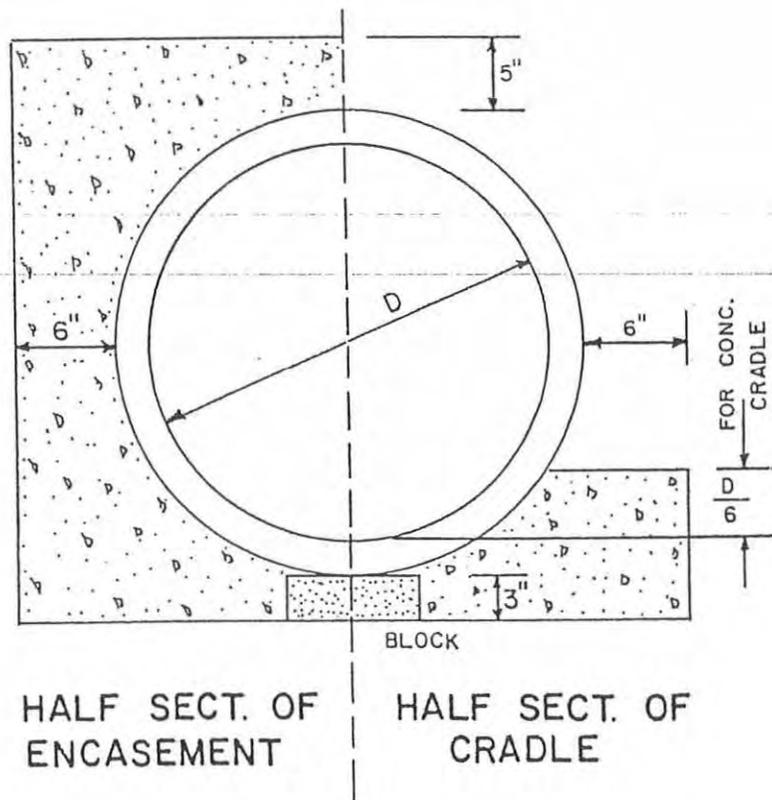
# CONCRETE BLANKET DETAIL



## NOTES:

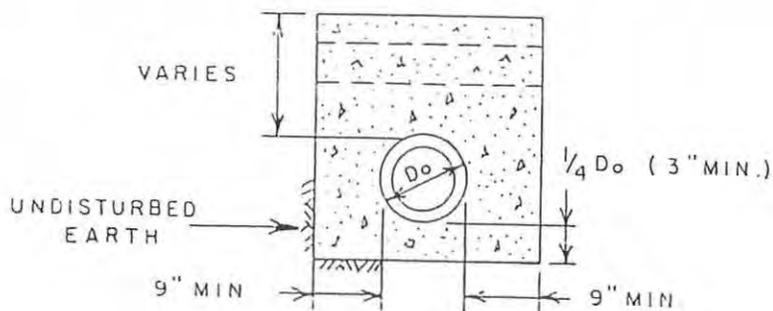
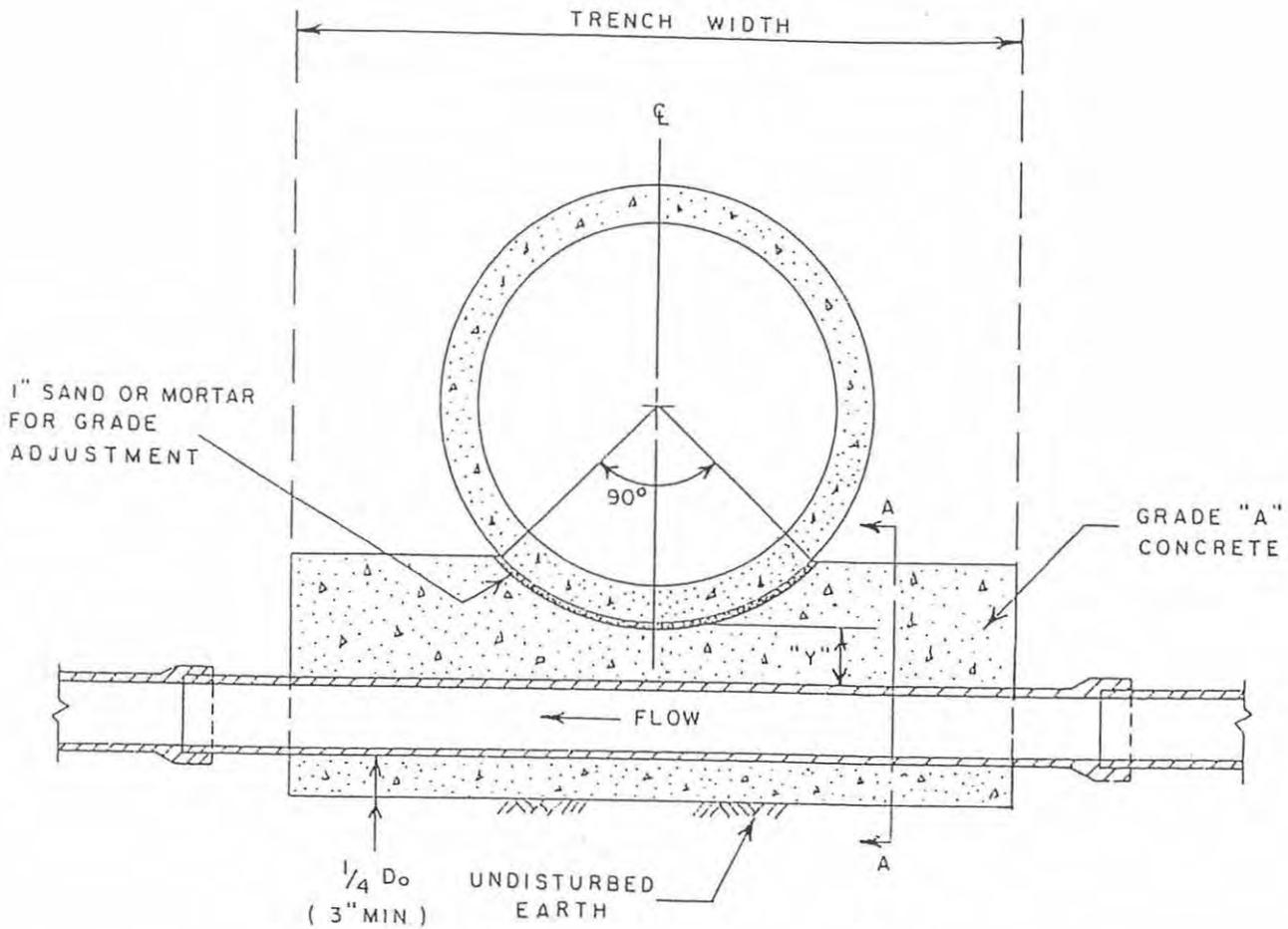
1. Concrete blanket shall be installed over existing sewers with diameters ( $D_o$ ) from 4" to 24" when "Y" is less than 18" or when ordered by the Engineer.
2. The blanketing shall extend across the full width of trench excavation.
3. Unless otherwise directed by the Engineer, concrete blanket shall be placed at least 24 hours before the pipe is placed.
4. Where pipe crosses over an existing sewer, "X" equal to a minimum of  $\frac{1}{12}$  O.D. (outside diameter) of the crossing pipe shall be provided for bedding material where possible. Otherwise the entire top surface of the concrete blanket shall be raised to make contact with the lower 90° of the perimeter of the crossing pipe (See Concrete Encasement Detail).
5. Concrete blanket shall not be used where "Y" is less than 6".

# CONCRETE CRADLE & ENCASEMENT



CONCRETE TO BE CLASS "A" 6 BAG  
MIX PER CU. YD. OF CONCRETE

# CONCRETE ENCASEMENT DETAIL



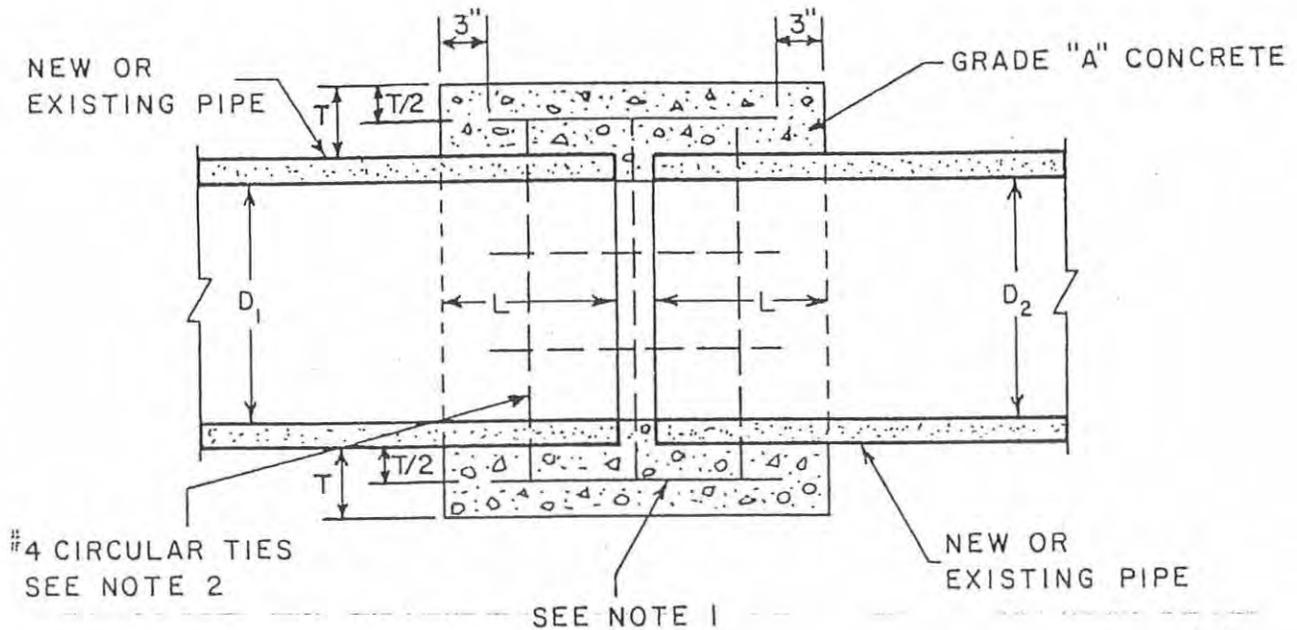
SECTION A-A

NO SCALE

## NOTES:

1. Concrete encasement shall be installed over sewers with diameters ( $D_o$ ) from 4" to 24" when "Y" is less than 6" or when ordered by the Engineer.
2. The encasement shall make contact with the lower 90° of pipe perimeter of the crossing pipe.

# STORM SEWER CONCRETE COLLAR DETAIL



D*	L	T
12"	12"	4"
15"	12"	4"
18"	12"	5"
21"	12"	5"
24"	12"	6"
27"	12"	7"
30"	12"	7"
36"	18"	9"
42"	18"	9"
48"	18"	10"
54"	18"	10"
60"	21"	12"
66"	21"	12"

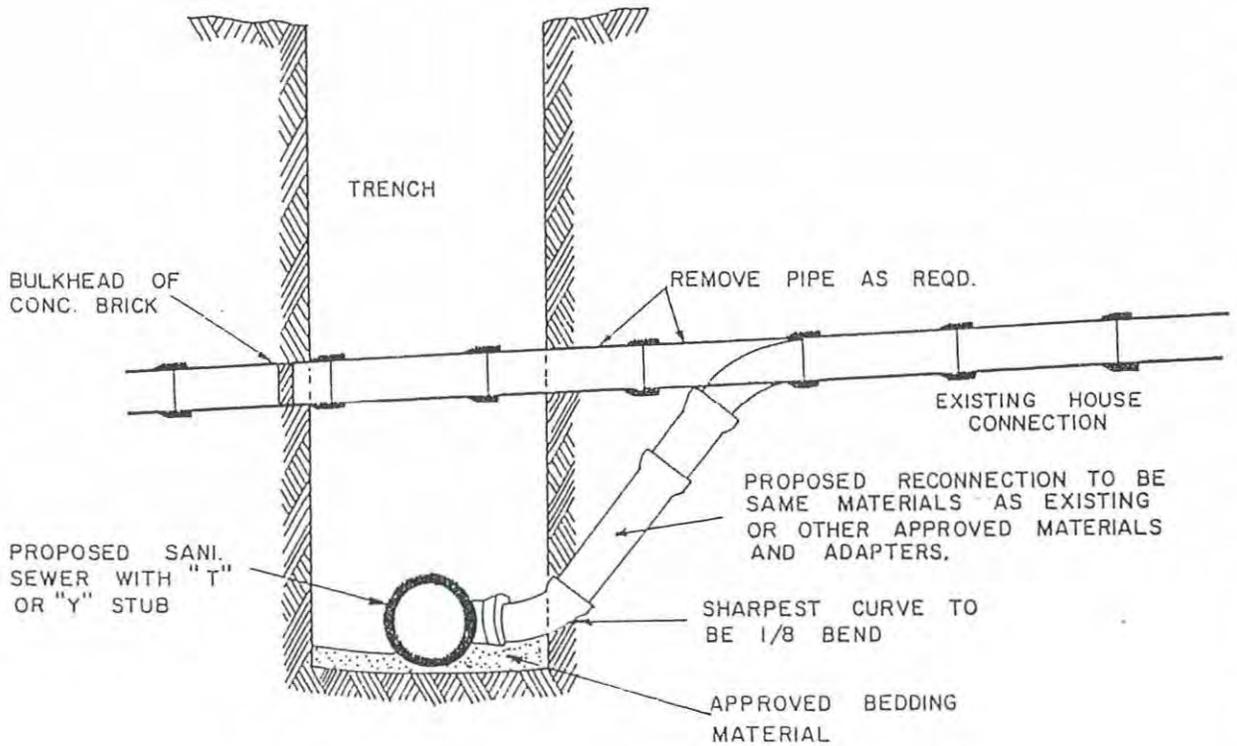
\* WHERE  $D_1 \neq D_2$ ,  
L & T SHALL BE  
THOSE OF THE  
LARGER PIPE

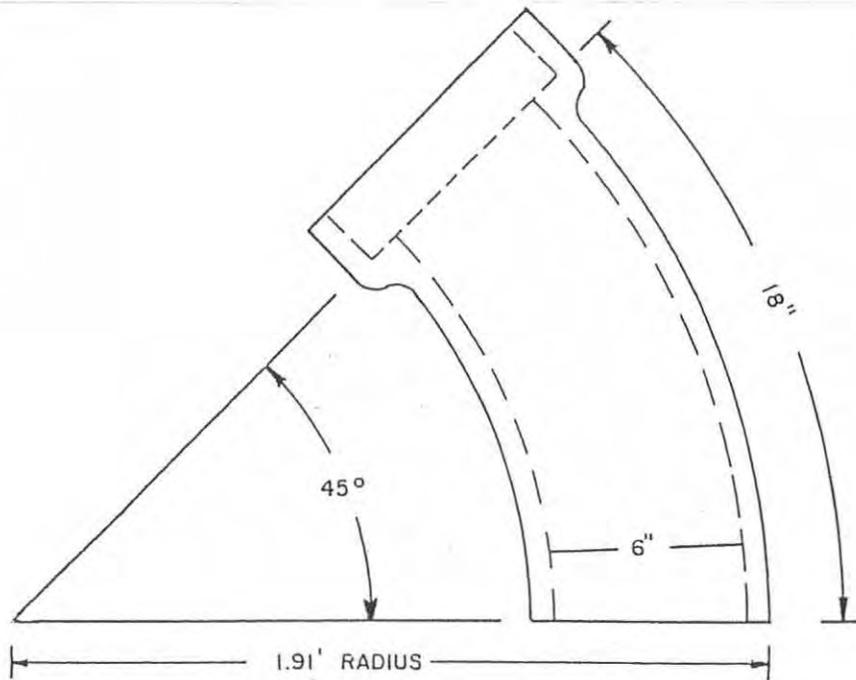
### NOTES:

1. Where the pipe is less than, or equal to, 21 inches in diameter, use 4 x 4 - 4/4 welded wire fabric. When the pipe is 24 inches or larger in diameter, use #4 reinforcement at 12 inches center on center.
2. Circular ties shall maintain an approximate spacing of 6 inches center on center for pipe diameters 24 inches or larger.
3. Concrete collars shall not be constructed on main line storm sewer unless shown on plans or ordered by the Engineer.
4. When the pipe is 24 inches or larger, a removable interior form shall be used or the interior joint shall be completely filled with mortar and neatly pointed.
5. On all pipes where an interior form is not used, the joint shall be sealed as to prevent any concrete from entering into the pipe.

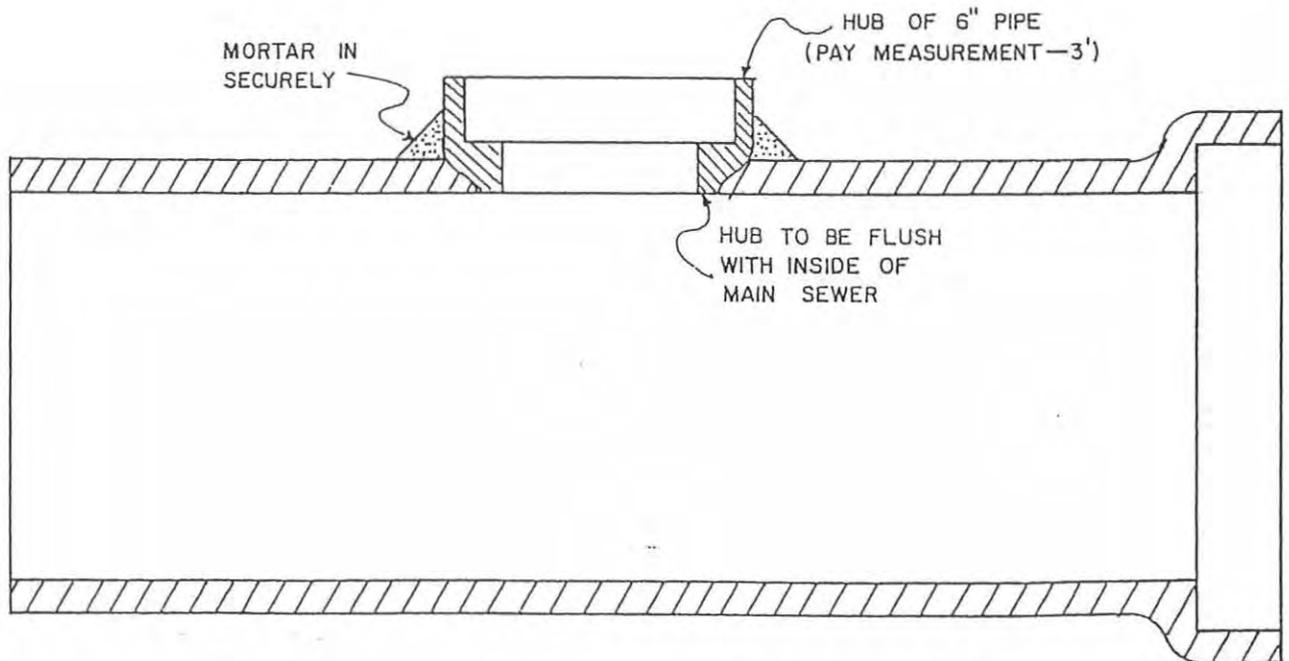
NOT TO SCALE

# TYPICAL HOUSE RE - CONNECTION





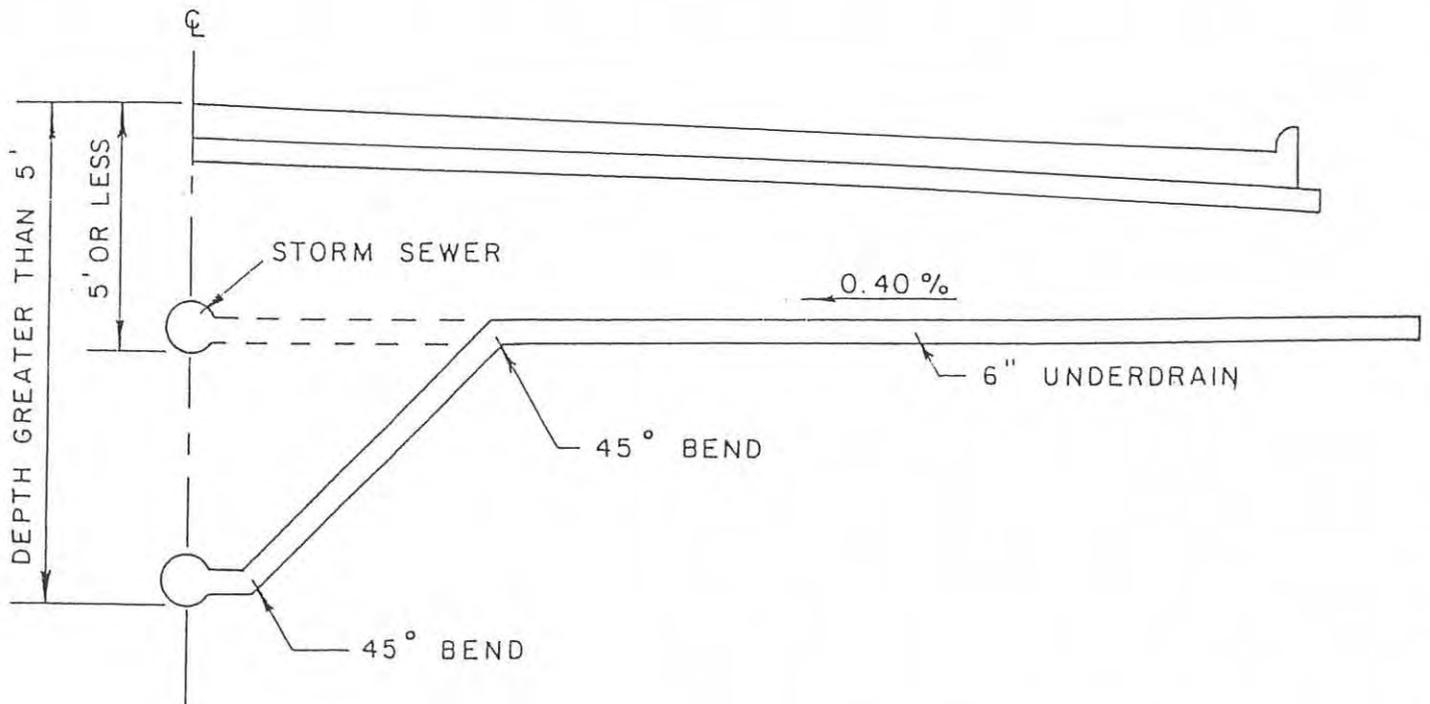
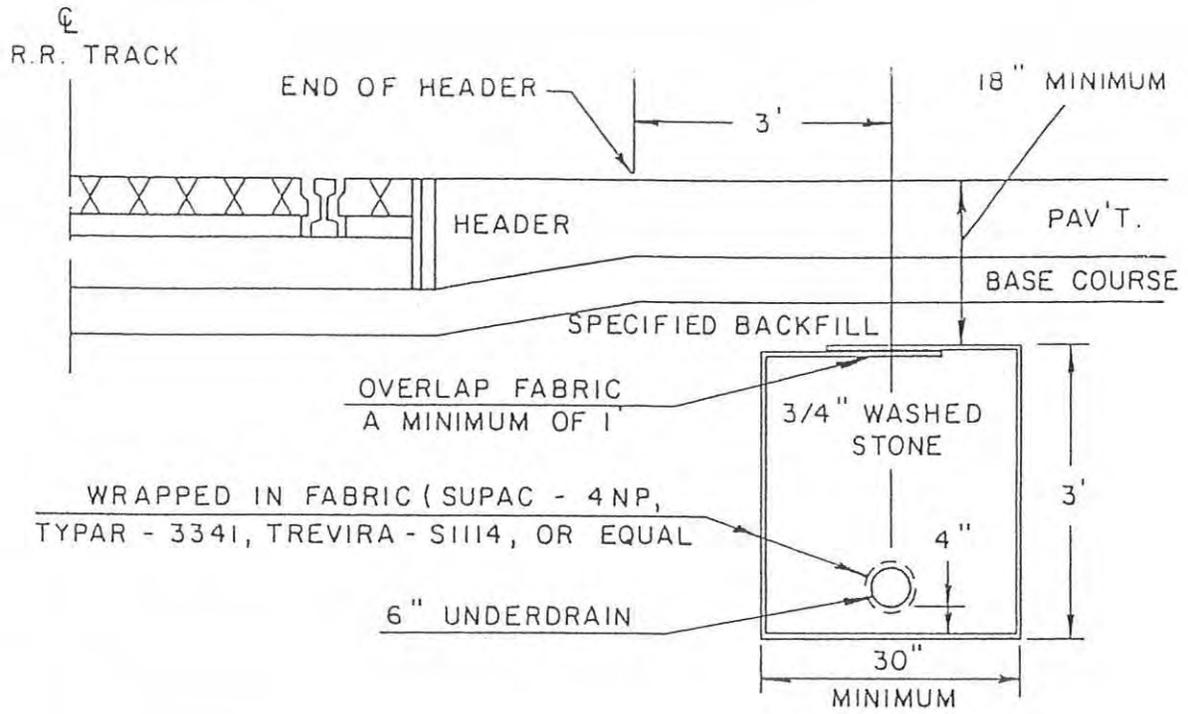
DETAIL OF 1/8TH. BEND



DETAIL OF "Y" TAP IN

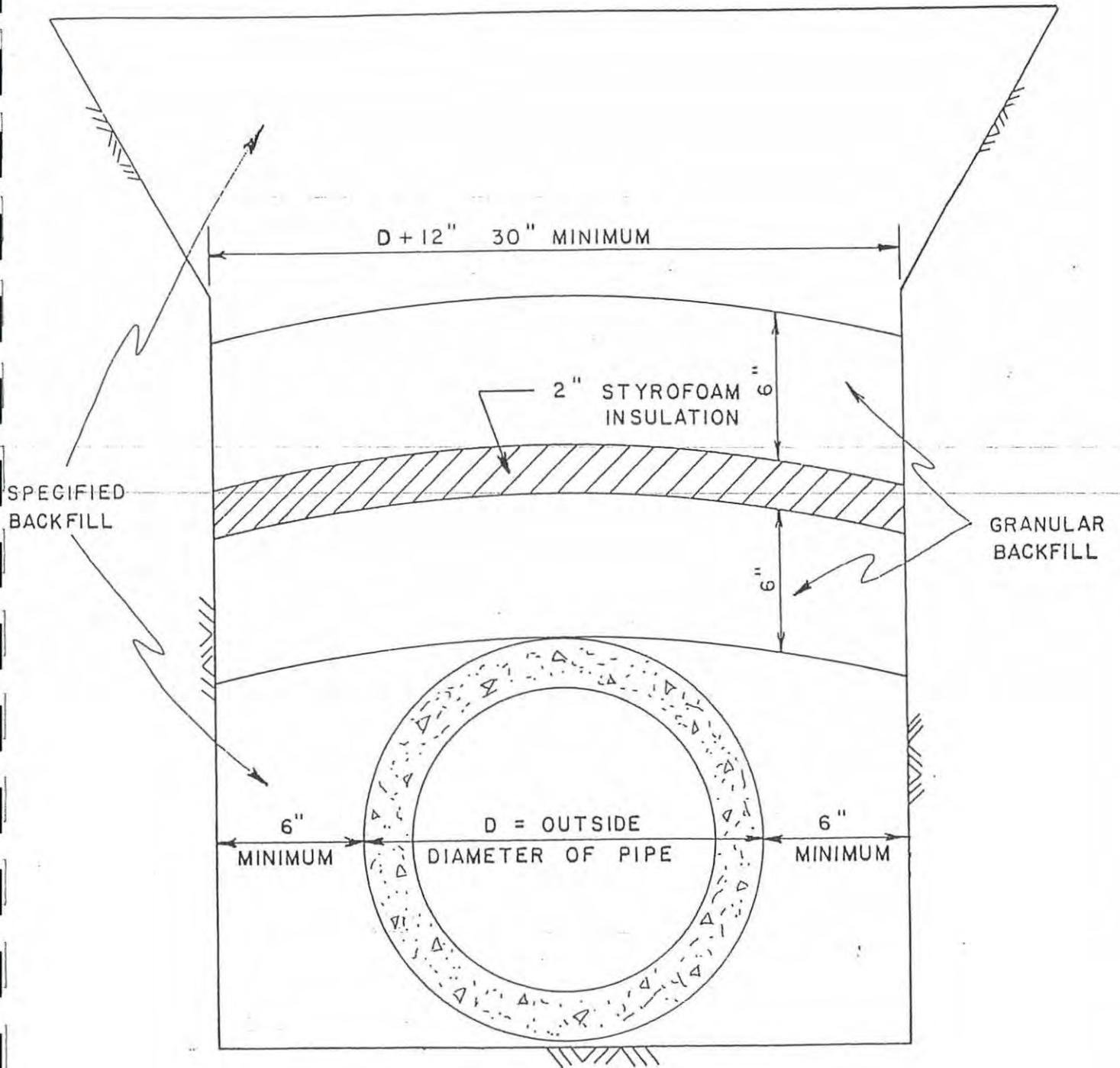
TAP IN TO BE BETWEEN  
SPRINGLINE AND TOP  
OF PIPE

# 6" UNDERDRAIN DETAIL

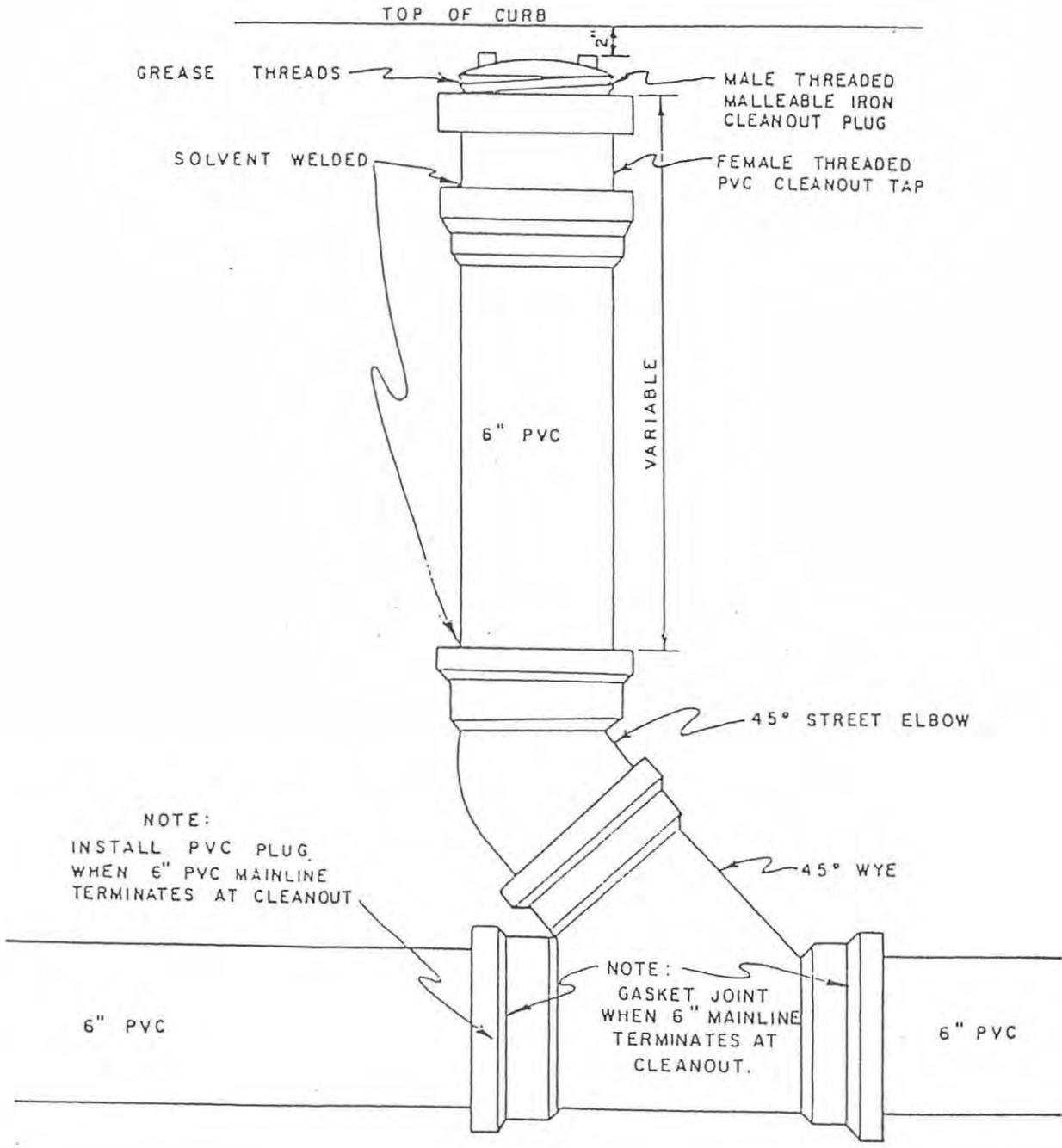


# FROST PROTECTION DETAIL

FOR PIPES WITH LESS  
THAN THREE FEET OF COVER



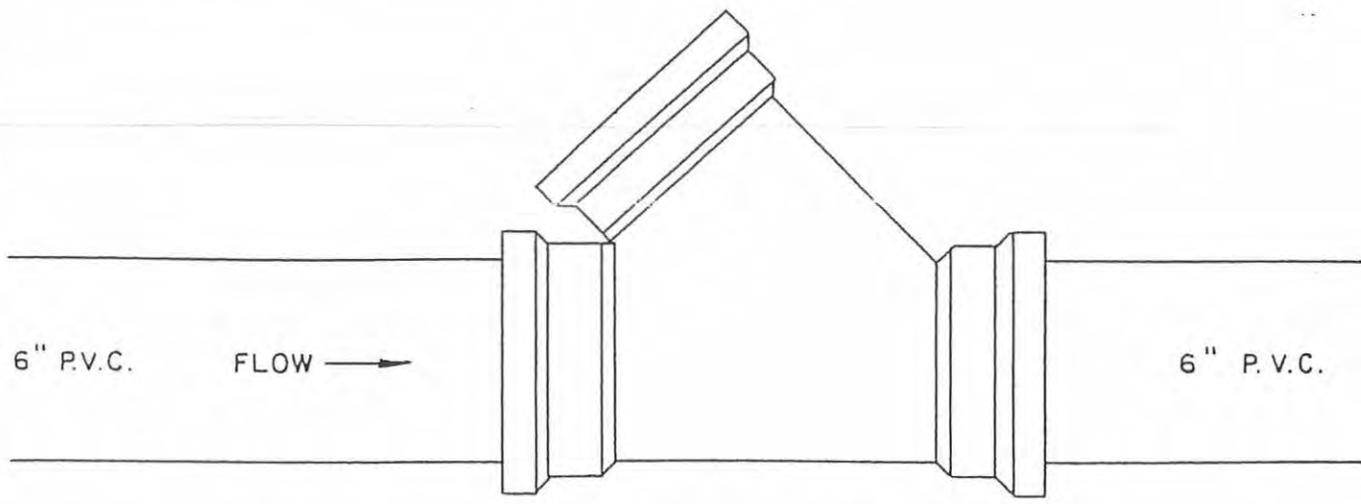
# MINI-STORM SEWER CLEANOUT DETAIL



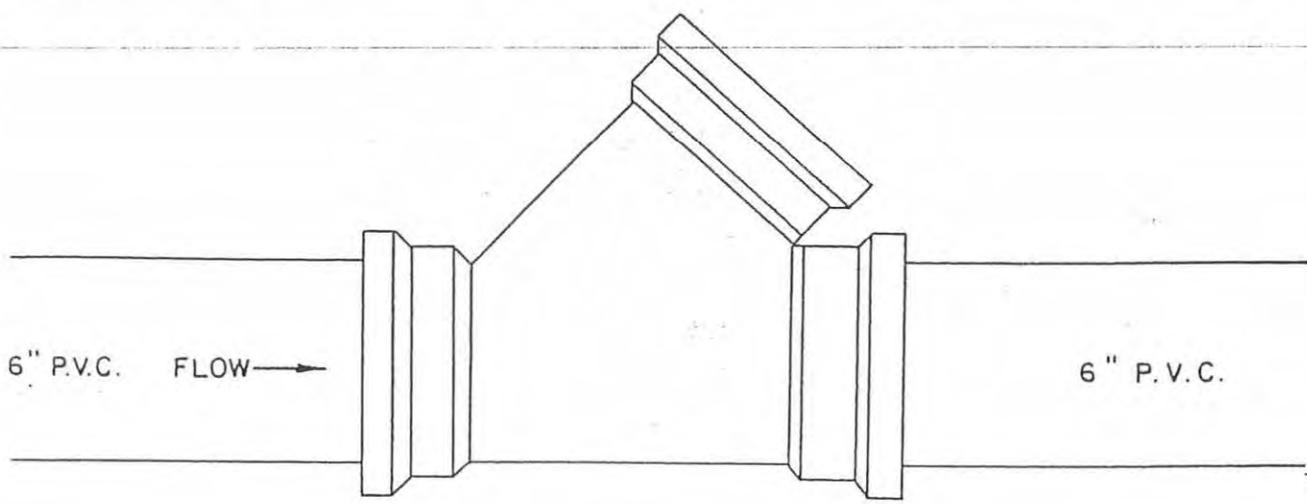
NOTE:  
INSTALL PVC PLUG,  
WHEN 6" PVC MAINLINE  
TERMINATES AT CLEANOUT

NOTE:  
GASKET JOINT  
WHEN 6" MAINLINE  
TERMINATES AT  
CLEANOUT.

NOTE: JOINTS MAY BE EITHER GASKET OR SOLVENT  
WELDED EXCEPT WHERE NOTED



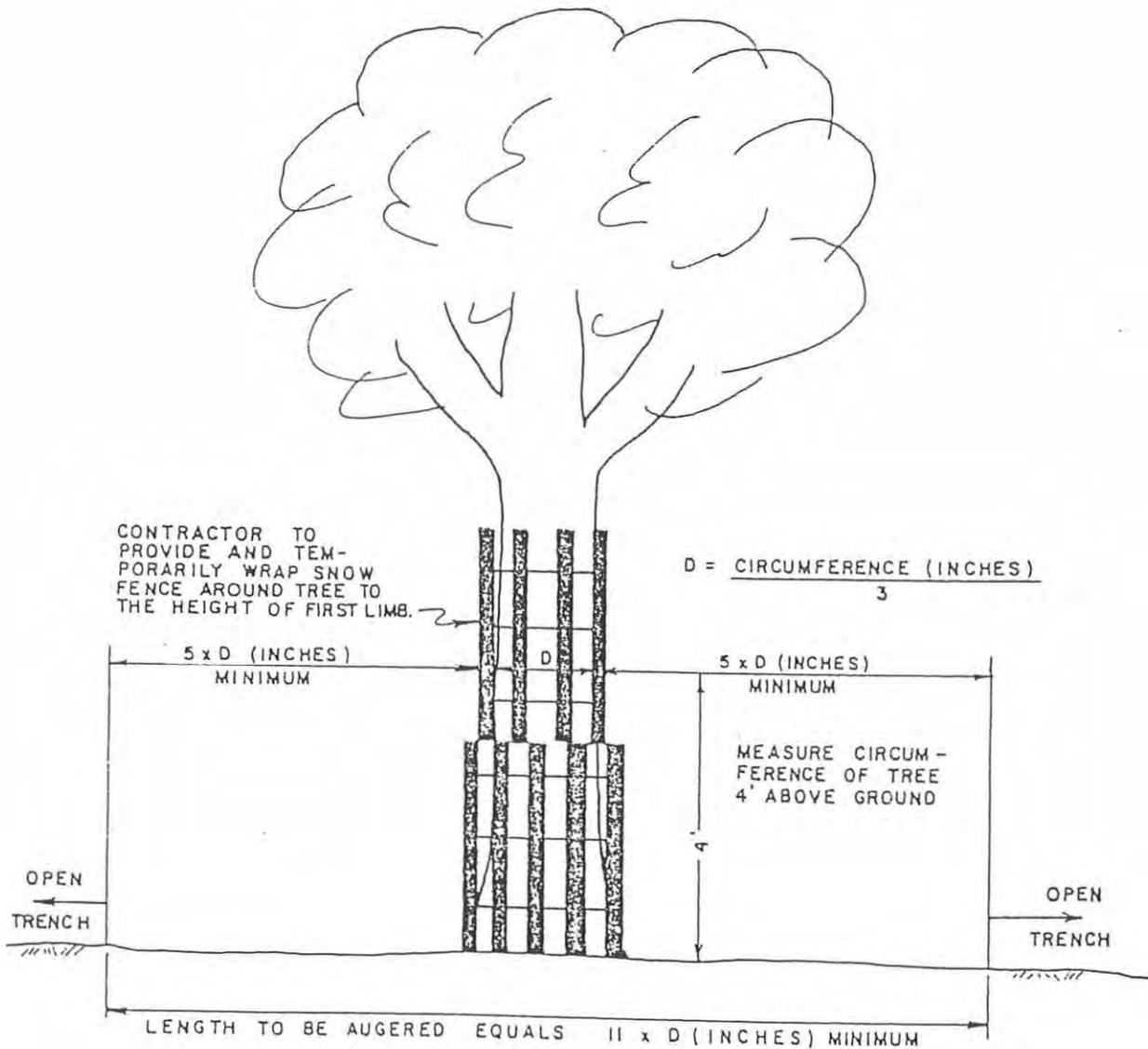
WYE INSTALLED WITH FLOW  
 PLAN SYMBOL 



WYE INSTALLED AGAINST FLOW  
 PLAN SYMBOL 

MINI - STORM SEWER CLEANOUT  
 WYE DIRECTION DETAIL

## MINI-STORM SEWER AUGER DETAIL

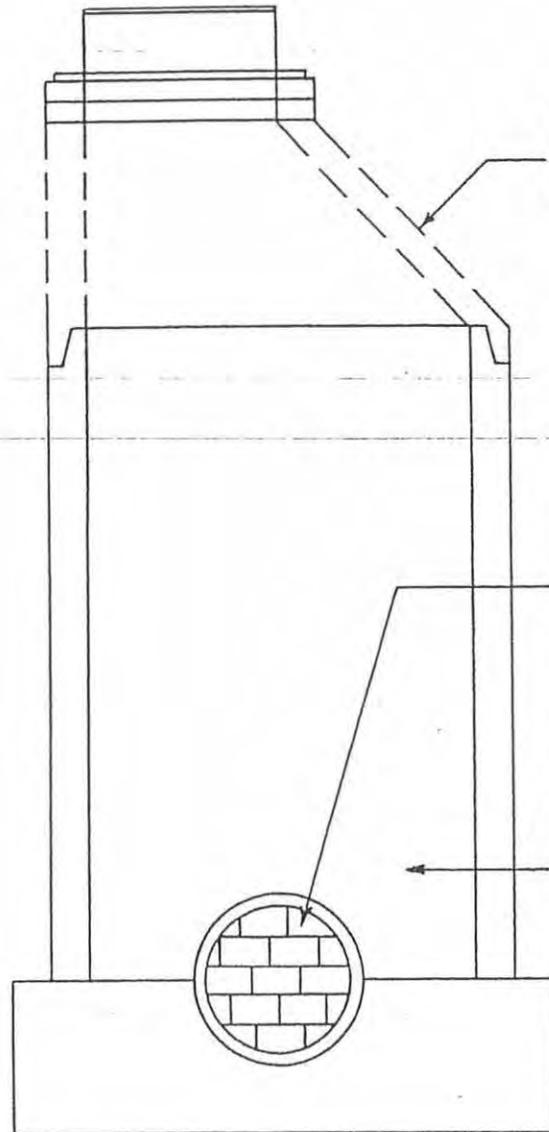
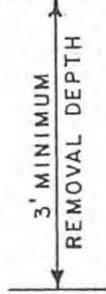


### NOTES

- 1.) THE CONTRACTOR WILL AUGER PAST ALL TREES AND PROTECT WITH SNOWFENCE AS SHOWN ABOVE. THE COST OF AUGERING AND PROTECTING WITH SNOWFENCE WILL BE INCLUDED IN THE BID PRICE OF 6" MINI-STORM SEWER.
- 2.) WRAP SNOW FENCING AROUND EVERY TREE TO PROTECT TRUNK FROM GETTING BARKED BY THE TRACTOR AND BACKHOE.

# ABANDONING STRUCTURES

PROPOSED TOP  
OF CURB GRADE



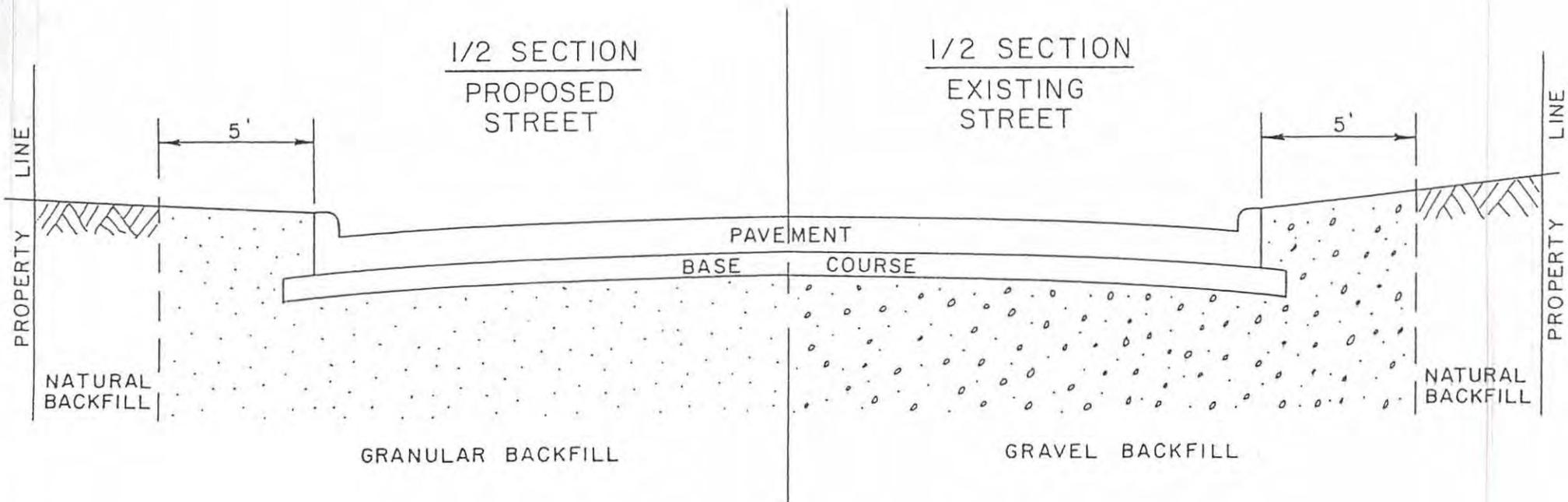
THE WALLS OF THE STRUCTURE SHALL BE REMOVED TO A MINIMUM DEPTH OF 3 FEET BELOW THE PROPOSED TOP OF CURB GRADE.

PLUG EXISTING PIPES WITH BRICK, CONCRETE BLOCK OR PLAIN CONCRETE.

BACKFILL REMAINING STRUCTURE WITH SPECIFIED BACKFILL, TO BE PLACED IN LAYERS NOT MORE THAN 12 INCHES IN DEPTH AND MECHANICALLY COMPACTED TO 90% OF MODIFIED PROCTOR (AASHTO DESIGNATION T180-61)

SCALE 1" = 2'

# TYPICAL BACKFILL REQUIREMENTS



# CASTING STANDARDS

CASTING STANDARDS

PAGE

Manhole Casting

217

Standard Inlet Casting

218

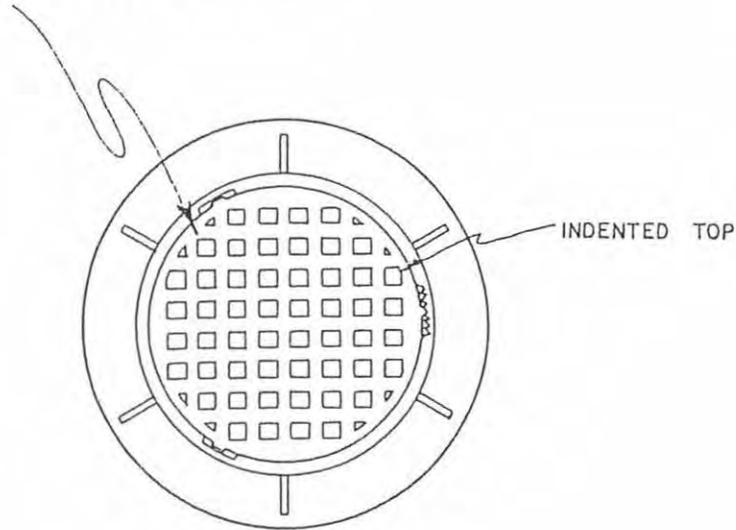
Special Inlet Casting

219

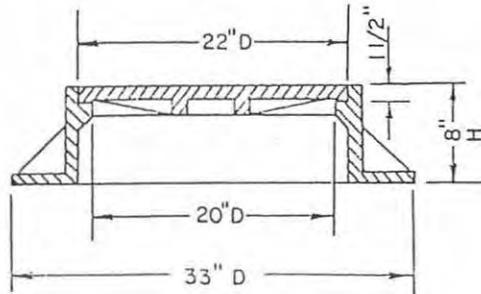
Pressure-Type Manhole Casting

220

SANITARY MANHOLE LID IS TO BE FURNISHED WITH TWO CONCEALED PICKHOLES AND A MACHINED GROOVE WITH A ONE PIECE "O" RING GASKET ON THE HORIZONTAL BEARING SURFACE



COVER GB 100-1



FRAME GB 100-2  
TOTAL WEIGHT 275 #

NOTE:

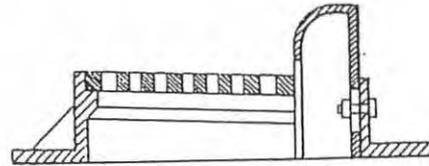
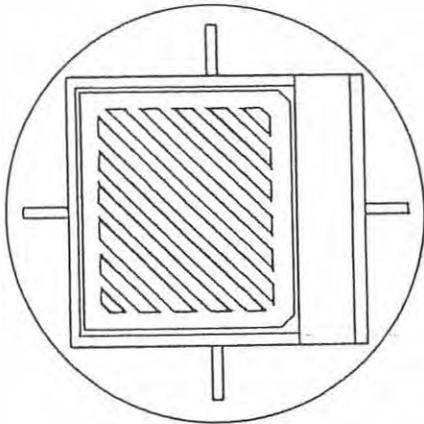
H	FRAME
4"	GB 100-3
10"	GB 100-4

NON-ROCKING TYPE

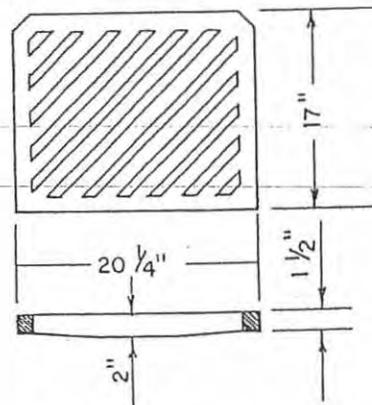
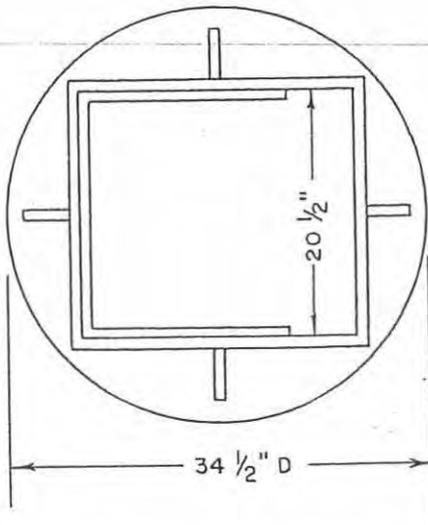
NEENAH R-1100 CASTING OR EQUAL TYPE "B" LID

STANDARD MANHOLE CASTING

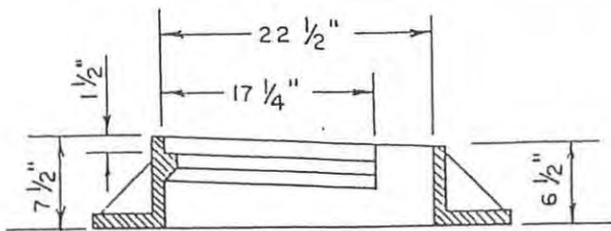
NOTE: ALL STANDARD INLET CASTINGS IN AREAS WITHOUT PROPOSED CURB AND GUTTER WILL BE NEENAH R-2100 NON-ROCKING CASTING WITH TYPE "D" GRATE.



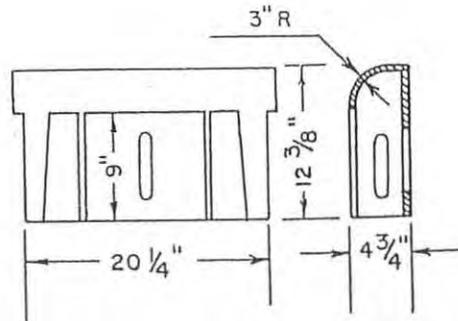
TOTAL WEIGHT 315 #



GRATE  
GB 120-2

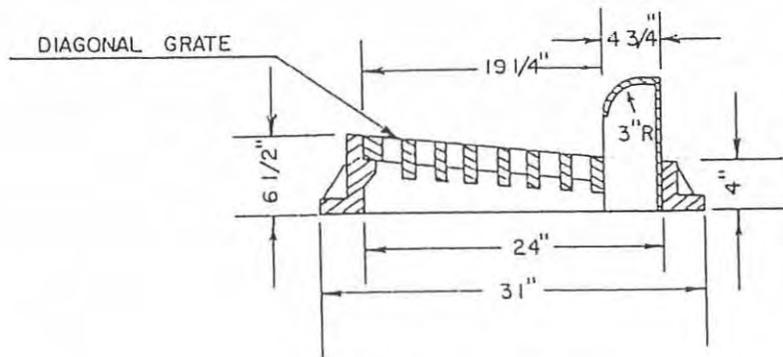
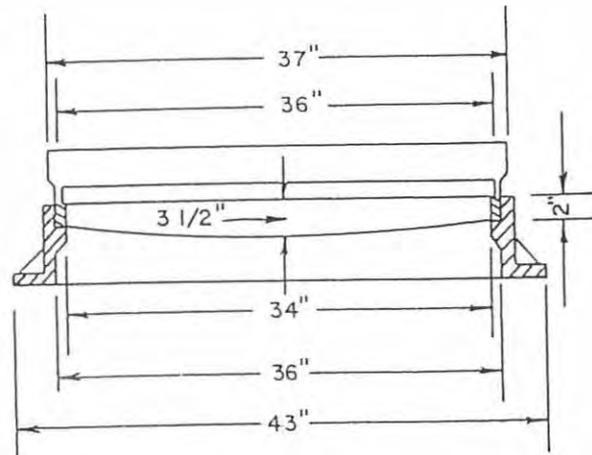


FRAME  
GB 120-1 3075



CURB BOX  
GB 120-3

NEENAH R-3080 OR EQUAL SLOTTED TYPE DIAGONAL GRATE  
STANDARD INLET CASTING

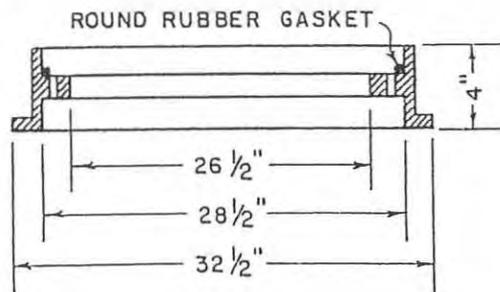
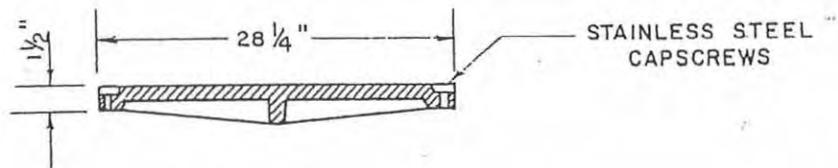
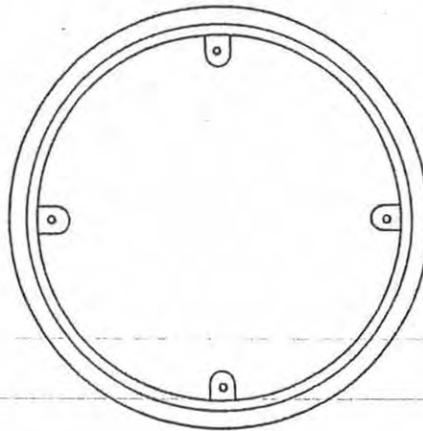


FRAME	GB	140-1
GRATE	GB	140-2
CURB BOX	GB	140-3
TOTAL WEIGHT		500 #

DW4

3067  
NEENAH R-3246 OR EQUAL SLOTTED TYPE DIAGONAL GRATE

SPECIAL INLET CASTING



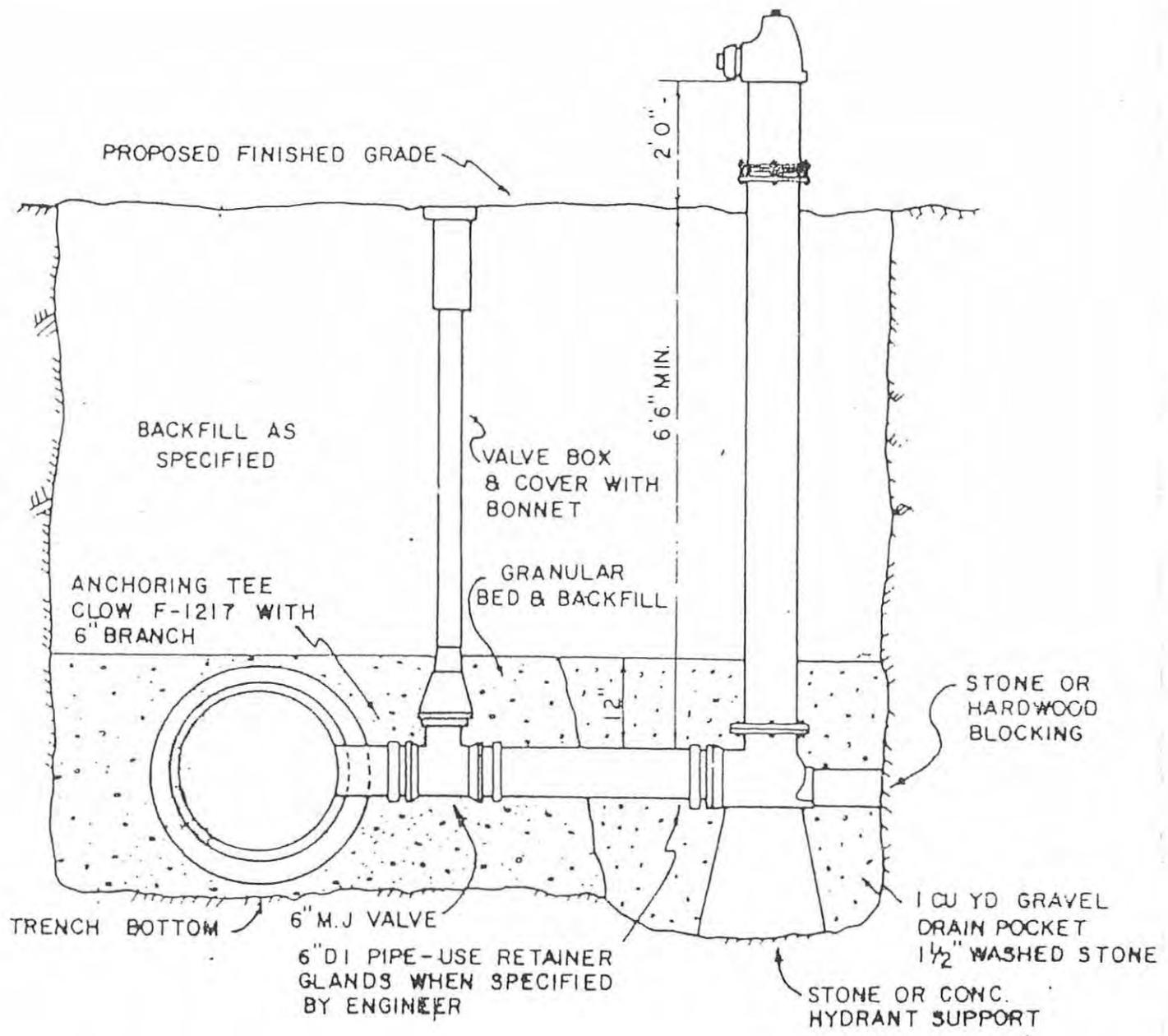
TOTAL WEIGHT 235 LBS.

NEENAH NO. R-6462-6H OR EQUAL

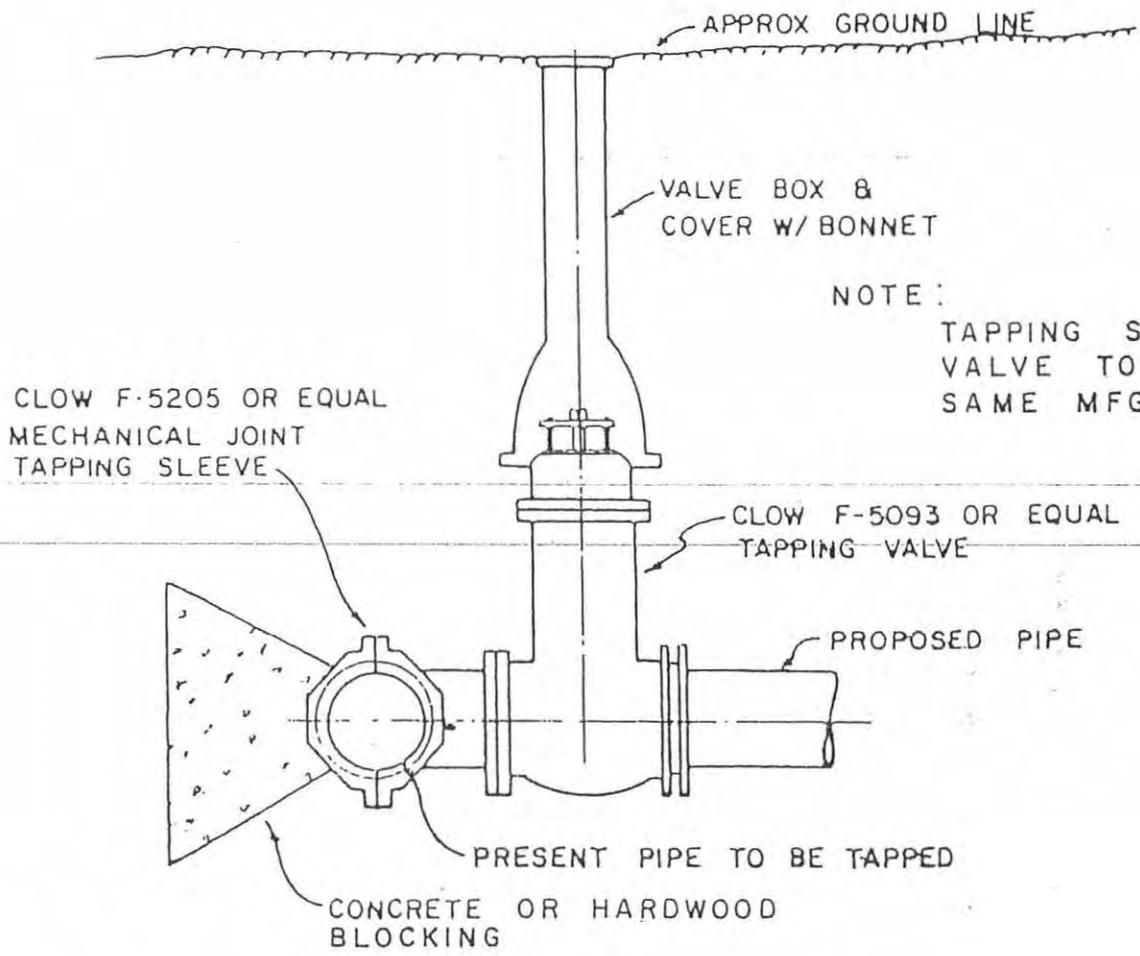
## PRESSURE TYPE MANHOLE CASTING

# WATER MAIN STANDARDS

Typical Hydrant Installation	222
Detail of Tapping Connection	223
Service Installation -- 3/4"-2"	224
Service Installation -- 3" and Larger	225



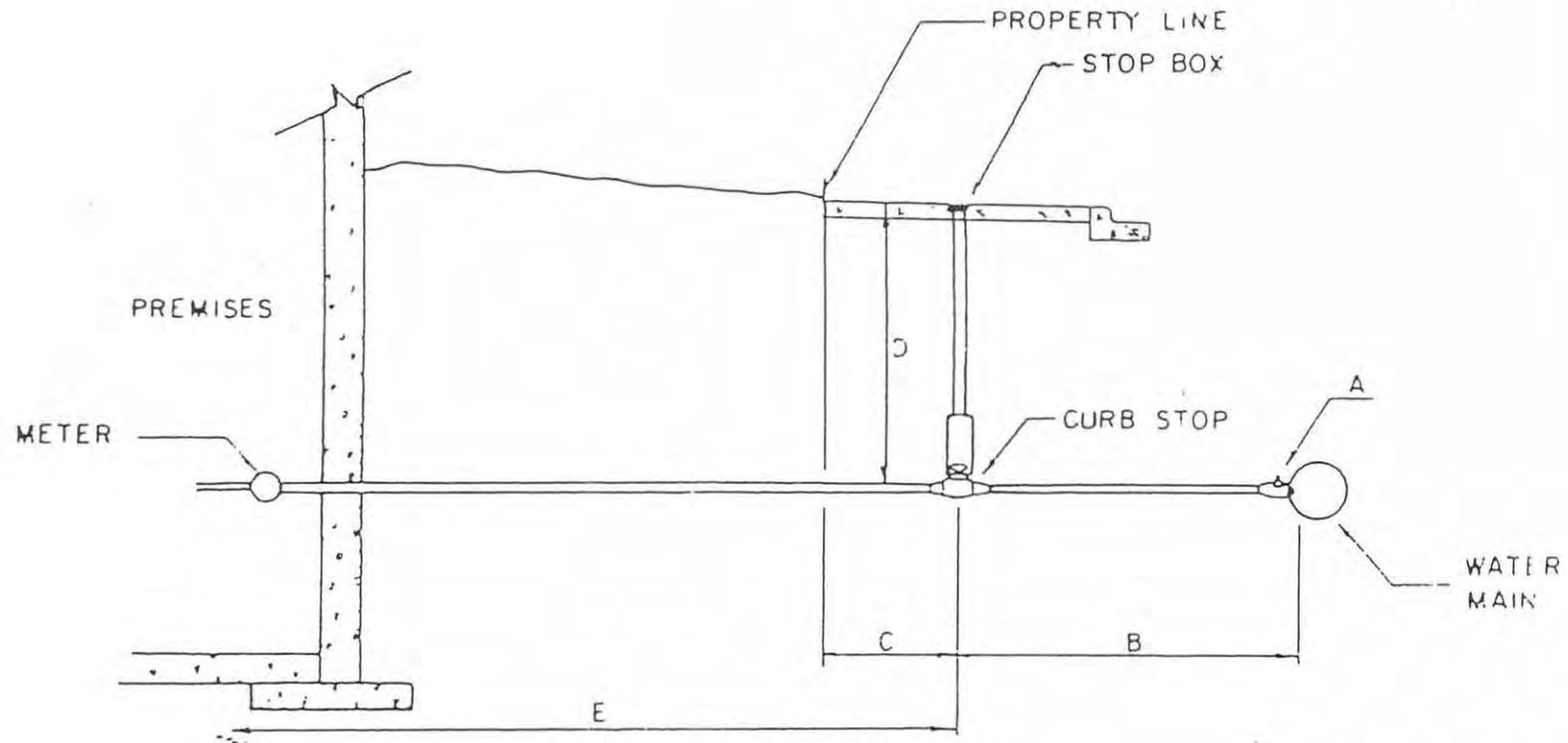
HYDRANT DETAIL



TAPPING CONNECTION

# SERVICE INSTALLATION

SIZE - 3/4" - 2"

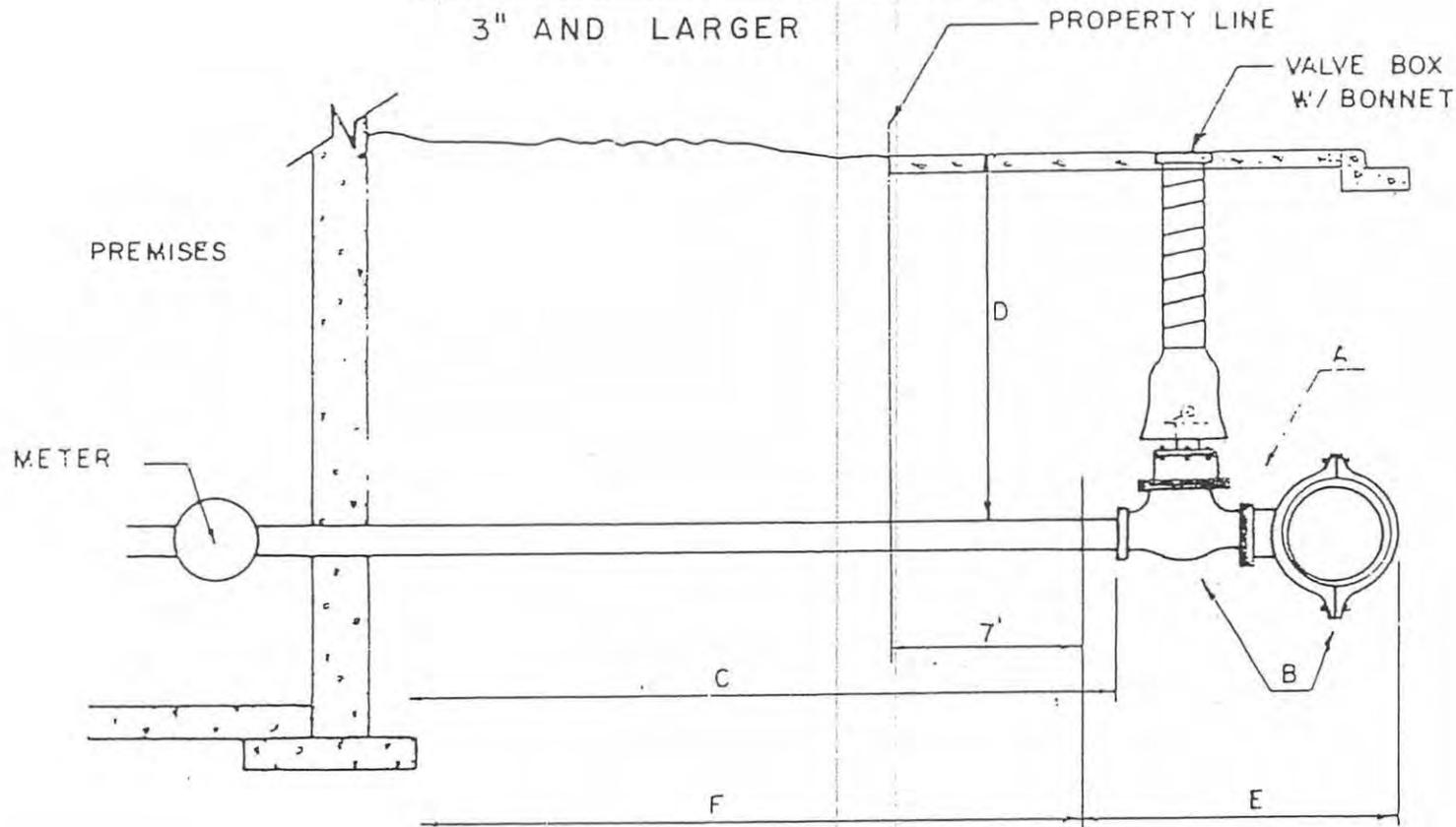


-224-

- A - TAP TO BE MADE AT LOCATION REQUESTED BY PLUMBER, IN THE CASE OF A DIFFERENCE OF OPINION, THE WATER UTILITY SHALL BE THE FINAL JUDGE
- B - TO BE INSTALLED BY THE WATER UTILITY AND THE COST THEREOF TO BE PAID BY THE OWNER OF THE PREMISES TO BE SERVED
- C - TO BE 7' OUT FROM THE PROPERTY LINE
- D - TO BE 6' OR MORE BELOW PROPOSED GRADE
- E - TO BE INSTALLED AND MAINTAINED BY AND THE COST THEREOF TO BE PAID BY THE OWNER OF THE PREMISES TO BE SERVED

# SERVICE INSTALLATION

3" AND LARGER



- A — TAP TO BE MADE AT LOCATION REQUESTED BY PLUMBER, IN THE CASE OF A DIFFERENCE OF OPINION, THE WATER UTILITY SHALL BE THE FINAL JUDGE
- B — TAPPING SLEEVE & VALVE, VALVE BOX AND LABOR FOR MAKING THE TAP ONLY WILL BE SUPPLIED BY THE WATER UTILITY AND THE COST THEREOF TO BE PAID BY THE OWNER OF THE PREMISES TO BE SERVED
- C — TO BE INSTALLED AND THE COST THEREOF TO BE PAID BY THE OWNER OF THE PREMISES TO BE SERVED
- D — TO BE 6' OR MORE BELOW PROPOSED GRADE
- E — TO BE MAINTAINED BY WATER UTILITY UP TO 7' FROM PROPERTY LINE
- F — TO BE MAINTAINED BY AND THE COST THEREOF TO BE PAID BY THE OWNER OF THE PREMISES TO BE SERVED

