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MCR:gm
Encl.

MARIAN C. RUSHING
Chief Deputy City Attorney

Marian C. Rushing

Yours very truly,

Enclosed herewith is a sample copy of uniform specifications applying to public works for the city of Portland. It is the hope of this office that many of the provisions contained in this sample can be adapted or used as written for other city work contracts, such as construction of buildings, etc. Since you are often involved in such contracts, we should very much appreciate your perusal of this sample form and any advice or comments which you care to give.

Dear Mayor Schrunk:

MAYOR TERRY D. SCHRUNK

MAYOR
EXEC. ASST.
ADM. ASST.
ADM. ASST.
ADM. ASST.

MAYOR'S OFFICE

RECEIVED
MAR 22 1962

OFFICE OF CITY ATTORNEY
CITY HALL
PORTLAND 4, OREGON
ALEXANDER G. BROWN
CITY ATTORNEY
March 20, 1962

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Section 52. (In this and in following sections provisions will have to be made for:

(1) The budgetary operations of the metropolitan municipal corporation in

conformity with the Local Budget Law;

(2) City and county monetary contributions in meeting/expenses of the metro-
such

politan municipal corporations as are not raised by taxes, assessments or bonds;

(3) The issuance of general obligation, revenue and refunding bonds;

(4) Borrowing money from a city or county;

(5) The levy of a general tax; and

(6) The levy of special assessments and their repayment.)

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS



STREETS - SEWERS -
BRIDGES &
STRUCTURES

applying to

SPECIFICATIONS

8-10-69

BY
RFA

OK

(3)

The Specifications contained herein have been developed around the following outline:

SECTION A	<u>NOTICE TO CONTRACTORS</u>	A short notice with a brief resume of the major quantities involved. (Not included herein - to be issued for each project).
SECTION B	<u>PROPOSAL</u>	Itemized bid proposal to be signed prior to submittal (not included herein - to be issued for each project).
SECTION C	<u>SPECIAL SPECIFICATIONS</u>	Special clauses supplemental to the Plans, General Conditions and General Construction Details, setting forth requirements peculiar to the specific work included in any particular contract or project. (not included herein - to be issued for each project).
SECTION D	<u>INSTRUCTIONS TO BIDDERS</u>	Items that would only be of interest prior to the contract execution.
SECTION E	<u>GENERAL CONDITIONS</u>	General contract clauses governing the City-Contractor relations.
SECTION F	<u>GENERAL CONSTRUCTION DETAILS</u>	Standard quality requirements for materials and workmanship used on the project.
	Subsec. I <u>Streets</u>	Details and procedures unique to Streets.
	Subsec. II <u>Sewers</u>	Details and procedures unique to Sewers.
	Subsec. III <u>Structures</u>	Details and procedures unique to Structures.

FOREWORD

SECTION G

STANDARD PLANS

Standard material descriptions and test requirements of items referred to in Subsections I through VI.

Subsec. VII. Materials

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Subsec. VI Paint, Galvanizing and Other Coatings

The standard details and procedures for all construction involving Portland cement concrete.

Subsec. V Portland Cement Concrete

The standard details and procedures for all construction involving earth work.

Subsec. IV Excavation, Backfill and Embankment

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INSTRUCTIONS TO BIDDERS

SECTION D

SECTION D

INSTRUCTIONS TO BIDDERS

1. DEPOSIT

The deposit for the Plans and Specifications will be refunded only when the documents are returned in good condition before the bids are opened.

2. PROPOSAL

2. a. FORM OF PROPOSAL

Proposals and bid bond, certified check or cashier's check shall be enclosed in a sealed envelope and labeled and addressed as required in the Notice to Contractors and filed as required therein. The Plans and Specifications must be returned with the proposal.

All proposals must be clearly and distinctly typed or written with ink or indelible pencil without any erasures or changes, and any erasure or change may invalidate the proposal.

All proposals must be on the form furnished by the City, and in addition to the necessary unit price items and total prices in the column of totals to make a complete bid, all applicable blanks giving general information must be filled in and the bid signed by the Contractor or a duly authorized agent. Any statement accompanying and tending to qualify a bid may cause rejection of such bid, unless such statement is required in a proposal embracing alternative bids.

Unless otherwise specified, bidders shall bid on all bid items included in the proposal and the low bidder shall be determined as noted in "Basis of Award" Section D, Subsection 10.

2. b. WITHDRAWAL OF PROPOSAL

A proposal may be withdrawn on written or telegraphic request of the bidder received prior to the scheduled closing time for filing bids. Negligence on the part of the bidder in preparing his proposal confers no right to withdraw his proposal after the scheduled closing time for filing bids.

2. c. LATE PROPOSALS

Proposals received after the scheduled closing time for filing bids, as set forth in the Notice to Contractors, will be returned to the bidder unopened, unless such closing time is extended by the City or unless, if such bid was sent through the mail, a legible postmark cancellation shows the time of mailing to

Bidders must satisfy themselves regarding and determine for themselves

5. EXAMINATION OF SITE AND CONDITIONS

Bidder shall state whether he is doing business as an individual, a co-partnership or a corporation, and, if incorporated, in what state, and, if a co-partnership, shall give the names of all partners; the person signing on behalf of a corporation or a co-partnership shall state his position with the firm or corporation, and state whether the corporation is licensed to do business in the State of Oregon.

4. ORGANIZATION

Such check or bid bond shall be forfeited to the City as liquidated damages in case the bidder fails or refuses to enter into a contract and furnish a satisfactory bond within ten (10) calendar days after tender of form of contract by the City. All such checks or bid bonds may be retained by the City when the City tenders a form of contract for execution to the successful bidder.

Each proposal must be accompanied by a corporate surety bond, certified check or cashier's check payable to the City Treasurer for an amount not less than ten per cent (10%) of the total amount of the bid. If a bid bond is submitted in lieu of a certified check, such bid bond shall be on the form provided with these specifications.

3. BID GUARANTEE

Change in a proposal already delivered will be permitted only if a request for the privilege of making such modification is made in writing signed by the bidder and the specific modification itself is stated and received prior to the scheduled closing time for filing bids. However, a modification which is received from an otherwise successful bidder and which makes the terms of the bid more favorable or advantageous to the City will be considered at any time it is received and may thereafter be accepted. To be effective every modification must be made in writing over the signature of the bidder.

2. e. MODIFICATION OF PROPOSAL

Except as may be provided otherwise herein, proposals which are incomplete, or fail to cover all items of the Plans or Specifications, may be rejected.

2. d. ALTERATION OF DOCUMENTS

be such that normal mail delivery time would have provided delivery to the City prior to the scheduled closing time for filing bids, and such proposal is received before the award has been made.

If it should appear to a Bidder that the work to be done or matters relative thereto are not sufficiently described or explained in the Specifications or that the Specifications are not definite and clear, the Bidder may make written inquiry regarding same to the Engineer at least five (5) days before the scheduled closing time for filing bids. Then if, in the opinion of the Engineer, additional information or interpretation is necessary, such information will be supplied in the form of an addendum which will be delivered to all individuals, firms and corporations who have taken out Specifications and such addendum shall have the same binding effect as though contained in the main body of the Specifications. Oral instructions or information concerning the Specifications or the project given out by City officers, employees or agents to prospective bidders shall not bind the City.

8. ADDENDA TO PLANS OR SPECIFICATIONS

Bidders must include in their bid prices the entire cost of each item of the work set forth in the proposal, and it is understood and agreed that there is included in each jump sum or unit price bid the entire cost of materials and labor incidental or necessary to the completion of that portion of the work covered, unless such incidental work is expressly included in other lump sum or unit price bids in the proposal.

7. BID PRICES TO COVER ENTIRE WORK

The estimate of quantities of work to be done under the Specifications in unit price bids is approximate and is given only as a basis of calculation for comparison of bids and award of contract. The City does not by implication agree that the actual amount of work will correspond precisely to the amount as shown or estimated. Payment will be made at unit prices under a contract, only for work actually performed or materials actually furnished according to actual measurement.

The City reserves the right to increase or decrease the amount of any class or portion of the work. No such change in the work shall be considered as a waiver of any condition of the contract nor shall such change invalidate any of the provisions thereof.

6. AMOUNT OF WORK TO BE DONE

all the conditions and circumstances affecting the project or the cost of the proposed work by personal examination of the site, the Plans and Specifications and by such other means as they may choose. It is understood and agreed that information as to underground or other conditions or obstructions indicated in the Plans or Specifications has been obtained by the City from data at hand. There is no express or implied agreement that such conditions are fully or correctly shown and the Bidder must take into consideration the possibility that conditions affecting the cost or quantity of work may differ from those indicated.

While price extensions are required as a matter of convenience, in the event of error in extensions, the unit prices bid shall govern. In the event of discrepancy between the written and numerical amounts, the written prices will govern.

The award will be made by the City Council to the lowest responsible bidder. In determining the lowest responsible bidder, the City will take into account, among other factors, the prices bid, discounts if any, the time of completion or delivery proposed, as between equal bids, the relative merits and performance of any item specifically proposed by Bidder, any variation in maintenance and guaranty period specifically proposed by Bidder in excess of any minimums specified, the realistic balance of prices in the proposals for various parts or units of the work and the experience and ability of the Bidder to perform the work.

10. BASIS OF AWARD

(General Conditions).

Time shall be considered the essence of the contract. If the Contractor fails to complete the project or to deliver the supplies or perform the services within the time specified in this contract or any extension thereof by the City Council, the actual damage to the City for the delay will be substantial but will be difficult or impractical to determine, and, therefore, in lieu thereof the Contractor shall be charged and will pay to the City as fixed, agreed and liquidated damages for each and every calendar day of delay, the sum of \$100 or such other amount as may be set forth as liquidated damages in the Special Specifications. Extensions of time will be allowed only under the circumstances set forth in Section E, subsection 2 of the Specifications

9. LIQUIDATED DAMAGES

Any addendum or addenda issued by the Engineer, which may include changes, corrections, additions, interpretations or information, and issued forty-eight (48) hours or more before the scheduled closing time for filing bids, shall be binding upon the bidder and his bid is conclusively presumed to have taken such addendum or addenda into account. City will send copies of such addenda to all contractors who have obtained copies of the Plans and Specifications for the purpose of bidding thereon, but failure of Contractor to receive or obtain such addenda shall not excuse him from compliance therewith if he is awarded the contract.

Any determination of the lowest responsible bidder and award are subject to review and determination by the City Attorney as to legal sufficiency of any bid submitted.

When, in the opinion of the Engineer, the prices in any unit bid proposal are obviously unbalanced such proposal may be rejected.

The City reserves the right to reject any or all bids, or waive irregularities not affecting substantial rights.

11. LEGAL REQUIREMENTS

The Bidder's attention is called to the requirements of Oregon Revised Statutes Chapter 279 and to the provisions of Section 5-1801 of the Public Works Code of the City of Portland, Ordinance No. 76971, and the Charter of the City of Portland, with reference to public contracts, public purchasing in general, and to Contractor's proposals.

The successful bidder shall not assign or transfer his contract without the written consent of the City of Portland, and the sureties on the successful bidder's performance bond.

12. OREGON PRODUCTS

Contractor must use Oregon produced or manufactured materials with respect to common building materials such as cement, sand, crushed rock, gravel, plaster, etc., in all cases where bid prices of such materials are no greater than those of similar materials produced or manufactured outside the State, in accordance with ORS 279.038.

When a project involves the use of non-metallic mineral construction material or materials except cement, sand, gravel, crushed rock and plaster, and if said materials are or can be produced in Oregon, the bidder shall submit alternate bids covering use of such Oregon materials and use of materials from outside the State, if bidder proposes to use such materials from outside the State, in accordance with ORS 279.040.

This section shall not apply where such preference constitutes an interference or conflict with federal statutes or regulations.

13. PREQUALIFICATION OF BIDDERS

Attention of bidders is called to the requirements of Oregon Revised Statutes, Chapter 279, relating to prequalification of bidders on public contracts, and to Article 4 of the Public Works Code (Ordinance No. 76971)

If the bidder proposes to furnish an item, process or material which he claims to be of equal value, utility or merit to the brand or manufacturer named, product or material designated, or process involved in the specifications, he shall, at least, 5 days prior to the date set for opening of proposals, submit to the Engineer a written statement describing or naming the item, material or process which he claims to be of equal value, utility or merit, together with samples, supporting data (including pertinent physical, mechanical, electrical, and chemical details), specifications, results of prior tests if available, a statement itemizing and explaining the differences between the item, material or process he proposes and the specification named or described item, material or process called for by the specifications and other details sufficient to permit the Engineer to evaluate the same. The Engineer may require demonstration, additional tests, and additional data, either before or after bid opening, all to be supplied at the expense of the claimant. If the Engineer determines that the proposed item, material or process is of equal value, utility or merit to the City compared to that specified, a proposal including the substitute item, material or process shall be deemed responsive, and not otherwise, to the specifications in that respect. Failure to submit such statement and data prior to bid opening shall be deemed a waiver of any objection on such ground and failure to supply additional material required after such submission shall be deemed an admission for the purposes of the bid that the item, material or process proposed shall not be approved as equal to that specified. The decision of the Engineer on the proposed substitute shall be final and binding upon the bidder.

In order to establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified on the plans or herein, either by description of process or by designating a manufacturer by name and referring to his brand or product designation or by specifying a kind of material. It is not the intent of these specifications to exclude other processes, equipment or materials of equal value, utility or merit. Whenever a process is designated or a manufacturer's name, brand or item designation is given or whenever a process or material covered by patent is designated or described, it shall be understood that the words "or approved equal" follow such name, designation or description, whether in fact they do so or not.

14. "OR APPROVED EQUAL" CLAUSE

of the City of Portland relating to forms, statements and other prequalification matters. Bidders are warned to file any prequalification statements required at least ten (10) days prior to the scheduled closing time for filing bids. In the event a prequalification statement has been filed with the City within the current calendar year and a bidder has been accepted as a qualified bidder upon City projects, a review of the previous statement may be made to determine whether a prospective bidder is qualified to bid upon the work under consideration and additional statements may be required. The City reserves the right to reject the proposal of any bidder who has not been prequalified for the class of work involved in the project.

15. CONTRACTOR, EQUAL OPPORTUNITY

Each bid must be accompanied by required form, "Certification of Bidder Regarding Equal Employment Opportunity", Form HUD-4238-CD-1, which must be fully completed and executed when submitted. (subsequent to page 7, Sec. B)

The bidder's attention is called to, Form HUD-902, "Instructions for Contractor Regarding Affirmative Action Under Executive Order 11246" and Form HUD-4238-CD-2, "Certification of Proposed Subcontractor Regarding Equal Employment Opportunity", found subsequent to page 30, Sec. C.

16. DELETION IN STANDARD SPECIFICATIONS

The first paragraph of Section E, subsection 6p of the Standard Specifications in hereby deleted.

GENERAL CONDITIONS

SECTION E

SECTION E

GENERAL CONDITIONS

1. DEFINITION OF TERMS

As used throughout this Contract, the following terms or expressions shall be understood to have the meanings given below:

- A.A.S.H.O. - American Association of State Highway Officials
- A.C.I. - American Concrete Institute
- A.P.W.A. - American Public Works Association
- A.S.A. - American Standards Association
- A.S.T.M. - American Society for Testing Materials
- A.W.P.A. - American Wood Preservers Association
- A.W.S. - American Welding Society
- A.W.W.A. - American Water Works Association
- N.E.M.A. - National Electrical Manufacturer's Association
- O.R.S. - Oregon Revised Statutes
- O.S.H.D. - Oregon State Highway Department
- W.C.L.A. - West Coast Lumberman's Association
- W.P.C.F. - Water Pollution Control Federation

APPROVED EQUAL. A component or process whose use in or on this particular project is approved by the Engineer. (See also Section E subsection 3b).

BIDDER. Any individual, firm, co-partnership or corporation submitting a proposal in response to the advertisement calling for bids on the work contemplated in the Specifications.

CITY. The City of Portland, Oregon, acting through its duly authorized officials.

CITY ATTORNEY. The City Attorney of the City of Portland, Oregon.
CITY ENGINEER. The City Engineer of the City of Portland, Oregon, acting directly or through properly authorized agents limited to the particular duties entrusted to them.

CONTRACT. The written agreement covering the performance of the project, including the advertisement calling for bids, the proposal, plans, specifications, instruction to bidders, contract bonds and all supplemental agreements affecting the project, and change orders in the course of the work.

CONTRACT COST. The aggregate amount of price promised to be paid by the City to the Contractor upon fulfillment of the contract.

CONTRACTOR. Any individual, firm, co-partnership, corporation or any combination thereof who has or have entered into the contract with the City for this particular project.

DATE OF ACCEPTANCE. The date of official acceptance of the work by the City.

PAY. Calendar day, any and every day shown on the calendar, Sundays and Holidays included.

DEPARTMENT OF PUBLIC WORKS. The Department of Public Works of the City of Portland, Oregon, acting directly or through properly authorized agents limited to the particular duties entrusted to them.

ENGINEER. The City Engineer, Traffic Engineer, or Water Engineer of the City, under whose direction the work will be performed, acting directly or through properly authorized agents limited to the particular duties entrusted to them.

ESTABLISHED GRADE. Official centerline elevations of the pavement surface to which future improvements will be related. Such elevations are established by the authority having legal jurisdiction over such matters.

INSPECTOR. The authorized representative of the Engineer whose instructions and decisions shall be limited to the particular duties and responsibilities entrusted to him in making detailed inspections of any or all portions of the work or materials therefor.

MATERIAL. Any item which is installed in, or incorporated into the project but not including tools, machinery, appliances, bracing or other equipment used to facilitate or accomplish the work.

NOTICE. A written communication delivered by hand or by mail to the authorized individual, member of the firm or officer of the corporation for which it is intended. If delivered or sent by mail it shall be addressed to the last known business address of the individual, firm or corporation. In the case of a contract with two (2) or more persons, firms or corporations, notice to one shall be deemed notice to all.

MUNICIPALITY. Shall include the City of Portland or any other municipal or quasi-municipal corporation affecting the project or the work thereon.

PLANS. The maps, drawings or reproductions thereof, approved by the Engineer, pertaining to the work and provided for and made a part of the contract.

Time shall be considered the essence of the contract, and in the event that the project is not completed within the time limit fixed in the contract or extensions thereof by the City Council, the Contractor shall be charged the liquidated damages fixed in the contract, as provided in Instruction to Bidders, Section D, subsection 9, as the agreed reasonable compensation to the City for the delay and for damages and additional expenses to the City occasioned thereby. The City, however, may grant extensions of time to the extent it finds reasonable and justified when the delay is due solely to causes beyond the control of the Contractor and without any fault or negligence or participation by the Contractor, and such causes shall include court orders enjoining the prosecution of the project, strikes, enemy action, acts of God which shall include unusual action of the elements not reasonably foreseeable by the Contractor, or act of the City not authorized by the Contractor has given written notice to the City of the cause of delay within ten (10) days after the beginning thereof and notice to the City of the termination thereof within five (5) days after such termination, and makes claim

2. COMPLETION DATE AND EXTENSION OF TIME

WATER ENGINEER. The Water Engineer of the City acting directly or through properly authorized agents limited to the particular duties entrusted to them.

USE OF PRONOUNS AND GRAMMATICAL CHANGES. As used herein, the singular shall include the plural, and the plural the singular, any masculine pronoun shall include the feminine or neuter gender; and the term "person" includes natural person or persons, firm, copartnership, corporation or association, or a combination thereof.

TRAFFIC ENGINEER. The Traffic Engineer of the City acting directly or through properly authorized agents limited to the particular duties entrusted to them.

SUBCONTRACTOR. An individual, firm or corporation acting for or in behalf of the contractor under separate contract with the contractor in the execution of all or any part of the contract with the City. Nothing contained in the contract shall create any contractual relation between any subcontractor and the City.

SPECIFICATIONS. The information, directions, provisions and requirements pertaining to the particular project under the contract and contained in the Special Specifications, General Conditions, General Construction Details and all supplements thereto.

SPECIAL SPECIFICATIONS. Special clauses supplemental to the Plans, General Conditions and General Construction Details, setting forth requirements peculiar to the specific work included in any particular contract or project.

for such extension prior to the contract completion date. The decision by the City Council of the reasonable term of any extension or denial thereof shall be final.

The Contractor shall check and compare all drawings prior to construction, and shall notify the Engineer of any discrepancies or omissions

3 c. CONFLICTS, ERRORS AND OMISSIONS

If the proposal includes a list of equipment, materials, or articles for which the Contractor must name the manufacturer at the time of submission of the bid, no substitutions therefor will be permitted after a proposal has been accepted without the express consent of the City.

If the Contractor desires to furnish items of equipment by manufacturers other than those specified, as a substitute after the contract is executed, he shall secure the approval of the Engineer prior to placing a purchase order or furnishing the same.

The provision relating to this clause contained in the "Instructions to Bidders" (Sec. D) shall apply to all bids.

Whenever a process is designated or a manufacturer's name, brand or item designation is given or whenever a process or material covered by patent is designated or described it shall be understood that the words "or approved equal" follow such name, designation or description, whether in fact they do or not.

In order to establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified on the plans or herein, either by description of process or by designating a manufacturer by name and referring to his brand or product designation or by specifying a kind of material. It is not the intent of these specifications to exclude other processes, equipment or materials of equal value, utility or merit.

3 b. "OR APPROVED EQUAL" CLAUSE

It shall be the duty of the Engineer to interpret the Plans and Specifications, and decide the true meaning thereof. Such interpretation shall be in writing if asked for by either party hereto. The decision of the Engineer relating to the Plans and Specifications, the acceptability of material or equipment, the proper execution of the work, the measurement of quantities, or the quantity, character and classification of material shall be final and binding upon both parties to the Contract. The Engineer may amend or correct any errors or omissions in the Plans and Specifications when such amendments or corrections are necessary to make definite the intent indicated by a reasonable interpretation of the contract requirements.

3 a. DUTIES OF ENGINEER

3. INTERPRETATION OF SPECIFICATIONS

in order to permit their correction. Coordination of drawings and specifications is intended. Labor and materials required for the work if indicated on one and not the other shall be furnished as fully as if mentioned or indicated on both; and should any work or materials be reasonably required or intended for carrying the project to completion which are inadvertently omitted on the Plans or Specifications, the Contractor shall furnish the same as fully as if particularly delineated or described. It is understood to be the intent of the Plans and Specifications to show and describe a complete project within the limits stated. In case of conflict between the requirements set forth in the Special Specifications, the Plans, the General Conditions, or the General Construction Details or between any two or more of them, the following order of precedence shall apply and the requirements of the document having greater precedence shall prevail: (1) Special Specifications, (2) Plans, (3) General Conditions, (4) General Construction Details. However, nothing contained in any of such documents nor in this order of precedence shall limit or revoke the authority of the Engineer as set forth above. Dimensions shown on drawings shall be followed, rather than scale measurements. Whenever it may appear that the contract drawings are not sufficiently detailed or explicit, the Engineer may furnish additional detail drawings or written instructions and the Contractor shall conform his work to such additional details or instructions.

4. LEGAL RELATIONS AND RESPONSIBILITIES

4a. PERFORMANCE BOND

At the time of execution of the contract the successful bidder must furnish performance bond or bonds approved by the Mayor and City Attorney of the City in an amount equal to the amount of the contract based upon the estimate of quantities or lump sum as set forth in the Proposal, conditioned upon a compliance with and fulfillment of all the terms and provisions of the contract, plans and specifications, including maintenance, repair and replacement, and all applicable laws and the prompt payment, as due, to all persons supplying labor and/or material for the prosecution of the work provided for in the specifications.

4b. LAWS AND REGULATIONS

The Contractor shall keep himself fully informed of the Charter, Ordinances and regulations, including the Public Works Code of the City and of all Federal and State laws in any manner affecting the project or the performance thereof, and of all orders and decrees of governmental bodies or officials having any authority or jurisdiction over the same. He shall himself observe and comply with and shall cause all his agents, employees and sub-contractors to observe and comply with said Charter and all such ordinances, regulations, laws, orders, and decrees. The Contractor shall save harmless and indemnify the City and all its officers and employees against any claim or liability arising from or based on the violation of said Charter or any such ordinances, regulations, law, order or decree whether by himself, his agents, employees or his sub-contractors.

4c. TRANSFER OF CONTRACT AND INTERESTS THEREIN

Neither the contract nor any interest therein shall be transferred to any other party or parties without the prior written consent of the City and in case of such attempted transfer without permission, the City may refuse to carry out the contract either with the transfer or the transferee, but all rights of action for any breach of the contract by said Contractor are reserved to the City. No officer of said City, nor any person employed in its service is or shall be permitted any share or part of the contract or is or shall be entitled to any benefit which may arise therefrom. The Contractor shall not assign any of the moneys payable under this contract or his claim thereto without the prior written approval of the City.

The Contractor shall take and assume all responsibility for the work. As between him and the City, the Contractor shall bear all losses and damages directly or indirectly resulting to him, to the City or to others on account of the character of performance of the work, unforeseen difficulties, accidents or any other cause whatsoever. The Contractor shall assume the defense of, indemnify and save harmless the City, its officers and employees from all claims, liability, loss, damage and injury of every kind, nature and description, directly or indirectly resulting from the nature of the work, the performance of the contract, the ownership, maintenance or use of motor vehicles in connection therewith, or the acts, omissions, operations, or conduct of the Contractor or any sub-contractor under the contract, or in any way arising out of the contract, irrespective of whether fault is the basis of the liability or claim, and irrespective of whether any act, omission or conduct of the City connected with the contract is a condition or contributory cause of the claimed liability, loss, damage or injury and irrespective of whether the act, omission or conduct of the Contractor or sub-contractor is merely a condition rather than a cause of the claim, liability, loss, damage or injury.

4e. RESPONSIBILITY OF CONTRACTOR

The City shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work or payment therefor, from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate, or certificate is untrue or incorrectly made, or that the work or materials do not conform in fact to the contract. The City shall not be precluded or estopped, notwithstanding any such measurement, estimate or certificate, or payment in accordance therewith, from recovering from the Contractor and his sureties such damages as it may sustain by reason of his failure to comply with the terms of the contract, or from enforcing compliance with the contract. Neither the acceptance by the City, or by any representative or agent of the City, of the whole or any part of the work, nor any extension of time, nor any possession taken by the City, nor any payment for all or any part of the project, shall operate as a waiver of any portion of the contract or of any power herein reserved, or any right to damages herein provided. A waiver of any breach of the contract shall not be held to be a waiver of any other subsequent breach.

4d. NO WAIVER OF LEGAL RIGHTS

The Contractor shall maintain such public liability and property damage insurance as will protect the Contractor and the City from any and all claims for damages or personal injury including death, which may arise from operations under this contract or in connection therewith, including all operations of sub-contractors. Unless otherwise required by the Special Specifications, such insurance shall provide coverage for not less than \$100,000 for personal injury to each person, \$300,000 for each accident and \$50,000 for general property damage; such insurance shall be without prejudice to coverage otherwise existing, and shall name as additional insureds

PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

The Contractor shall not commence work until he has first obtained all insurance required in the contract nor until such insurance has been approved by the City Attorney, nor shall he allow any sub-contractor to commence work until he also has first obtained insurance applicable to such work. The Contractor shall maintain insurance throughout the life of the contract which will hold the City harmless and shall indemnify the City for any and all losses to third persons or to the City arising out of the Contractor's operations, including any contingent liability arising therefrom.

4 h. INSURANCE

The City shall have the right to let other contracts to be coordinated with this contract. This Contractor shall afford such other contractors reasonable opportunity for introduction and storage of materials and for execution of their work, and shall cooperate with them. Any matter of dispute shall be decided by the Engineer, and his decision shall be binding. If any part of this Contractor's work depends for its proper execution upon the work of any such other contractor, this Contractor shall inspect and promptly report to the Engineer any defects that affect the subsequent work. Failure to do so shall constitute an acceptance of such other contractor's work as fit and proper for the reception and attachment of his own work and equipment.

4 f. OTHER CONTRACTS

The City shall have the right to take possession of and use any completed or partially completed portion of the project, notwithstanding that the time for completing the entire project or such portions thereof may not have expired; but such taking of possession and use shall not be deemed an acceptance of the project or of any part thereof not completed in accordance with the contract. If such prior use increases the cost of or delays the project completion, the Contractor shall be entitled to such extra compensation or extension of time or both, as the City may determine, and the decision of the City Council shall be final and conclusive.

4 f. USE OF COMPLETED PARTS OF THE PROJECT BEFORE ACCEPTANCE

The Contractor and all his sub-contractors engaged on the project shall provide industrial accident insurance for all persons employed on the work to be done under the contract. This insurance protection shall be carried with the Industrial Accident Commission of the State of Oregon insofar as such protection is available from the Commission. Employees for whom protection is not available from that Commission due to employment on navigable streams or to other cause shall be adequately protected by industrial accident insurance carried with a reliable insurance company or agent licensed to do business in Oregon. Such insurance in amount, form and company shall be subject to approval by the City Attorney.

INDUSTRIAL ACCIDENT INSURANCE

have been made under the contract.

completion and acceptance, even though partial payments or progress payments fire, water, high winds or other cause, during construction and until final held responsible for all damage to the work under construction, whether from (20) days written notice to the Auditor of the City. The contractor will be ated or be cancelled prior to the completion of this contract without twenty suffered. The policy of insurance shall provide that it shall not be terminated to the contractor as to any remaining balance, for replacement of the loss to the benefit of the City to the extent of any loss suffered by the City, and whom it may concern. Any payments made under any such policy shall inure to any, shall be made adjustable with, and payable to the City as trustee for bunkhouses or other structures erected for housing the workmen. The loss, if value of which is not included in the cost of the work, or any cook shanties, stages, towers and forms owned by or rented by the contractor, the capital not cover any tools owned by mechanics, any tools, equipment, scaffolding, miscellaneous materials and supplies incident to the work. Such insurance shall of the permanent construction, including surplus materials, shanties, miscellaneous adjacent to the structure insured, materials in place, or to be used as part include all items of labor and materials connected therewith whether in or coverage and with a company satisfactory to the City. Such insurance shall sole expense obtain fire insurance with extended coverage in amount, form, allowed are subject to damage by fire, then the contractor shall at its damage by fire or if any materials upon which progress estimates are to be If the contract involves any work or structure which is subject to

FIRE INSURANCE

the City and all other governmental bodies with jurisdiction in the area involved in this project, their officers, agents, and employees, and shall further provide that this policy shall not be terminated or be cancelled prior to the completion of this contract without ten (10) days' notice to the Auditor of the City and shall be subject to the approval of the City Attorney.

4 i. ROYALTIES AND PATENTS

The Contractor shall pay all royalties and license fees; Contractor shall save City free from all loss or damage that may result from the wrongful or unauthorized use of any patented article or process hereunder.

4 j. PERMITS AND REGULATIONS

The Contractor shall secure all municipal, County or State permits or licenses, necessary or incident to the actual performance of the work under this contract, and shall, during its progress, comply with all laws, ordinances and government regulations pertaining to the project.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations, Federal, State or local bearing on the conduct of the work as drawn and specified. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Engineer in writing and necessary changes shall be made as provided in the contract for changes in the work.

4 k. MINIMUM WAGE

The minimum wage to be paid to any employee of a contractor or a sub-contractor engaged in performance of the public work required in the contract, other than an employee paid on a monthly or per diem basis and specifically exempted by statute, shall be the prevailing rate of wages paid for the same class of work in the trade or industry in the Portland, Oregon area as required by ORS 279. See also Section E subsections 7 a. and 7 g. of these General Conditions.

4 l. SUB-CONTRACTORS

No part of the work shall be assigned, transferred, sublet or sub-contracted without the prior written consent of the City, or approval at the time of award, and no such consent or approval shall release the Contractor from any obligation to the City or to persons employed by the sub-contractors, or to those supplying materials to the sub-contractors. In all cases, sub-contractors will be considered by the City merely as foremen employed by the Contractor, and liable to be replaced for incompetency, neglect of duty or misconduct.

4 m. EMPLOYER'S CONTRACT FOR MEDICAL CARE OF EMPLOYEES

Contractor shall promptly, as due, make payment to any person, co-partner-ship, association or corporation, furnishing medical, surgical and hospital care, or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all moneys and sums which the Contractor: (1) may or shall have deducted from the wages of his employees for such services pursuant to the terms of Oregon Revised Statutes Chapter 655, and any contract entered into pursuant thereto; or, (2) collected or deducted from the wages of his employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service.

General requirements for street and sewer improvements contained in Article 7 of Ordinance No. 76971 (Public Works Code of the City) shall apply to all applicable improvements.

4 p. GENERAL REQUIREMENTS FOR LOCAL IMPROVEMENTS

Whenever work under this project affects or may affect public property owned by or under the jurisdiction of any governmental authority, including governmental subdivision (other than City), agency or district, Contractor agrees to indemnify and save harmless such governmental authority, its officers, agents and employees from any loss, damage or claim of loss or damage to such property or the use thereof, arising from work under this project. Contractor further agrees to supply any bond or insurance and make any special guarantee deposit required by such governmental authority, before beginning any portion of the work which affects or may affect the property of such governmental authority or the use thereof.

4 o. PROTECTION OF OTHER GOVERNMENTAL AUTHORITIES

Contractor shall make payment promptly, as due, to all persons supplying to him labor or materials for the prosecution of work under the project. Contractor shall pay all contributions or amounts due from him to the State Industrial Accident Fund and shall pay to said Fund all amounts due from any subcontractor and remaining unpaid, incurred in the performance of the project. Contractor shall not permit any lien or claim to be filed or prosecuted against the City on account of any labor or material furnished. Contractor shall pay to the State Tax Commission all sums withheld from employees pursuant to Oregon Revised Statutes Chapters 315 or 316.

4 n. LABOR, MATERIALS AND ITEMS: WITHHELD TAXES

All tests of materials, appliances, fittings or work completed or in process of completion, required by the Specifications, by City ordinance or by other law, shall be made under direction of the Engineer by and at the sole expense of the Contractor, who shall repair at his own expense all damage resulting from such tests. When additional tests are required

5 c. TESTS

The Engineer shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for inspection. The Contractor shall make application to the Engineer for inspection at least for (48) hours in advance of starting any work. Inspectors shall be recognized as authorized agents of the Engineer, and their duties shall be to pass upon materials used and work performed. Instructions given by the Inspector shall be respected and executed by the Contractor, but no Inspector shall have any power to waive the terms of the contract or the obligations of the Contractor thereunder to furnish good materials or do the work in a thorough and workmanlike manner. Failure or oversight of the Engineer or any Inspector, to condemn defective materials at the time of use, or condemn improper work at the time it is done shall not release the Contractor of his obligations under these Specifications. The Contractor shall tear out, remove and replace the faulty materials or work at no additional cost to the City, upon discovery of the defects and upon receipt of notice from the Engineer to do so. If any work should be covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense. Defective work and materials may be rejected prior to the date of acceptance of the work notwithstanding that such defective work or material has been previously inspected or estimated for progress or partial payment, and progress or partial payment made. Acceptance shall not constitute approval of latent defects or waiver of maintenance requirements.

5 b. INSPECTION

The work shall be done under the direction and to the satisfaction of the Engineer. The Contractor shall do all the work and furnish all labor, materials, equipment, tools and machines necessary for the performance and completion of the project in accordance with the Specifications within the specified time.

5 a. WORK TO BE DONE TO SATISFACTION OF THE ENGINEER

5. CONTROL OF PROJECT

by the Engineer, the Contractor shall furnish all tools, labor and material to make an examination of any work that may be in progress or completed. Cost of such additional examination disclosing faulty work shall be paid for by the Contractor. Should the work prove to be satisfactory and additional examination ordered by the City but not specifically required by the Specifications or law will be paid for by the City as extra work.

The City shall have the right to require, and the Contractor agrees to do extra work over and above that which is indicated by the Plans and Specifications and covered by the unit prices of the contract, but which is logically part of the improvement, arising from reasonably unforeseeable foundation conditions, changed requirements or new information. Such additional work shall be undertaken only upon written instructions from the Engineer.

6 e. EXTRA WORK

The City shall have the right to make such alterations, eliminations and additions in the line, grade, location, or dimensions of the project as it may deem necessary, or as may be required due to reasonably unforeseeable conditions encountered during the progress of the work.

6 d. CHANGES IN PLANS OR QUANTITIES

During the progress of the work, such additional detail drawings as the Engineer may consider necessary will be furnished to the Contractor.

6 c. ENGINEER MAY FURNISH ADDITIONAL DRAWINGS

For any work or unit of the project of substantial magnitude, or requiring special methods, plant or equipment, the Contractor shall, in advance, prepare a layout, program and schedule of operations and shall submit it to the Engineer for approval before beginning operations. The material and construction details of plants, forms, shoring, falsework and other structures built by the Contractor but not a part of the permanent project, shall meet the approval of the Engineer, but such approval shall not relieve the Contractor from responsibility for their safety and sufficiency.

6 b. METHODS, EQUIPMENT AND SCHEDULE

Within ten (10) days after the date of the contract, or such other time as may be fixed by the contract, the Contractor shall commence the work and shall notify the Engineer forty-eight (48) hours in advance of the time and place where such work will be started. If it shall appear to the Engineer that insufficient force is being employed, or if inadequate equipment and methods are used, or if progress is for any reason unduly delayed, he may instruct the Contractor in writing to increase his force or equipment, or adopt improved methods to expedite the work, and the Contractor shall heed and follow such instructions but conformity to the Engineer's instructions shall not relieve the Contractor of any of his responsibilities under this contract.

6 a. COMMENCEMENT AND PROGRESS OF THE WORK

6. PROSECUTION AND PROGRESS OF THE WORK

The Contractor, or his authorized representative, shall give personal attention to the prosecution of the work, and shall be present on the site continually during its progress. If called for in the Special Specifications he shall maintain an office on or adjacent to the site of the project. A complete copy of the Drawings and Specifications shall be kept on or near the site at all times. When the Contractor is not present on any part of the work where it may be necessary to give instructions, orders may be given by the Engineer to the superintendent or foreman who may have charge of that particular part of the project, and such order shall be received and followed. Such directions shall not be deemed to change the status of Contractor or Sub-contractor, nor to make the City an employer, nor to give the City direct responsibility for the methods and manner of the work. If any person employed on the project shall refuse or neglect to obey the instructions of the Engineer relating to the work thereon, or shall appear to the Engineer to be incompetent, disorderly, or unfaithful, he shall, upon written request from the Engineer, be at once replaced and not again employed upon any part of the project.

6 I. CONTRACTOR'S REPRESENTATIVE

The Contractor shall make arrangements for adequate sanitary conveniences for the use of all persons employed on the project. These conveniences shall be located and maintained, and, when otherwise not available, specially constructed, all in a manner that is unobjectionable to adjoining property owners and that meets the approval of health authorities. The use of these conveniences shall be strictly enforced. Upon completion of the project any specially constructed conveniences shall be removed from the premises, and such premises shall be left clean and free from nuisance.

6 h. SANITARY CONDITIONS

The Contractor shall be responsible for all expense involved in making any required changes in the Plans or Specifications to accommodate a substitution approved by the Engineer for the convenience of the Contractor or to circumvent an unforeseen difficulty in obtaining a specified article.

6 g. SUBSTITUTIONS

The Contractor shall furnish to the Engineer for general approval four (4) copies of all layout, detail, shop and working drawings requested by the Engineer. After review and approval by the Engineer, two copies will be returned to the Contractor. It is understood that the approval by the Engineer of the Contractor's drawings is a general approval relating only to their compliance with the intent of the contract, and shall not constitute a waiver of errors, misfits, discrepancies or omissions.

6 f. CONTRACTOR TO FURNISH DRAWINGS

If the Contractor should neglect to prosecute the project properly, or fail or refuse to perform any of the terms or conditions of the contract, the City may, without prejudice to any other remedy, supply or correct any deficiency or defect. Such action by the City shall be taken only after three (3) days' notice by the Engineer to the Contractor and his surety, unless in the judgment of the Engineer an emergency or danger to the work or to the public exists, in which event City action as set forth above may be taken without any notice whatsoever. The cost of such City action shall be deducted from the payment then or thereafter due the Contractor and the Contractor shall pay to the City any excess of cost over such payment due.

6 m. CITY'S RIGHT TO DO WORK

At least 24 hours before blocking any street, the Contractor shall notify the Chief of the Bureau of Fire.

6 l. NOTICE TO BUREAU OF FIRE

The Contractor shall conduct the project with a proper regard for the safety and convenience of the public. When the project involves use of public ways the Contractor, as required by the Specifications or the Engineer, shall provide flagmen when needed and install and maintain means of free access to all fire hydrants, service stations, warehouses, stores, houses, garages and other property at all times. Private residential driveways shall be closed only with approval of the Engineer or specific permission of the property owner. The Contractor shall not interfere with normal operation of public transit vehicles unless otherwise authorized. The Contractor shall not unnecessarily obstruct or interfere with travel over any public street or sidewalk. Where detours are necessary, they shall be maintained with good surface and shall be clearly marked. Open trenches and excavations shall be provided with adequate barricades of a type approved by the Engineer which can be seen from a reasonable distance. At night all open work and obstructions shall be marked by lights. The Contractor shall install and maintain all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges and facilities. Safety instructions received from the Engineer or governmental authorities shall be observed, but following of such instructions shall not relieve the Contractor from his responsibility or liability for accidents to workmen or damage or injury to person or property.

6 k. PUBLIC SAFETY AND CONVENIENCE

If Saturday, Sunday, holiday or overtime work is to be performed, the Engineer or his Inspector shall be notified 24 hours in advance.

6 j. NOTIFICATION OF OVERTIME WORK

6 n. TERMINATION OF OR DEFAULT ON CONTRACT

All terms and conditions of the contract are considered material, and failure by the Contractor to comply with any of said terms or conditions shall, at the option of the City, be deemed a breach of the contract. Upon such failure the City shall have the right, whether an alternative right is provided or not, to declare the contract terminated. The issuance by the City or by the Engineer of an order stating that the contract is terminated, and service of a copy of said order upon the Contractor and the bonding company, shall be deemed a complete termination of the contract. Upon the contract being so terminated, the City may retain all sums due under the contract and both the Contractor and his sureties shall be liable under his bond for all losses, expenses and damages caused to the City by reason of his failure to complete the contract, and the surety shall be required, at the City option, to complete the project notwithstanding such termination, the Contractor and his sureties shall remain liable under the terms of the contract for work performed prior to such termination. If the Contractor fails to begin work as required by the contract or if at any time he refuses, neglects or fails, in the judgment of the Engineer to have available on the work a sufficient amount of suitable materials, adequate equipment and a sufficient force of competent workmen to insure completion of the work within the specified time, or if the Contractor fails to make adequate progress in the prosecution of the project so that its completion within the specified time is endangered, or if the Contractor fails to perform the work in good faith, in an acceptable manner, in accordance with the Specifications, or if he refuses, neglects or fails for any reason whatsoever to observe any of the terms and conditions of the contract, or if he abandons the work, the Engineer may give the Contractor written notice specifying the default and requiring its correction. Should the Contractor, for three (3) days after receipt of such notice of default, fail to proceed in accordance therewith to remedy such default, he shall, when so ordered in writing by the City, discontinue or not begin the work, and any or all payments due or that may become due to the Contractor may be withheld by the City until the completion by City or another person of all work included in the contract, and expiration of any maintenance and/or guarantee period.

The City may, for good and sufficient reason, suspend temporarily, Contractor's operations on the project or upon any part of it. In the

6. o. SUSPENSION OF WORK

None of the foregoing provisions shall be construed to require the City to complete the work, nor to waive or in any way limit or modify the provisions of the contract relating to the fixed and liquidated damages suffered by the City on account of the failure of the Contractor to complete the project within the time prescribed.

Upon completion of the project under the contract, the Contractor shall be entitled to the return of all his material which has not been used in the work, of his plant, tools equipment and other property, provided, however, that he shall have no claim on account of usual and ordinary depreciation, loss, wear and tear.

The Contractor shall continue to prosecute to completion all the work from which he has not, as above provided, been ordered to desist, and he shall cooperate with and in no way hinder or interfere with the forces employed by the City or other Contractor or otherwise, to do any designated part of the work as above specified.

After service on the Contractor of such order to desist from work or part thereof, the City may take possession of the project or such designated equipment, materials or other property on the project, none of which shall be removed by the Contractor as long as they may be required for the work, and the City may, by contract or otherwise, provide the supervisions of workmen, materials, appliances and equipment necessary for the completion of, and may complete the project of such designated part thereof. The expense so incurred for the completion of the project or part thereof, together with all damages liquidated or otherwise sustained or to be sustained by the City, shall be deducted from the fund or appropriation set aside for the purpose of the contract and shall be charged to the Contractor as if paid to him. In case the amount of such expenses and damages shall exceed the sum which would have been payable under the contract if completed entirely by the Contractor, the amount of such excess shall be paid to the City by the Contractor and both he and his sureties shall be liable to the City therefor; in case the amount of such expenses and damages shall be less than the sum which would have been payable under the contract if completed entirely by Contractor, he shall be entitled only to payment in accordance with the contract terms for the work Contractor actually performed, subject, however, to all the terms of said contract.

The Contractor shall comply with all of the provisions of the laws of the State of Oregon, ordinances of the City, and governmental regulations relating to the employment of labor. Contractor agrees that no person shall be required or permitted to labor more than eight (8) hours in any one day, or forty (40) hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, in which event, the person or persons so employed for excessive hours shall receive at least time and one-half pay for all overtime in excess of eight (8) hours a day, and for work performed on Saturday and on legal holidays. This subsection does not apply to the employment by a contractor of foremen, watchmen and timekeepers paid on monthly rate, and this subsection shall not apply to labor performed in the manufacture or fabrication of any material ordered by the Contractor or manufactured or fabricated in any plant or place other than the place where the main contract is to be performed.

6 p. WORKING CONDITIONS

Contractor shall comply with the work preference provisions contained in Section 5-1801 of the Public Works Code of the City as though fully set forth herein, and any violation of the provisions thereof shall render the contract void.

Contractors shall in the performance of contracts, give preference to local labor and before employing non-resident labor shall notify the appropriate Commissioner of said City of his intention to do so, stating in said notice his reasons for employing said non-resident labor. If the Contractor gives preference to non-resident labor the Council may, at its option, terminate this contract and the Contractor shall in such event forfeit all rights hereunder.

6 p. LOCAL LABOR

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The City will provide the rights of way and easements necessary for the work. It shall be the responsibility of the Contractor to obtain information regarding width, status and special conditions attached to particular sections of the rights of way or easements which may be found in the Plans or Specifications, or can be obtained from the Engineer. Special occupancy and use of public ways are subject to permits issued by the proper authority. The use of private property outside of the designated right of way, for storage of materials or spoil, construction of access roads or other usage, must be arranged by the Contractor at his expense.

6 u. RIGHTS OF WAY

Contractor must present to the inspector satisfactory evidence that a permit from the governing authority has been obtained designating each hydrant that may be used for obtaining water for the project before these hydrants may be used. Cost of water and all expense incidental thereto, shall be borne solely by the Contractor unless otherwise noted in the Specifications.

6 t. WATER SERVICE

Any information shown on the plans as to the location of existing water courses, drains, sewer lines or utility lines, which cross or are adjacent to the project, has been compiled from the best available sources, but is not guaranteed to be accurate. The Contractor shall provide for the flow of all sewers, drains 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. The Contractor shall make excavations and borings ahead of his work, where necessary, to determine the exact location of interfering utilities or services. He shall support and protect private or public utility lines or other services, where necessary, in a manner approved by the Engineer, and Contractor shall be responsible for damage or interruption of service that may be due to his operations. Arrangements must be made by the Contractor with respective owners for moving or maintaining any lines or services which must be cut or moved because of the work. All costs resulting from interferences or obstructions, whether or not herein specifically mentioned, shall be borne solely by the Contractor.

6 s. INTERFERENCE AND OBSTRUCTIONS

Until acceptance of the project, the Contractor shall at all times protect from damage all public property and private property which may be affected by the work and preserve all materials, supplies, equipment of any description, and all work already performed. Contractor shall be responsible for protecting same from the nature of the work, the action of the elements, damage by any person or persons or from any other cause whatsoever.

6 r. PROTECTION OF WORK AND PROPERTY

The Engineer shall set stakes for lines and grades in conformity with the plans and with customary engineering practices for the particular type of work involved, and the Contractor shall not be expected to furnish men or materials for the initial staking of the work. The Contractor shall give forty-eight (48) hours notice to the Engineer when stakes or levels are required upon any part of the work. All stakes, bench marks or monuments shall be carefully protected and preserved, and shall not be changed by the Contractor or any of his employees. If they are required to be replaced unnecessarily, due to carelessness or other reason, the Contractor shall be charged the expense thereof, and the same may be deducted from any payment. After the original staking of the work, if it be necessary to replace stakes that are unavoidably moved, or to give supplemental stakes or elevations, or to check measurements or elevations previously given, the Contractor shall, for brief intervals, furnish the Engineer with men to assist him in such work.

6 w. LINES AND GRADES

Whenever the project or work thereunder involves the crossing of any railroad line or the encroachment on any railroad right of way, unless otherwise specifically noted in the Specifications, the Contractor shall submit a program of his proposed operations within the railroad right-of-way area which shall be approved by the appropriate railroad officials and the Engineer before the work is started within such area. The Contractor shall pay for services of flagmen and/or watchmen furnished by the railroad company and provide and drive piling, set cribbing, build bridges or tunnels, install enclosing pipe, and do all other work required by the railroad company or necessary for the safety or maintenance of railroad traffic. Contractor agrees to furnish any bond required of the City by the railroad company as a result of such intended operations and agrees to indemnify the City for any and all expenses incurred by the City, and to assume any and all liability or claims thereof imposed on the City as a result of Contractor's operations in the railroad right-of-way area. All costs resulting from interferences, obstructions or liabilities set forth in this subsection, whether or not herein specifically mentioned, shall be borne solely by Contractor.

6 v. RAILROAD RIGHT OF WAY

Any blasting or use of explosives on any City project requires a permit and is subject to all the provisions relating thereto contained in Article 21 of Ordinance No. 76339 (Police Code of the City) and also

6 z. BLASTING AND USE OF EXPLOSIVES

As a condition precedent to final acceptance of the project, Contractor shall remove all equipment and temporary structures, and all rubbish, waste and generally clean up the right of way and premises to conform substantially to conditions as they existed before the improvement was made, as the Engineer may determine.

6 y. CLEANING UP

The Contractor shall, without cost to the City, make all necessary repairs and replacements to remedy, in a manner satisfactory to the Engineer, any and all defects, breaks, or failures of the work occurring within the periods fixed in this paragraph due to: faulty or inadequate materials or workmanship; disturbances of or damage to City improvements under, within, or adjacent to the work; or settling, washing, or slipping from any cause. When such defects or damages occur within one year following the date of acceptance of the work in any part of the surface rock done under the contract, or in adjacent surface improvements not included in the work under this contract, including but not limited to pavements, curbs, walks, tracks, poles, wires, walls, stairways, buildings or other surface structures, the contractor shall repair the same without cost to the City and the one-year maintenance period required of the Contractor shall, with relation to such required repair, be extended one year from the date of completion of such repair. When such defects or damages occur within two years following the date of acceptance of the work, in any part of the subsurface work done under this contract or in any adjacent subsurface improvement not included in the work under this contract, including but not limited to sewers, drains, culverts, other drainage structures, pipes, valves, conduits, conductors, base-ments, foundations or other subsurface structures, the contractor shall repair the same without cost to the City and the two-year maintenance period required of the Contractor shall, with relation to such required repair, be extended two years from the date of completion of such repair.

6 x. MAINTENANCE

It shall not be considered a part of the Engineer's work to provide grade, line or batter boards or to transfer lines and grades from the stakes to such boards, or to measure and lay out the work, or to furnish elevations beyond these initial elevations beyond those initial elevations customarily set by the Engineer.

applicable provisions contained in Ordinance No. 114851 (Fire Code of the City), and also is subject to all of the laws, orders and regulations of any other governmental authority in whose jurisdiction such work may be done.

7. ACCEPTANCE AND PAYMENT FOR WORK

7 a. Payments

Payments for all work under the contract will be made at the price or prices bid therefor, and the prices shall include full compensation for all incidental work.

Before any payment is made under the contract for the particular project, the Contractor or his surety and every subcontractor or his surety performing the work on the project during the period covered by the payment, shall first file with the City Auditor a statement in writing under oath, in form prescribed by the State Labor Commissioner, certifying the hourly rate of wages paid each classification of workmen not exempt by statute, employed by him upon such project and further certifying that no workman employed by him upon such project, has been paid less than the minimum prevailing rate of wage as required by these Specifications. Such certificate shall be supplied by the Contractor and all subcontractors who have performed any work on the project up to the time of such payment and shall comply with Oregon Revised Statutes, Chapter 279. A new certificate shall be filed before each payment.

Progress payments will not be made unless authorized by the Special Specifications. When progress payments are authorized by the Special Specifications, progress estimates of the work performed will be made by the Engineer near the end of each calendar month. These estimates shall include the value of the labor performed and materials incorporated in the work since commencing of the work under contract. Such estimates need not be made by strict measurements but they may be approximate only, may relate to the cost schedule mentioned herein, and shall be based upon the whole amount of money that will become due according to the terms of the contract when the project has been completed. If the contract price is determined, in whole or in part, on a lump sum basis, an estimated cost schedule relating thereto shall be prepared by the Contractor and approved by the Engineer before the start of the work, and progress estimates based on said estimated cost schedule shall be made by the Engineer and shall be the basis for the progress payments required by the contract.

If the contract price is determined wholly on a unit bid basis, the Engineer may use the unit prices bid by the Contractor in his proposal in making progress estimates on the work. In case the said unit prices do not, in the opinion of the Engineer, truly represent the actual relative costs of the different parts of the work, he may use a percentage of the unit price in making progress estimates. The Engineer may include in such progress estimate, eighty-five (85%) per cent of the cost to the Contractor of materials delivered to the site, properly stored, protected from damage and insured, provided that after any such payment such materials must be used in the particular project.

The Engineer may at any time, by written order, and without notice to the sureties, make changes in the Plans and/or Specifications of this

7 e. Changes

The City shall be given facilities to obtain complete cost data on the project. The Contractor shall permit full access to all bills, payrolls, and other data, shall provide a list of tools and equipment used, and generally shall cooperate with City representatives.

7 d. Cost Data

Payments may at any time be withheld if the work is not proceeding in accordance with the contract or if in the opinion of the Engineer the Contractor is not fully complying with the requirements of the contract.

7 c. Payments May Be Withheld

Payments shall be based on measurements of the completed work in accordance with United States Standard Measures and the units of measurement for payment shall be as shown on the Plans or as specified in the Specifications. The Engineer will make the measurements at no cost to the Contractor. In calculating quantities, all lengths and areas will be based on horizontal and vertical measurements unless otherwise specified.

7 b. Measurement of Pay Quantities

When the progress estimate indicates that the progress payment would be less than five hundred dollars (\$500), no progress payment will be made for that estimate period. The making of such progress payment shall, under no circumstances, be construed as an acceptance of any of the work or materials under the contract.

Progress estimates will be acted upon by the City Commissioner under whom the project fails, on or before the 20th of the following month and warrants will be issued by the City Auditor for the amount of estimate, less twenty per cent retainage when the work or any part thereof is to be paid for from a special assessment fund, or fifteen per cent (15%) retainage when none of the work hereunder is to be paid for from a special assessment fund. Such amount of retainage shall be withheld and retained by the City until after the project is completed, tested, and accepted by the City and satisfactory evidence has been furnished to show that all bills have been paid and satisfied and all claims and damage actions have been settled or are adequately covered by insurance. If the Contractor fails to complete the project within the time limit fixed in the contract or any extension thereof, no estimates shall be made or progress or other payments allowed thereafter until the project is finally completed.

When extra work is ordered by the Engineer to be done on a force account basis, such work will be paid for on the basis of cost plus certain percentage allowances.

7 g. Force Account

Payments for extra work shall be made and rendered with progress and final payments.

Extra work may also be performed at an agreed price in writing instead of by force account at the direction of the Engineer.

All extra work shall be done in accordance with the terms and provisions of this contract and shall be subject to the same control and inspection as regular contract items.

The Engineer may at any time by a written order, without notice to the sureties, require additional work which the Engineer finds necessary or appropriate in connection with the contract but not within the scope thereof, and not classified by the Engineer as incidental work which may result in alterations in the amounts of work for which unit prices have been established in the contract. Upon such order the Contractor shall carry out such work at prices agreed upon between the Contractor and the City, but in no event exceeding the unit prices established in the contract. When such order pertains to work of a class or classes for which no unit prices are so established, then the agreed adjustment shall be based either on unit prices decided on fair and equitable grounds or shall be a lump sum similarly decided, as the City may determine, or such work may be done as extra work at force account. In no case shall the Contractor make any claim for extra work unless ordered as such.

7 f. Payment for Extra Work

contract and within the general scope thereof. If such changes cause an increase or decrease in the amount due under the contract, or in the time required for its performance, an equitable adjustment shall be made and the contract shall be modified accordingly by written change order. The decision of the City Council as to the amount of the adjustment to be made, if any, shall be final and binding. Any claim of Contractor under this clause must be asserted in writing within 30 days from the date of receipt by the Contractor of the notification of change; provided, however, that the City, if it determines that the facts justify such action, may receive and consider and adjust any claim prior to the date of the acceptance of the project. But, nothing provided in this clause shall excuse Contractor from proceeding with the prosecution of the work as changed. Except as otherwise herein provided, no charge for extra work or material will be allowed. In determining the adjustments to be made, if any, no allowance to Contractor will be made for anticipated profits.

Payment for purchased materials and supplies used on force account work will be computed at the prices billed to the Contractor or subcontractor by the supplier, less all discounts plus the allocable allowance set forth on the preceding page. It shall be presumed that the Contractor or his subcontractor has taken advantage of all possible discounts on bills for materials and supplies, and such discounts shall be subtracted from the total amounts of bills regardless of any failure of the Contractor to take advantage of same.

Freight and express on material and supplies will be considered to be a part of the cost of the materials and supplies and will be paid for as materials and supplies.

Materials and supplies produced by the Contractor or a subcontractor will be paid for at prices to be agreed upon between the Contractor and the Engineer, which prices shall be no greater than the prices at which

The payment to be made for labor used in the work will be computed at the rates actually paid to the laborers by the Contractor or subcontractor, plus the allocable allowance set forth above, unless these rates are in excess of the current local rates, in which event the payment shall be computed at the current local rate, plus allocable allowances. The time allowed shall be the number of hours worked directly on force account operations.

Rental on each piece of equipment having a value in excess of \$100. 5

Materials and supplies actually used on the force account work. 5

Employer's contributions under the Unemployment Compensation Act and under the Social Security Act for old age insurance. 15

Employer's contribution to State Industrial Accident Fund under terms of Workmen's Compensation Act. 15

Labor, including time of foreman, while engaged directly upon force account work. 15

Items of Cost for Which Payments Will be Made	
Percentage	Cost
Allowance	To Actual
Additional	

The items of cost for which payment will be made and to which payment will be restricted, together with the percentage allowance applicable to the respective items, are as follows:

The percentage allowances made to the Contractor in accordance with the terms outlined above will be understood to be reimbursement and compensation for all superintendence, use of tools and small equipment, overhead expense, bond cost, insurance premiums, profits, indirect costs and losses of all kinds, and all other items of cost not specifically designated herein as items for which payment is to be made, whether the services, costs and other items involved are furnished or incurred by the Contractor or by the subcontractor. No other reimbursement, compensation or payment shall be made for any such services, costs or other items.

The rentals allowed for equipment will in all cases be understood to cover all fuel, supplies, repairs, and renewals, and no further allowances will be made for those items unless specific agreement to that effect is made in writing before the work is commenced. Individual pieces of equipment having a value of one hundred dollars (\$100) or less will be considered to be tools or small equipment, and no rental shall be allowed on such.

For equipment rented on a day or hour basis, rental will be allowed for only those days or hours during which the equipment is in actual use. For equipment rented on a monthly basis, straight time rental will be allowed from the day the equipment is first used on the particular piece of force account work until and including the last day on which it is used on that particular work, excluding, however, the time during which the equipment is used on other work during the period, and further excluding the time that the equipment is idle for a continuous period of more than six (6) days.

When a piece of equipment and the operators thereof are hired, rented, or furnished as a unit, the additional percentage to be allowed shall be five (5) per cent, and the Contractor shall not be entitled to fifteen (15) per cent on the time of the operators of such equipment. Neither shall the Contractor be entitled to payment for contributions made under the terms of the Workmen's Compensation Act, the Unemployment Compensation Act, or the Social Security Act to cover the time of operators of equipment hired, rented or furnished on this basis.

Rental on equipment used will be computed at the rates actually paid by the Contractor or subcontractor plus the allocable allowance set forth on the preceding page unless these rates are in excess of the current local rates, or unless the equipment is owned by the Contractor or subcontractor, in either of which events payments shall be computed at rates to be agreed upon between the Contractor and the Engineer prior to beginning work, which rates shall in no case be greater than the current local rates.

the materials and supplies can be obtained elsewhere.

Upon notification by the Contractor that the work is completed and ready for final inspection, the Engineer shall make such inspection as soon as possible. If he finds that the work covered by the contract has been fully and satisfactorily completed, the Engineer shall so notify the Contractor and the City Commissioner under whom the project falls, shall make a final estimate and shall recommend acceptance of the work as of a certain date. Upon approval and acceptance, the Contractor will be paid a total payment equal to the amount due under the contract less the retained percentage. Payment of this final estimate will be made at the same time in the month and in the same manner as provided for progress estimates. This retained percentage shall be retained for a period of thirty days following the final acceptance of the project. Every person performing labor or furnishing material or supplies toward the completion of the project, shall have a lien upon such retained percentage provided such notice of lien shall be given in the manner and within the time provided by law.

7 f. Acceptance and Final Payment

If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a subcontractor by any person in connection with the project as such claim becomes due, the City may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due the Contractor by reason of his contract. Payment by City of such a claim shall not relieve the Contractor or his surety from his or its obligation with respect to any unpaid claims.

7 h. Payment of Labor or Services Claims

All claims for extra work done in any month shall be filed in writing by the Contractor with the Engineer before the fifth of the following month, and such claims shall show the names and number of each workman employed thereon, the date and the number of hours so employed, the character of work he is doing and the wages paid or to be paid him; also the claim shall show the materials delivered for the extra work, the quantity and character of such material, from whom purchased and the net amount paid or to be paid therefor.

Should any percentage allowance or other corresponding allowance be made by the Contractor to a subcontractor, in connection with force account work, such allowance shall be at the sole expense of the Contractor and the Contractor shall not be reimbursed or otherwise compensated for the same by the City.

If all or any portion of the project has been designated by the City prior to award of contract as a local improvement to be paid for, in whole or in part, by local improvement assessment and the City has created a local improvement assessment district therefor, then it is expressly agreed and the contract is made upon the condition that the Contractor will look for payment for the material and work contracted for, to the special assessment fund created by assessment upon the property benefited by such local improvement, collected and paid into the City treasury for that purpose, and to the owners of the real property within that assessment district; as to the whole of the payments in case the project is to be paid for solely by the special assessment procedure, or for so much thereof as may be allocated by the City to the special assessment procedure in case only part of the project is to be paid therefrom; the Contractor shall not require the City or any of its officers to pay the same, excepting out of such special fund so assessed and collected into the City treasury for such purpose, nor seek to enforce the payment of the same or any part thereof against the City or any of its officers by legal process or otherwise, or out of any other fund, or in any manner otherwise than as herein provided.

7 j. Special Assessment Fund

If the City declares a default of the contract, and the surety completes said contract, all payments after declaration of default and retainages held by the City, shall be paid to the surety and not to the Contractor in accordance with the terms of the contract.

Upon completion of such prerequisites, Contractor shall be paid the retained percentage except for any special retainage required under the contract.

If the City declares a default of the contract, and the surety completes said contract, all payments after declaration of default and retainages held by the City, shall be paid to the surety and not to the Contractor in accordance with the terms of the contract.

As a further prerequisite to final payment, Contractor shall execute and deliver to the City in form approved by the City Attorney, a receipt for all amounts paid or payable to Contractor under the contract, and a release and waiver of all claims against the City growing out of or connected with the contract and shall furnish satisfactory evidence that all amounts due for labor, materials and other obligations under the contract have been fully and finally settled or are fully covered by insurance protecting the City, its officers, agents and employees as well as the Contractor.

Before final payment of retained percentage is made under the contract, the Contractor or his surety and every subcontractor or his surety shall first file with the City Auditor a statement in writing under oath as heretofore set forth, certifying the hourly rate of wage paid each non-exempt classification of workmen employed by him upon such project. Such certificate shall be supplied by the Contractor and all subcontractors who have performed any work on the project up to the time of such final payment, and shall comply with Oregon Revised Statutes, Chapter 279.

GENERAL CONSTRUCTION DETAILS

SECTION F

Subsec. 1 Streets

SUB SEC. I STREETS

1. SUBGRADE FOR PAVEMENT

Pavement subgrade is the surface of the roadbed material which has been prepared as specified herein upon which a layer of subbase and pavement or surfacing is to be placed. Subgrade shall be even and shall conform to plan grades and cross sections. The grade of the subgrade shall not be raised or adjusted to compensate for anticipated settlement under weight of pavement. The roadbed material, of which the subgrade is made, shall be compacted to produce a density of not less than that required for embankment. Rolling shall continue until a firm even surface is produced and the entire thickness of the loosened layer of material is uniformly dense and compact. Before any material is placed on a low subgrade to correct grade or cross section, the roadbed to be altered shall be watered if required, and shall be loosened to a depth of 2 inches. The corrected subgrade shall then be made. Subgrade which becomes damaged from the Contractor's operations or negligence shall be remade at the Contractor's expense.

All soft and spongy places in the subgrade shall be excavated to a firm foundation and the places refilled with approved material. The refilled places shall be rolled as specified for embankment and brought to proper grade. Excavation below subgrade shall be paid for upon unit prices quoted for the particular material and all refilling to subgrade shall be paid for as embankment, provided, however, that if such refilling be made with broken stone or material other than earth, payment will be made upon the basis of the unit price for the particular material.

Where the subgrade is too sandy to be rolled and tamped, it shall be compacted by water. No pavement or pavement base of any kind shall be placed on any section of the work until the subgrade for that section has been completed, examined for grade and approved by the Engineer for pavement, or pavement base construction.

Should the subgrade at any time become soft or churned up with the base course material, the contractor shall, without additional compensation, remove the material from the affected portion, reshape and compact the subgrade and replace the removed section of base to true grade and shape with crushed rock or gravel as ordered by the Engineer. Base rock shall not be placed on frozen subgrade.

2. ADJUSTMENT OF MANHOLE AND INLET FRAMES AND OTHER HARDWARE

The adjustment of manhole and inlet frames and other hardware to conform to the grade of the finished pavement and the payment therefor shall be absorbed in the unit cost of excavation unless otherwise stipulated in the Special Specifications and/or plans.

4.a. General. Concrete base and concrete pavement shall have the thickness shown on the plans and called for in the Special Specifications and/or Plans. The concrete shall be furnished and placed in accordance with the requirements of Sub Sec. V (Portland Cement Concrete) of these "General Construction Details." When the City's quality tests indicate faulty materials or workmanship, the Engineer may require further testing of all materials including the finished concrete at the contractor's expense; these tests shall conform to the A.S.T.M. testing procedures for the respective material tested.

4. CONCRETE BASE AND PAVEMENT

3 d. Finished Surface. The finished surface of the base shall not vary more than 3/8 inch from a ten-foot straight edge applied to the surface parallel to the center line of the pavement nor more than 1/2 inch from a template conforming to the cross section shown on the Plans. The edge grade of the completed course shall not deviate from the plan grade by more than 3/4 inch. Finished base which does not conform to the above requirements shall be bladed, watered, and thoroughly recompact to conform to the requirements.

The base shall be watered as ordered by the Engineer and compacted by rolling with rollers of approved type. Each roller shall weigh not less than ten tons. Rolling shall commence at the outside edges of the base and progress toward the center of the roadbed until there is no visible disturbance of the stone ahead of the roller. Under no circumstances shall the center of the base material be rolled first. Should low or high spots develop during rolling operations, such spots shall be smoothed out by blading with a self-propelled pneumatic-tired motor grader. The surface of the base course shall be maintained as required until the paving is completed.

3 c. Base Course. The base material shall be laid in two courses and unless otherwise required by the Special Specifications or Plans, the bottom course shall be 3"-0 gravel (not crushed) and the top course shall be 3/4"-0 crushed rock or crushed gravel. Each course shall be spread uniformly over the entire roadway to such depth that it shall be of the required thickness as called for in the Special Specifications and/or Plans after being bladed, sprinkled if necessary, rolled and compacted to a uniform crown and grade. The spreading and shaping shall be so performed as to prevent the separation of the coarse from the fine particles of material.

3 b. Materials. The materials used shall conform to the requirements of Sub Sec. VII (Materials).

3 a. General. The base to which these Specifications apply is a gravel or crushed rock base which is to be surfaced with a hot mixed, hot laid asphaltic concrete pavement.

3. GRAVEL AND CRUSHED ROCK BASE

5 c. Parking Strips. The parking strips shall be graded to an even contour between the walks and the curb line and the contractor shall not place any refuse material within this area.

Any part of the sidewalk damaged by foot traffic or other causes occurring prior to its final acceptance shall be repaired or replaced by the contractor at his expense in a manner satisfactory to the Engineer.

5 b. Protection of Work. Barriers protecting the work shall not be removed except upon permission of the Engineer and until they are removed the new sidewalk shall not be used.

5 a. General. Details shall conform to the requirements of Subsec. V (Concrete) and the standard Plans.

5. CONCRETE CURBS AND SIDEWALKS

4 d. Basis of Payment. All materials will be paid for in place by use of unit measure and prices, and all work and materials will be computed by horizontal measurement, unless otherwise provided for in the Special Specifications.

Any part of the pavement damaged by traffic or other causes occurring prior to its final acceptance shall be repaired or replaced by the contractor at his expense in a manner satisfactory to the Engineer.

4 c. Protection of Work. No traffic shall be allowed on the base or pavement until lab tests indicate that the design ultimate strength has been attained, except that street intersections required to be kept open for traffic shall be bridged or constructed with high early cement and opened to the public 48 hours after finishing.

If the crown section of the pavement or base is uniform the subgrade shall be checked by means of a template immediately before placing the concrete and any high spots that appear shall be cut down to conform to the specified section. Depressions or low spots in earth subgrade but not in select material subgrade may be filled to a depth of not more than 1/2 inch with sand which shall be watered and struck off to the required grade and so maintained until the concrete is placed. If the crown section is variable, grade stakes shall be set to the surface of the base or pavement and shall be removed when the concrete is laid beyond them.

4 b. Subgrade Treatment. The concrete shall be placed on a thoroughly compacted subgrade sufficiently moist to insure that no moisture will be absorbed from the fresh concrete.

6 d. (1) General. Paving plants shall be so designed, coordinated and operated as to produce uniform mixtures within the job-mix tolerances. Thermometric equipment shall be provided to record or indicate the temperature of bituminous cement near the charging valve at the mixer and to record the temperature of the heated aggregates at the drier. These devices shall be accurate and satisfactory to the Engineer.

6 d. General Plant and Equipment Requirements. All equipment, tools, machinery and other appliances used in handling materials and executing any part of the work shall be subject to the approval of the Engineer before the work is started and whenever found unsatisfactory shall be changed and improved as required by the Engineer. All plants shall be maintained in a satisfactory working condition and shall conform to the following requirements:

If fine aggregate partly of natural sand and partly of manufactured sand or fines is furnished, it shall be intimately blended at the producing plant by mechanical processing; or, if not so blended the natural sand shall be kept separate from the manufactured sand or fines and each kind of material shall be delivered into a separate pile or placed in a separate bin at the paving plant site.

6 c. Handling and Storing of Aggregates. The handling of fine and coarse aggregates at the producing plant, in delivery, and in storage at the paving plant site shall be such as will prevent the segregation of materials or the intermingling of separate gradings or kinds of aggregates.

6 b. Composition of Asphaltic Concrete. The asphaltic concrete shall be composed of bituminous cement, mineral filler, fine aggregate and coarse aggregate intimately combined and mixed together in the proportions hereinafter specified and conforming to the requirements of Sub. Sec. VII (Materials) of these "General Construction Details."

6 a. Description. This specification shall apply to pavements consisting of one or more courses of plant-mixed, hot-laid asphaltic concrete. The number of courses of which the pavement is to consist and the cross-section of each course shall be as indicated by the Plans and the Specifications.

6. ASPHALTIC CONCRETE PAVEMENT

5 d. Pay quantities. The unit price for sidewalk and/or curb shall be for completed work and no allowance shall be made for excavation or embankment, or for removal of stumps, old walks, curbs, or other material except for an amount of excavation or embankment in excess of the volume displaced by the sidewalk and/or curb.

Scales for the weighing of aggregates may be of either the beam or spring-less dial type and shall be of a standard make and design, accurate to 0.5% of

form to the following requirements:
 6 d.(6) Requirements for Batching Plants. All batching plants shall conform to the following requirements:

the compartment may be taken for sampling and testing purposes. compartment shall be provided with a gate or other means by which materials in cut off quickly and completely, and to be without leakage when closed. Each shall be provided with its individual outlet gate designed and constructed to be adequate to satisfactorily perform their intended uses. Each compartment a "tailing" pipe for rejections. The sizes and locations of these pipes shall an overflow pipe to prevent backing up of materials into other compartments and are stated in the table given in Subsec. VII. Each compartment shall have for the sizes or gradings above the No. 10 sieve for which separate percentages bin shall be reserved for aggregates passing the No. 10 sieve, and the others separate and adequate storage of appropriate fractions of the aggregates; one capacity. Bins shall be divided into at least 3 compartments arranged to insure be of sufficient capacity to supply the mixer when it is operating at full

6 d. (5) Aggregate storage bins. Storage bins to supply the mixer shall

maximum plant production. however, double jacketed screens may be used if of satisfactory performance at the mixer, shall be provided. Screens shall be of the shaker or vibrating types; specified size and having normal capacities in excess of the full capacity of 6 d. (4) Screens. Plant screens, capable of screening all aggregates to a

of the Engineer. all or any part of the collected material to the hot elevator, at the direction aggregate dust collector system so constructed as to waste or return uniformly during the heating and drying process. It shall be equipped with a The drier shall be of a type and design which will continuously agitate the

mix. shall provide a uniform delivery of the aggregates to the drier in the proportions closely approximating the proportions required in the asphaltic concrete production, proportioning and temperature will be obtained. The means used means for uniformly feeding cold aggregates into the drier so that uniform 6 d. (3) Drier. The plant shall be provided with an accurate mechanical

period. cement shall provide proper and continuous circulation during the entire operating entire contents thereof will be provided. The circulating system for bituminous shall contact the heating tank or kettle, and so that uniform heating of the set forth in the Specifications. Heating shall be by such means that no flame under effective and positive control at all times, to temperature requirements storage of bituminous cement shall be capable of heating the bituminous cement, 6 d. (2) Bituminous cement storage and heating. Tanks or kettles for

The plant shall include a means for calibration of aggregate feed
 offices by means of weight test samples. The materials fed out of the bins
 shall be by-passable to a test box or to test boxes, either in combined
 The proportioning of aggregate shall be by volumetric measurement. Each
 bin shall have an accurately controlled individual gate to form a feeding
 office for volumetrically measuring the material drawn from each bin com-
 partment. The feeding office shall be of adequate dimensions to provide a
 positive feed without bridging and with one dimension adjustable by positive
 mechanical means provided with a lock. Indicators graduated with a sub-
 division of inches to provide suitable accuracy of measurements shall be pro-
 vided on each gate.

6 d. (7) Requirements for Continuous Mixing Plants. Continuous mixing
 plants shall provide for accurate proportioning of aggregate and bituminous
 cement and shall conform to the following requirements:

The batch mixer shall be of the twin pugmill type capable of producing
 a uniform mixture with the job-mix tolerances set forth in Sub sec. VII
 (Materials). It shall have a sufficient number of paddles or blades of such
 type and arrangement and rotating at such speed as to quickly produce a
 uniformity, properly and thoroughly mixed batch of asphaltic concrete. The
 speed of the mixer shall be adjustable within reasonable limits and shall be
 operated at the speed directed by the Engineer.

Bituminous cement shall be introduced into the mixer either (a) through
 a weigh bucket and discharge combination of standard make and design or (b)
 by means of a volumetric meter indicating dial and discharge combination of
 proven accuracy, capable of being locked and automatically reset to give any
 desired discharge, delivering bituminous cement into each batch within a maxi-
 mum error of two (2%) per cent of the required weight, and so controlled as
 to begin flow into the mixer when the dry mixing period is over and to dis-
 charge all bituminous material required for batch in not more than 15 seconds
 after the flow has started.

Asphalt binder shall be weighed by means of springless dial scales having
 a capacity of not more than 500 pounds with one pound graduations for mixers
 with a manufacturer's rated capacity of 4,000 pounds or less and not more than
 1,000 pounds with one pound graduations for mixers with a manufacturer's rated
 capacity of over 4,000 pounds, or other scales of equal accuracy. Scale
 pointers shall be set at zero weighing.
 All scales shall be of suitable type and in good condition. Their accuracy shall be proved to the Engineer at
 such reasonable intervals as he may indicate.

Trucks for hauling asphaltic concrete mixtures shall have tight, clean and smooth metal beds that have been sprayed with a minimum amount of thin

Pavers shall employ mechanical devices such as equalizing runners, straightedge runners, eveners or other compensating devices to adjust the grade line so that minor changes in grade elevations will not be reflected immediately in the finished surface, and shall also confine the edges of the mixture to true lines. The screed or strike-off assembly shall operate by cutting, crowding or other practical action which is effective on mixtures without tearing, showing or gouging at the workable temperature specified, and which produces a finished surface without segregation and of the evenness and texture specified. The screed or strike-off assembly shall be adjustable as to level and, if so directed by the Engineer, shall have an indicating level attached thereto in full view of the operator.

6 e. Pavers, Trucks and Rollers. Asphaltic concrete pavers shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of asphaltic concrete 8 feet to 12 feet wide, true to line, grade and crown, and to the depth as noted on the Plans, with or without the use of side forms or side supports. Receiving hoppers shall be equipped with distribution screws to evenly place the mixtures in front of the screeds.

The continuous type mixer shall be of an approved pugmill type capable of producing a uniform mixture within the tolerance limits fixed by the specifications. The paddles shall be adjustable for angular position on the shafts and reversible to retard the flow of the mix. The mixer shall carry a manufacturer's plate giving the net volumetric contents of the mixer at the several heights inscribed on a permanent gauge. The output of the pugmill in pounds per second shall not be greater than the dead capacity of the pugmill, in pounds, divided by the specified mixing time in seconds.

Satisfactory means shall be provided to afford positive interlocking control between the feed of aggregates from the bins and the flow of bituminous cement from the meter or other proportioning source. This control shall be by interlocking mechanical means which can be locked to maintain the relationship of aggregate feed and bituminous cement flow desired or designated by the Engineer. Definite means shall be provided to indicate when each of the aggregate bins is not sufficiently full to insure the flow of aggregate required by the job mix.

aggregate form or separately from each bin. The plant shall be equipped to handle conveniently test samples of adequate quantity to provide an accurate feed orifice calibration commensurate with the aggregate size, the orifice opening and the plant capacity set up. An accurate platform scale with a minimum capacity of 500 pounds shall be provided.

fuel oil, paraffin oil or lime solution to prevent the mixture from adhering to the beds. Any truck causing excessive segregation of material by its spring suspension or other contributing factors, that shows oil leaks of any magnitude, or that causes undue delays, upon direction of the Engineer, shall be discharged from the work until such conditions are corrected. When the length of haul tends to excessive loss of heat of the mixture, or when weather conditions are such as to necessitate such protection, each load shall be covered with a tarpaulin while in transit to prevent unnecessary loss of heat or to protect the mixture from the weather.

Rollers shall be modern, self-propelled tandem or 3-wheeled rollers, in good condition, capable of reversing without back lash and shall weigh not less than 200 pounds to the inch width of tread. The compression wheels of three-wheeled rollers shall be at least 20 inches in width.

6 f. Preparation of Base. Base failures in existing pavements or bases shall be corrected by the entire removal of failed portions, when so directed by the Engineer, the removal being to prescribed depths. The subgrade shall then be thoroughly compacted and the repair made with materials meeting the requirements of the Specifications covering the kind or kinds of materials designated by the Engineer to be used in the repair.

Irregular or depressed surfaces of pavements of bituminous treated surfacings shall be brought to uniform contour by patching with asphaltic concrete mixture, thoroughly tamping and rolling it until it conforms with the surrounding surface. The size and grading of aggregates and proportions of materials in the patching mixture shall be varied as directed by the Engineer where the depressions to be patched are of such size as to justify the same.

Where asphaltic concrete mixture is to be placed directly on existing bituminous surfacings or on Portland cement concrete surfacings, the areas to be thus covered shall be made clean and free of dust, dirt, mud and other objectionable matter. If the new pavement is to overhang or abut the edges of such existing surfacings, the edges thereof shall be trimmed to remove ragged, broken or badly misshapen portions of the surfacings and to provide a satisfactory face against which to construct the new pavement, after which the edges shall be painted with a thin uniform coating of bituminous cement.

All existing Portland cement concrete, asphaltic concrete, or other bituminous surfaces shall, before any new asphaltic concrete is laid thereon, have applied a tack coat of emulsified asphalt (RS-1). This tack coat shall be applied with a pressure distributor, or in such other manner as the Engineer

6 h. Heating and Screening of Aggregates. Preceding the preparation of the asphaltic concrete mixture, the aggregates, exclusive of mineral filler, shall be dried to the extent that they have no surface moisture and not more than 1/2 of one (1%) per cent of contained moisture, shall be heated to the required temperature as set forth in 6 k., and immediately thereafter shall be separated into sizes or grades, one of the sizes or grades to be aggregate passing the No. 10 sieve, and the others to be the sizes or grades above the No. 10 sieve size for which separate percentages are stated in the table given in Subsec. VII (Materials).

If the methods and equipment used in the work do not produce results satisfactory to the Engineer in the above respects, then and in that event side forms of material and design satisfactory to the Engineer shall be provided so far as is considered necessary by the Engineer to provide adherence to specified grade and line, and to prevent lateral displacement or squeezing out or side shoving under the roller.

6 g. Side Forms. The use of side forms will not be required provided that the methods and equipment used in the work produce a pavement laid to neat, straight lines, proper thickness and specified crown, top width and grade without excessive spread beyond specified top width.

In all cases, the base upon which asphaltic concrete mixture is to be placed shall be prepared only a short distance in advance of the placing of asphaltic concrete mixture upon it, and under no circumstances shall any asphaltic concrete mixture be placed upon a base that is not thoroughly compacted, of proper grade and cross-section, free from ruts, irregularities and defects of all kinds, and which is dry and clean.

The applying of the tack coat and the painting of contact surfaces and pavement edges shall be done just prior to placing the asphaltic concrete mixture in contact therewith, or just sufficiently in advance thereof to provide an adhesive film of bituminous cement insuring good bond. Asphalt or asphalt stains which come upon surfaces of concrete or structures which will be exposed to view shall be promptly and completely removed.

Contact surfaces of curbs, gutters, catch basins, manholes, and other structures within the pavement areas shall be painted with a thin uniform coating of bituminous cement of the type designated by the Engineer and applied as directed by the Engineer.

The rate of application shall be from 0.05 to 0.10 gallons per square yard. Care shall be taken so as not to tack coat more of the existing pavement than can be covered by new pavement in the same day. The contractor must take every precaution to keep unnecessary traffic off the tack coat.

The ingredients of the mixture shall be heated, combined and mixed in such manner as to produce a mixture of such temperature that when deposited on the road it will be within the temperature range set forth in Section 6 k.

For batching plants, the mixing time, after introduction of bituminous cement, shall be not less than 30 seconds and as much longer as is necessary to obtain the specified results. For continuous mix plants, the mixing time in seconds shall be as determined by dividing the pugmill output, in pounds per second; and shall be regulated by fixing a minimum gauge in the mixing unit or by other satisfactory mixing unit adjustments.

The combined mineral aggregate shall be thoroughly mixed dry, after which the proper amount of bituminous cement shall be distributed over the aggregate and the whole thoroughly mixed for such period of time as is necessary to produce a homogeneous mixture, of unchanging appearance, in which all particles of mineral aggregate are uniformly coated with bituminous cement.

The proportions of the materials introduced into the mixer shall be as determined by the Engineer within the limits and ranges set forth in the table given in Subsec. VII (Materials).

The dried mineral aggregates, prepared as prescribed herein, shall be combined in the proportionate amounts of size or grading of aggregates required to meet the job-mix formula. Mineral filler, when used, shall be introduced in such manner that it will be uniformly incorporated in the mix.

6 j. Preparation of Mixture. The size of batch shall be as determined by the Engineer based on the manufacturer's capacity rating or the net cubic contents of the mixer below the center of the mixer shafts.

6 i. Heating of Asphaltic Cement. The asphaltic cement shall be heated in kettles or sumps so designed that the heating will be uniform throughout the entire mass and so that the heat can be positively controlled at all times. The temperature to which the asphaltic cement is heated shall be sufficient for proper mixing but shall not exceed the maximum temperature set forth in 6 k.

Each size or grade of the heated aggregates shall be deposited in a separate bin, each bin being provided with an overflow vent to prevent the overflowing of one bin into another, and the aggregate in each bin shall at all times be maintained uniform in size and grading.

On areas of irregular shape, of limited area or where unavoidable obstacles make the use of specified spreading and finishing equipment impracticable, in the judgment of the Engineer, the mixture may be spread and finished by blade grader or by hand methods which shall be performed in a skillful manner, without segregation of materials, and to specified grade, cross-section and smoothness.

The lengths of strips and the time of placing adjoining strips shall be such that the edge of any strip along a longitudinal joint shall have the adjoining strip constructed against it within 24 hours. No asphaltic concrete material shall be placed against the edge of a strip, course or layer of similar material that has been rolled and has cooled unless and until said edge has been prepared in the same manner as set forth for transverse joints in 6 n.

The mixture shall be delivered to and spread by an asphaltic concrete paver conforming to the applicable requirements of 6 e, and shall be thereby struck-off and finished to specified grade and cross-section. The mixture shall be laid in strips of such width as to hold to a practical minimum the number of longitudinal joints required.

The mixture shall be laid only on a base or surface which fully meets the requirements set forth in 6 f. The placing of the mixture will be permitted only on a stable subgrade when the atmospheric temperature is above 40 degrees Fahrenheit. The paving shall not be laid in water or during rainy weather unless expressly authorized or ordered by the Engineer.

6 l. Hauling, Spreading and Finishing. The mixture shall be transported from the mixing plant to the point of use in trucks conforming to the applicable requirements set forth in 6 e, of these Specifications. No loads shall be sent out so late in the day as to prevent completion of the spreading and compacting during daylight, unless artificial light satisfactory to the Engineer is provided. No hauling will be done over freshly placed pavement.

6 k. Temperature Limits. The temperature to which the aggregates and bituminous cement are to be heated and at which the asphaltic concrete is to be deposited on the road shall be in accordance with the following:

Degrees Fahrenheit to which aggregates are to be heated before mixing 250° to 325°
Degrees Fahrenheit to which bituminous cement is to be heated before mixing 250° to 300°
Degrees Fahrenheit at which asphaltic concrete is to be deposited on the road 250° to 300°

The motion of the roller at all times shall be slow enough to avoid displacement of the hot mixture. Any displacement occurring as a result of the reversing of direction of the roller, or from any other cause, shall be corrected at once by the use of rakes and of fresh mixture when required. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened with water but excess water will not be permitted.

Per Cent (%)	
95	Class "A" asphaltic concrete
92	Class "B" asphaltic concrete
92	Class "C" asphaltic concrete

Rolling shall be continued until the asphaltic concrete has been compressed to such extent that its specific gravity, expressed in percentage of the specific gravity of the combined aggregates, is not below the following minimum:

Each roller shall be operated by a competent, experienced roller operator and, while the work is underway, shall be kept as nearly as practicable in continuous operation. Rolling shall begin at the sides and progress gradually to the center, except that on super-elevated curves rolling shall progress from the lower to the upper edge parallel with the center line of the road and in each case uniformly overlapping each preceding track by not less than 1/3 the width of the roller until the entire surface has been completely rolled. If a 3-wheeled roller is used, the entire surface shall be covered and compacted with the rear or compression wheels.

6 m. Compacting. After the spreading, striking-off and finishing has been performed and while the mixture is still hot, the course of asphaltic concrete shall be compacted thoroughly and uniformly by rolling. The rolling shall be done with three-wheeled or tandem rollers weighing not less than 6 tons and at least one of which shall weigh not less than 10 tons. In general, one roller shall be provided for each 75 tons of mixture placed per hour or each 600 square yards of mixture placed per hour when the depth of course is such that 75 tons of mixture is spread over an area exceeding 600 square yards. On projects involving 1,000 tons or less of asphaltic concrete, only one roller (minimum weight of 10 tons) will be required.

Care shall be taken at all times to prevent segregation in the mixture as evidenced by areas of fine and coarse materials, and any portions where such segregation occurs shall be corrected with fresh mixture either spread and worked into the surface or by complete removal and replacement of segregated mixture, as directed by the Engineer.

6 o. Thickness of Lifts. Those courses of pavement which are of uniform thickness shall, if their thickness does not exceed three inches, be constructed in a single lift or layer. If their thickness exceeds three inches, such course shall be constructed in two or more lifts, no one of which is more than three inches in thickness, and each lift shall be separately distributed, spread and compacted in accordance with the foregoing specifications applicable to the particular course.

When the end of a course or strip of asphaltic concrete is to be temporarily subjected to traffic, the end shall be left on a bevel of approximately 10:1 (horizontal to vertical), being cut back to a bevel of approximately 1:1 to provide a fresh edge against which subsequently placed asphaltic concrete is to abut.

6 n. Transverse Joints. Placing of a course or strip of asphaltic concrete shall be as nearly continuous as practicable and the roller shall pass over an unprotected end of freshly laid mixture only when the laying of the course or strip is to be discontinued long enough to permit the mixture to become chilled. In all such cases, when the work is resumed, the material previously laid and permitted to become chilled shall be cut back or removed along the end so as to produce a slightly beveled edge for the full thickness of the course and the old, cut away material shall be removed from the work. The new mixture shall be placed or raked against the fresh cut, thoroughly tamped, and rolled to provide a smooth joint exactly meeting the line, grade and cross-section of adjoining asphaltic concrete after thorough compaction.

The surface of the asphaltic concrete after compaction shall be smooth and true to the established cross-section and grade. Any mixture that becomes loose or broken, mixed with dirt, or is any way defective shall be removed and replaced with fresh hot mixture, which shall be immediately compacted to conform with the surrounding area. Any areas showing an excess of bituminous cement due to improper rolling procedure shall be removed and replaced.

Along forms, curbs, headers, and walls, around manholes and catch basins, and at other places not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons or mechanical tampers. On depressed areas, a trench roller may be employed, or compression strips may be used under the roller, to transmit compression to the depressed area.

Generally, where an adjoining strip of asphaltic concrete is to be placed against a strip which is still hot, that 6-inch width of the strip of asphaltic concrete which is nearest the joint with a successive strip shall not be rolled until the adjoining strip has been placed against it, at which time the rolling of the successive strip shall overlap the 6-inch width of the preceding strip of asphaltic concrete. During the rolling operations, hand raking and spotting shall be performed at edges and joints of the mixture to provide neat lines at edges and smooth, uniform surfaces at joints.

The quantity to be paid for at the price bid per ton for a given class of asphaltic concrete shall be the amount of that class of asphaltic concrete mixture actually incorporated in the pavement, in accordance with the plans and

crete used in the work.
 may be called for in the proposal for the respective classes of asphaltic concrete used in the work.
 at the prices bid per ton (2,000 lbs.) or at the bid price per square yard, as pavement, in accordance with the foregoing specifications, payment will be made
 6 t. Measurement and Payment. For the construction of asphaltic concrete

6 s. Samples. Whenever called upon to do so, the contractor shall, with- out charge, provide the Engineer with test samples of asphaltic concrete cut from the completed pavement or the individual courses thereof. He shall also provide the Engineer with test samples of the asphaltic concrete mixtures and all mate- rials entering into the work.

6 r. Protection of Work. Traffic shall not be allowed on the pavement until expressly authorized by the Engineer.

6 q. Miscellaneous Details of Construction. When so directed by the Engineer, the contractor shall furnish and place a "1/4 inch-minus" or other fine mix of asphaltic concrete for use in feathering the pavement at intersec- tions, connections with existing pavements, at gutter lines and at other such locations. This special mix shall be proportioned as directed by the Engineer and shall be classed and paid for on the same basis as applies to that particular class of asphaltic concrete which is listed in the bid items applicable to the contract.

6 p. Surface Smoothness. The surface of the top or wearing surface course, when finished, shall be of uniform texture, smooth, true to crown and grade and free from defects of all kinds. The smoothness shall be such that when tested with a 10-foot straight-edge placed on the surface with its centerline parallel to the centerline of the highway, the maximum deviations of the surface from the edge of the straight-edge will nowhere exceed one-fourth ($\frac{1}{4}$ ") of an inch.

Where a course is to be constructed in two or more lifts, the thicknesses of the respective lifts shall be as the Engineer directs. Unless otherwise directed by the Engineer, the top surface of each lift shall be parallel to the top surface of the finished pavement.

Any course of the pavement that is of variable thickness, shall, at places where the maximum thickness is greater than 3 inches, be constructed in 2 or more lifts, no one of which has a maximum thickness greater than 3 inches. In this case, each lift shall be distributed, spread and compacted in accordance with the foregoing specifications applicable to the particular course.

The drying shall be done in a suitable rotary heater or dryer equipped with a fan and dust collector that will remove all excess dust contained in the aggregate. Preparatory to the proportioning of the materials, the aggregates shall

be less than 100° F. nor more than 225° F. Mixing temperatures of the aggregate shall at no time extent that it has no surface moisture and not more than four tenths per cent 7 e. Preparation of the Aggregates. All aggregate shall be dried to the

land Cold Mix. 7 d. Preparation of Base. The base shall be properly shaped to receive the wearing course and shall be clean and dry in advance of the placing of the Port-

loads weighed on public scales. ton in the finished pavement, the Engineer reserves the right to have selected 7 c. Measurement. When the Portland Cold Mix is to be paid for by the

requirements of Sub Sec. VII (Materials) of these "General Construction Details." 7 b. Materials. The asphaltic cement and aggregate shall conform to the

The cold mix asphalt concrete shall be composed of asphalt and mineral aggregate mixed together in the proportions specified in Sub Sec. VII (Materials) mixtures numbered 1, 2 and 3. Hydrated lime shall also be used in

plans. 7 a. General. Portland Cold Mix Asphaltic Concrete is considered by the City as a temporary pavement or patch and shall be used when required to provide a temporary surface for expediency or for patching of temporary pavements. Wearing surfaces consisting of one or more courses of cold laid asphalt concrete and, where required, a top dressing shall be constructed on the prepared base in conformity with the lines, grades, thickness and typical cross section shown on the

7. PORTLAND COLD MIX ASPHALTIC CONCRETE

(Form W-136). Payment, as above indicated, shall be understood to comprise full and complete payment for the asphaltic concrete pavement in place including the furnishing and hauling of all materials, the furnishing of tools, equipment, and supplies, the performing of all work and the bearing of all incidental expense. No separate or additional payment will be made for the preparation of the base, for wasted materials, or for any other detail of the work specified to be done, unless otherwise specifically provided in the Special Specifications or Preliminary Estimate

specifications and the orders and directions of the Engineer. When paid for on tonnage basis, tonnages will be determined by weighing the asphaltic concrete mixture on platform weigh scales furnished by the contractor.

7 h. Mixing. The mixing of the Portland Cold Mix asphalt concrete shall be done in a mixer of the pugmill type, the paddles of which rotate at a speed of not less than 60 nor more than 85 revolutions per minute. The mixer shall be in first class condition, and the number, type, and arrangement of paddles shall be such as will quickly produce a thoroughly and properly mixed asphalt concrete.

The number of pounds of each size of grade of aggregates, the number of pounds of hydrated lime, the number of pounds of liquerifier and the number of pounds of asphalt to be used in each mixer batch shall be as the Engineer orders. The quantities ordered by the Engineer shall be such, however, that the proportions of different materials will be within the limits hereinbefore specified.

Liquerifier.

There shall be an accurately calibrated device for the measurement of

more than one pound.

The asphalt shall be weighed on separate dial or beam scales limited in capacity to two times the weight of asphalt required for one mixer batch. The graduations on the scales shall not be greater than one pound. If a beam scale is used it shall be equipped with a "Tell Tale" dial with graduations of not

7 g. Proportioning. The aggregates shall be proportioned in a weigh box mounted on approved multiple-beam or springless dial charging scales, the different sizes of aggregate being weighed into the weigh box one at a time in the proportions ordered by the Engineer.

7 f. Heating of Asphalt. The asphalt shall be heated in sumps or kettles so designed that the heat can be positively controlled at all times. Heating by steam coils is preferred. Under no circumstances will a direct flame from oil or other fuel be permitted to come in direct contact with the heating kettles. The asphalt circulating system shall be constructed of adequate size to give the proper and continuous circulation of the asphalt throughout the operating periods.

Each size and grade of the heated aggregate shall be deposited in a separate bin. The combined capacity of the bins used for the aggregates of any specified mix shall be at least 6 cubic yards. Arrangements shall be made for drawing materials from any bin into a weigh box in the proportions specified.

The screens, which shall be approved vibrating or rotary screens, shall each have an effective screening area of 22 square feet.

sieve. One of the above sizes or grades shall be aggregate passing the No. 10 sieve. The separations of the aggregate shall be between such limits as may be necessary to produce the mixtures specified and as the Engineer sizes for Cold Mix No. 3. The separations of the aggregate shall be between such sizes for Cold Mix No. 1, 2 sizes for Cold Mix No. 2, and 4 be separated into 3 sizes for Cold Mix No. 1, 2 sizes for Cold Mix No. 2, and 4

The weight of the batch of mixed materials shall not be greater than the manufacturer's rated capacity of the mixer.

The properly proportioned aggregate and liquefier shall be placed in the mixer first and the mixing continued until all the stone is coated.

The asphalt cement and hydrated lime shall be successively introduced and the mixing continued until the mixture is thoroughly uniform and homogeneous in character. The total mixing time will vary in relation to the nature of the aggregates and the capacity of the mixer, but in no case shall the mixing time after the introduction of the asphalt be less than 45 seconds.

7 i. Spreading and Finishing. Unless otherwise specially ordered, each course of the pavement shall be spread with a mechanical, self-propelled spreading and finishing machine equipped with a hopper or mixture compartment to receive the mixture from the hauling trucks and a screed or cut-off device that oscillates in a horizontal motion or vibrates vertically when striking off the course or lift under construction. The spreading machine shall be of a type or design approved by the Engineer.

When areas inaccessible to the spreading and finishing machine are encountered, hand methods of spreading and finishing shall be used.

Immediately after each load is dumped it shall be distributed into place by means of hot shovels or suitable forks and spread with hot rakes in a loose layer of uniform density and correct depth so that after compaction the course shall have the thickness specified on the plans, and will conform to the grade and surface required.

7 j. Compacting. After spreading, the mixture shall be thoroughly and uniformly compressed with a three-wheel power-driven roller weighing not less than 10 tons as soon after being raked as it will bear the roller without undue displacement. Rolling shall start longitudinally at the sides and proceed toward the center of the pavement overlapping on successive trips by at least one-half the width of a rear wheel. Alternate trips of the roller shall be of slightly different lengths.

The speed of the roller shall at all times be slow enough to avoid displacement of the mixture, and any displacements occurring from any cause shall at once be corrected by the use of rakes and of fresh mixture where required. Rolling shall proceed continuously until all roller marks are eliminated and no further compression is possible.

Areas inaccessible to the rollers shall be compacted by tamping with hot iron tampers.

7 l. Miscellaneous. Where the Portland Cold Mix is to be placed against a concrete or stone curb, or on a concrete base or on an old concrete pavement, or against a hardened pavement joint, and where it is to be placed against any metal surface, a thin paint coat of cutback asphalt shall be applied in advance of the placing. The application shall be thin and uniform, care being exercised to avoid accumulation of asphalt in depressions.

The seal coat mixture shall be paid for at the same price per ton as the cold mix pavement to which it has been applied.

7 k. Application of Seal Coat. After the rolling of the wearing course has been satisfactorily completed, the Cold Mix Seal Coat, when required, shall be evenly applied in sufficient quantity to fill the surface voids without adding a separate layer. From 5 to 12 pounds of Cold Mix Seal Coat per square yard shall be applied. After the Cold Mix Seal Coat has been satisfactorily distributed, the surface of the pavement shall again be compacted with at least one complete rolling with either of the two types of roller described heretofore.

Subsec. II Sewers

1. MANHOLES, DROP MANHOLES AND SPECIAL STRUCTURES

1. a. General

All Portland cement concrete used in connection with the installation of manholes, drop manholes, special structures and their appurtenances, shall conform to the requirements of subsection V (concrete) of these "General Construction Details."

Manholes shall be constructed at the locations, of the type or types, and at the grades specified in the Special Specifications or as shown on the Plans.

Concrete manholes and other concrete structures or parts thereof which do not have footings extending beyond exterior wall faces may be poured directly against the excavation faces without the use of outer forms if the excavation face is firm and stable.

Except where special construction in unstable soil is authorized, all manholes and other structures shall be founded on and shall be in direct contact with firm, undisturbed soil. All unauthorized excavation below the specified sub-grade shall be replaced, at the expense of the Contractor, with concrete monolithic with that of the structure slab or foundation above.

Subgrade soil for all concrete sewer structures regardless of type shall be firm, dense and thoroughly consolidated and shall be free from mud and muck. When necessary, a layer of concrete of sufficient strength and thickness to withstand subsequent construction operations shall be installed below the specified subgrade elevation and the structure concrete deposited thereon. Coarse gravel or crushed stone may be used for sub-soil reinforcement if results satisfactory to the Engineer can be obtained thereby. Such material shall be applied in thin layers, each layer to be entirely bedded in the sub-soil by thorough tamping. Finished elevation of any sub-soil reinforcement shall not be above the specified subgrade.

Free drop inside the manhole will not be permitted except for street inlet connections of 10" diameter or less.

1. b. Manhole Bases

All manhole bases shall be of cast in place monolithic concrete. Where sewer lines enter or pass through manholes, the invert channel shall be smooth and semi-circular in cross section and may be formed directly in the concrete of the manhole base, may be half tile laid in the concrete or may be constructed by laying the sewer lines continuously through the manhole and breaking out the top exposed section and neatly trimming the edges after the surrounding concrete has hardened. Changes of direction of flow within the manhole shall be made with a smooth curve with as long a radius as possible. The floor of the manhole outside the channels shall be smooth and slope toward the channel, not less than one inch per foot.

1. c. Manholes - Monolithic Concrete

Standard manholes and drop manholes shall have an elliptical cross section

Unless otherwise specified in the Special Specifications, a lump sum price will be paid for the construction of diversion manholes, special manholes and special structures. With the exception of excavation and surfacing, all other materials and labor required for the completion in conformity with the Plans and ready for service, shall be included and absorbed in the lump sum price bid.

1. g(2) Diversion Manholes, Special Manholes and Special Structures

Unless otherwise specified in the Special Specifications, a lump sum price will be paid for Standard Precast, Monolithic and Drop Manholes. This lump sum price shall include the particular type of manhole in place complete with ring, cover, steps and any excavation outside of the trench pay width.

1. g(1) Precast, Monolithic and Drop Manholes

1. g. Pay Quantities

All manhole rings and covers and inlet frames and gratings shall conform to the standard Plans and Subsec. VII (Materials) of these "General Construction Details."

1. f. Manhole Frames and Covers and Inlet Frames and Gratings

Manhole steps shall be made of 3/4" genuine round wrought iron and shall be of the design or designs as shown on the Plans. No galvanizing or coating will be required. Steps shall be in line and uniformly spaced on 12-inch centers. No progress or final payments will be made for manholes until the Contractor has furnished the City a signed copy of the supplier's invoice for Genuine Wrought Iron Manhole steps.

1. e. Manhole Steps

All joint surfaces of precast sections and the face of the manhole base shall be thoroughly clean and wet prior to the placing of the precast sections. Joints shall be set in Class C mortar conforming to the requirements of Sub-section V (Concrete) of these "General Construction Details."

Standard Precast concrete manholes shall be constructed on a poured-in-place concrete base with precast concrete rings, a taper section, and cast iron frame and cover. The manhole base shall be as specified herein and the precast sections shall be reinforced concrete pipe and taper sections manufactured in conformity with the Plans and Special Specifications.

1. d. Manholes - Precast Concrete

3'0" by 4'0" in conformity with the Standard Plans. For sewers up to and including 24" diameter the 4-foot axis shall be in line with the sewer. For sewers from 27" up to and including 36" diameter the 4-foot axis shall be transverse. For sewers with diameters exceeding 36" the offset type of manhole shall be used except as noted in the Special Specifications or the Plans.

2. PIPE SEWERS

2. a. General

Pipe sewers shall be laid with non-reinforced sewer pipe, reinforced concrete sewer pipe, vitrified clay sewer pipe or such other pipe as may be called for in the Special Specifications, or as designated on the Plans. Pipe, unless otherwise noted, shall conform to the requirements of Subsec. VII (Materials) of these "General Construction Details."

2. b. Connections to Existing Sewers

Connections to existing sewers, manholes, and other structures shall be made in a workmanlike manner, shall be tight, and shall have smooth flow surfaces and curves. Unless otherwise noted in the Specifications, payment shall be made for connections on a lump sum basis.

2. c. Concrete Bedding for Pipe

Where shown on the Plans, or ordered by the Engineer, the pipe shall be laid on a standard American Concrete Pipe Association Class "A" Bedding. The excavation shall be carried below the bottom of the pipe to an additional depth equal to one-fourth (1/4) the inside diameter, or as required by the Engineer. The pipe shall be laid and supported either on a bed of concrete or pre-cast concrete blocks of approved form. After laying, the space under and around the pipe, up to a depth of one-fourth (1/4) the outside diameter above the outside bottom of the pipe, shall be backfilled with concrete, which shall be worked around the pipe. Concrete for bedding shall be 2000 lbs. 2" to 4" slump conforming to the requirements of Subsec. V of these "General Construction Details."

2. d. Solid Rock Bedding Provisions

When the tunnel or trench bottom is in solid rock and has been excavated as required by Subsec. IV (Excavation) of these "General Construction Details" the bottom of the trench or tunnel shall be backfilled to grade with a sand bedding material as approved by the Engineer.

2. e. Trench or Tunnel Bottom Stabilization

When the tunnel or trench bottom is in water-saturated earth and has been excavated as required by Subsec. IV (Excavation) of these "General Construction Details" the bottom of the trench or tunnel shall be stabilized and back-filled to grade with bank-run gravel or other suitable stabilizing material approved by the Engineer.

2. f. Pipe Laying

Before being laid, all pipe shall be carefully examined and passed upon by the Inspector. The accepted pipes before being lowered into the trench shall be fitted together, if necessary, matched and marked in the order in which they are to be laid. The trench shall be carefully shaped and graded to the required line and grade. Bell holes deep enough to receive the bell of the pipe shall be shaped in the bottom of the trench so that the pipe shall have a solid bearing along its entire length.

The offsets from the grading line to the pipe invert grade shall be made with a leveling board, equipped with an accurate level, and a measuring pole equipped with a plumb bob and fitted with an iron shoe at the lower end. The shoe to extend at least eight inches from the pole at exactly 90° from the same. The pole shall be made from planed, straight-grained lumber of the

2. f(3) Measuring Pole

A line parallel to, and at a convenient number of feet above the invert grade of the sewer, may be used to line and grade each pipe to its proper position in the trench.

2. f(2) Grading Line

After being laid, the inside of each joint shall be carefully scraped smooth with a circular disk or swab to remove any surplus or foreign material entering the sewer.

After the insertion of the spigot into the bell, when using self-centering pipe and after caulking of non self-centering pipe, the remainder of the bell shall be filled with cement mortar well rounded out onto the body of the pipe.

When a Portland cement mortar joint is utilized, the pipe furnished shall have been designed for exclusive use with a mortar joint. Before being laid, the outside of the spigot and the inside of the bell of the pipe shall be carefully cleaned. Except when using self-centering pipes, the lower half of the bell of the preceding pipe shall have placed in it a strand of ship oakum or untarred hemp saturated with a thick grout or neat cement before the insertion of the spigot end. The pipe shall then be pressed into place so that the spigot end shall enter the bell to its full depth and be in contact with the end of the pipe previously laid. On large pipes 18 inches in diameter and over, the lower half of the pipe joint must be pointed from the inside of the pipe. The pipe shall then be lined and graded and the upper half of the bell finished with a strand of grouted hemp or oakum after which the grouted hemp or oakum shall be well caulked into place with force enough to firmly compact the caulking material, but not enough to split the bell. The two halves of the gasket must overlap enough to make a continuous ring of material without voids or vacant places in the gasket.

2. f(1b) Mortar Joints

Unless otherwise provided for in the plans or specifications, the pipe and joint shall conform to the requirements of Subsec. VII (Materials) of these "General Construction Details."

2. f(1a) Rubber Type Gasket Joints

Unless otherwise provided for in the Special Specifications or authorized by the Engineer, a rubber-type gasket joint as approved by the Engineer shall be used.

2. f(1) Joints

The gravity sewer line shall be tight against leakage. The Engineer

2. h(2) Sanitary Sewer Line

The Contractor, in contracting to do the work covered by these specifications, agrees that the tests and leakage allowances hereinstated are fair and practical.

2. h(1) General

2. h. Tests of Workmanship

Pipe encasement shall be constructed in accordance with the requirements of the Plans, Specifications or the Engineer.

2. g. Pipe Encasement

In order to insure adequate lateral and vertical stability of the installed pipe during pipe jointing and embedment operations, a sufficient amount of acceptable pipe embedment material to hold the pipe in rigid alignment shall be uniformly deposited and thoroughly compacted on each side of each pipe laid; this requirement shall apply to both concrete, and vitrified clay pipe sewers.

2. f(7) Initial Lateral Support

To get a true line and grade through short tunnels, a straight edge or a line shall be used or two pipes may be connected together and after jointing materials have set, laid as one pipe through the tunnel.

2. f(6) Line and Grade Through Short Tunnels

The Contractor shall, at his own expense, furnish and put in place, as required, all grade, batter boards or targets. These grade boards or targets shall be of new lumber not less than 1" x 3" in cross section. They shall be placed in the proper position and held firmly in that position until the pipe has been laid between the manholes, so that frequent checks can be made of the pipe grade and alignment. At no time must there be less than three grade boards or targets in position. All poles, bobs, lines, levels, as well as such spikes, tacks or nails sufficient to do proper work shall be furnished by the Contractor at his own expense.

2. f(5) Grade Boards - Check Lines, Etc.

A plumb bob shall be used to align the pipe in the trench by holding the plumb line very tightly against the grading line with the bob just clearing the bell of the pipe being laid. After the bob has come to rest, the bell end of the pipe shall be moved so that its center is exactly under the point of the bob.

2. f(4) Use of Plumb Bob

proper cross section for the work and marked at intervals of one foot. The zero end of the pole to be at the bottom of the shoe.

extension.

All wyes, tees or stubs shall be plugged with flexible-jointed caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or

2. h(7) Plugging of Wyes, Tees or Stubs

All lateral branches included in the test section shall be taken into account in computing allowable leakage. An allowance of .2 GPH per foot of head above invert shall be made for each manhole included in a test section. If a test produces more than the allowable leakage the contractor should test manholes and line separately.

2. h(6) Inclusion of Laterals and Manholes

At the Contractor's option, pipe may be filled up to 24 hours prior to time of exfiltration testing to permit normal absorption into the pipe walls to take place. Where water for infiltration is supplied by flooding the trench, such flooding shall be commenced at the Engineer's option, up to 24 hours prior to time of testing or until such lesser time as measured infiltration becomes reasonably constant.

2. h(5) Allowance for Absorption

Leakage up to 25% in excess of the above limits will be approved in any tested section, provided the excess is offset by leakage measurements in adjacent sections such that the combined leakages are within the amount allowable for the combined sections; provided all visible leaks other than beads or damp spots on the pipe shall be repaired and provide sections producing less than the allowable leakage may be used to balance other sections only to the extent that the combined leakage is within the allowable limits.

2. h(4) Balancing

Pipe and joints shall sustain a maximum limit of 0.4 GPH per inch diameter per 100 ft. when field tested by actual infiltration conditions. If exfiltration testing is required or necessary, the joints shall perform equally well, except that an allowance of additional 10 per cent of gallowage shall be permitted for each additional two (2) ft. head over a basic four (4) ft. minimum internal head. Head shall be measured from the crown of the lower end of the pipe section being tested.

2. h(3) Allowances

The fact that an entire system may pass the test requirements will not relieve the Contractor of repairing or replacing faulty joints or sections known to be contributing a considerable portion of the leakage water.

Should the line fail to pass the test as defined below, it shall either be repaired or replaced so that it will pass the test. The test may be either interior or exterior and shall have a head that will cover all joints by four (4) feet. or all portions of the completed line. The test may be either interior or exterior, without prior notice to the Contractor, make a hydrostatic test on any

2.h(8) Testing Equipment and Procedure

The Contractor, at his own expense, shall furnish all necessary testing equipment, and shall perform the tests in a manner satisfactory to the Engineer. Any arrangement of testing equipment which will provide readily observable and reasonably accurate measurements of leakage under the specified conditions will be permitted.

In the event the Contractor elects to test large diameter pipe one joint at a time, leakage allowances shall be converted from GPH per 100 ft. to GPH per joint, by dividing by the number of joints occurring in 100 ft.

2.h(9) Trial Test

The first section of pipe, not less than 300 ft. in length, installed by each crew shall be tested, if required by the Engineer, in order to qualify the crew and/or the material; and successful installation of this section shall be prerequisite to further pipe installation by the crew.

2.i Pay Quantities

2.i(1) Measurement of Pipe for Payment

For all sizes of pipe on less than fifteen per cent (15%) grade, payment for pipe shall be made on the basis of the horizontal distance center to center of standard manholes, which shall cover and include split pipe used in manholes. Where the grade of the sewer is on more than fifteen percent (15%) grade, the payment for pipe shall be made on the basis of the slope distance center to center of standard manholes. No deduction shall be made for the length of wyes, and the bid price for each wye shall cover the differential in cost between the wye and the corresponding length of straight pipe. For sewers entering diversions, special manholes or special structures, the length of pipe shall be allowed to the outside of the wall of the structure. If split pipe is used in diversions, special manholes or special structures, its cost shall be absorbed in the cost of these structures.

2.i(2) Sand Bedding and Trench or Tunnel Stabilization

Sand bedding material and trench or tunnel bottom stabilization material shall be paid for on the basis of truck measure.

2.i(3) Concrete Bedding

Concrete for monolithic bedding of pipe shall be computed on a cubic yardage basis for the required section as shown on the standard plans. Pay width of bedding section shall be the pay width for excavation as given in Subsection IV (Excavation) of these "General Construction Details." No allowance shall be made for filling excess excavation beyond the designated limits.

2.i(4) Pipe Encasement

Pipe encasement shall be paid for at the unit price bid per lineal foot for the actual length constructed, measured along a line parallel with the center line of the pipe.

3. MONOLITHIC CONCRETE SEWERS

3.a. General

All concrete used in connection with the installation of monolithic concrete sewers and their appurtenances shall conform to the requirements of Subsection V (Portland Cement Concrete) of these "General Construction Details."

3.b. Reinforcement

When called for on the Plans or in the Special Specifications, monolithic concrete sewers shall be reinforced with steel conforming to the requirements of Subsection V (Portland Cement Concrete) of these "General Construction Details."

3.c. Sewer Invert

The invert portion or base of the sewer shall be formed between templates spaced at proper intervals to form convenient sections for construction. The concrete shall be mixed dry enough to stand in place after being tamped and wet enough to be dense without excessive tamping. If required, the surface of the concrete in the invert shall be brought to proper distance below the flow line to allow for invert lining.

3.d. Sewer Barrel Placing

After the invert of the sewer is constructed, the remaining portion of the barrel of the sewer between transverse joints shall be placed in one continuous operation.

3.e. Connections to Existing Sewers

Connections to existing sewers, manholes, and other structures shall be made in a workmanlike manner, shall be tight, and shall have smooth flow surfaces and curves. Unless otherwise noted in the Special Specifications, payment shall be made for connections on a lump sum basis.

3.f. Tests of Workmanship

Finished monolithic sewers shall be substantially tight against leakage from either the inside or outside. Upon completion of the sewer and prior to final acceptance, any visible leaks shall be corrected to satisfaction of the Engineer by grouting and other means. Any cracks other than hair cracks, visible from the inside shall be cut out to a depth permitting calking and calked with neat cement or lead wool.

3.g. Pay Quantities

For all sizes of pipe on less than fifteen (15%) per cent grade, payment for pipe shall be made on the basis of the horizontal distance from outside wall to outside wall of manholes or construction joint adjacent thereto as shown on the Plans. On grades in excess of fifteen (15%) per cent grade, the measurement shall be the slope distance. The lineal foot price bid for the monolithic concrete sewer pipe in place shall cover all costs less excavation.

6 h. Heating and Screening of Aggregates. Preceding the preparation of the asphaltic concrete mixture, the aggregates, exclusive of mineral filler, shall be dried to the extent that they have no surface moisture and not more than 1/2 of one (1%) per cent of contained moisture, shall be heated to the required temperature as set forth in 6 k., and immediately thereafter shall be separated into sizes or grades, one of the sizes or grades to be aggregate passing the No. 10 sieve, and the others to be the sizes or grades above the No. 10 sieve size for which separate percentages are stated in the table given in Subsec. VII (Materials).

If the methods and equipment used in the work do not produce results satisfactory to the Engineer in the above respects, then and in that event side forms of material and design satisfactory to the Engineer shall be provided so far as is considered necessary by the Engineer to provide adherence to specified grade and line, and to prevent lateral displacement or squeezing out or side shoving under the roller.

6 g. Side Forms. The use of side forms will not be required provided that the methods and equipment used in the work produce a pavement laid to neat, straight lines, proper thickness and specified crown, top width and grade without excessive spread beyond specified top width.

In all cases, the base upon which asphaltic concrete mixture is to be placed shall be prepared only a short distance in advance of the placing of asphaltic concrete mixture upon it, and under no circumstances shall any asphaltic concrete mixture be placed upon a base that is not thoroughly compacted, of proper grade and cross-section, free from ruts, irregularities and defects of all kinds, and which is dry and clean.

The applying of the tack coat and the painting of contact surfaces and pavement edges shall be done just prior to placing the asphaltic concrete mixture in contact therewith, or just sufficiently in advance thereof to provide an adhesive film of bituminous cement insuring good bond. Asphalt or asphalt stains which come upon surfaces of concrete or structures which will be exposed to view shall be promptly and completely removed.

Contact surfaces of curbs, gutters, catch basins, manholes, and other structures within the pavement areas shall be painted with a thin uniform coating of bituminous cement of the type designated by the Engineer and applied as directed by the Engineer.

The rate of application shall be from 0.05 to 0.10 gallons per square yard. Care shall be taken so as not to tack coat more of the existing pavement than can be covered by new pavement in the same day. The contractor must take every precaution to keep unnecessary traffic off the tack coat.

The ingredients of the mixture shall be heated, combined and mixed in such manner as to produce a mixture of such temperature that when deposited on the road it will be within the temperature range set forth in Section 6 k.

For batching plants, the mixing time, after introduction of bituminous cement, shall be not less than 30 seconds and as much longer as is necessary to obtain the specified results. For continuous mix plants, the mixing time in seconds shall be as determined by dividing the pugmill output, in pounds per second; and shall be regulated by fixing a minimum gauge in the mixing unit or by other satisfactory mixing unit adjustments.

The combined mineral aggregate shall be thoroughly mixed dry, after which the proper amount of bituminous cement shall be distributed over the aggregate and the whole thoroughly mixed for such period of time as is necessary to produce a homogeneous mixture, of unchanging appearance, in which all particles of mineral aggregate are uniformly coated with bituminous cement.

The proportions of the materials introduced into the mixer shall be as determined by the Engineer within the limits and ranges set forth in the table given in Subsec. VII (Materials).

The dried mineral aggregates, prepared as prescribed herein, shall be combined in the proportionate amounts of size or grading of aggregates required to meet the job-mix formula. Mineral filler, when used, shall be introduced in such manner that it will be uniformly incorporated in the mix.

6 j. Preparation of Mixture. The size of batch shall be as determined by the Engineer based on the manufacturer's capacity rating or the net cubic contents of the mixer below the center of the mixer shafts.

6 i. Heating of Asphaltic Cement. The asphaltic cement shall be heated in kettles or sumps so designed that the heating will be uniform throughout the entire mass and so that the heat can be positively controlled at all times. The temperature to which the asphaltic cement is heated shall be sufficient for proper mixing but shall not exceed the maximum temperature set forth in 6 k.

Each size or grade of the heated aggregates shall be deposited in a separate bin, each bin being provided with an overflow vent to prevent the overflowing of one bin into another, and the aggregate in each bin shall at all times be maintained uniform in size and grading.

On areas of irregular shape, of limited area or where unavoidable obstacles make the use of specified spreading and finishing equipment impracticable, in the judgment of the Engineer, the mixture may be spread and finished by blade grader or by hand methods which shall be performed in a skillful manner, without segregation of materials, and to specified grade, cross-section and smoothness.

No asphaltic concrete material shall be placed against the edge of a strip, course or layer of similar material that has been rolled and has cooled unless and until said edge has been prepared in the same manner as set forth for transverse joints in 6 n. The lengths of strips and the time of placing adjoining strips shall be such that the edge of any strip along a longitudinal joint shall have the adjoining strip constructed against it within 24 hours.

The mixture shall be delivered to and spread by an asphaltic concrete paver conforming to the applicable requirements of 6 e, and shall be thereby struck-off and finished to specified grade and cross-section. The mixture shall be laid in strips of such width as to hold to a practical minimum the number of longitudinal joints required.

The mixture shall be laid only on a base or surface which fully meets the requirements set forth in 6 f. The placing of the mixture will be permitted only on a stable subgrade when the atmospheric temperature is above 40 degrees Fahrenheit. The paving shall not be laid in water or during rainy weather unless expressly authorized or ordered by the Engineer.

The mixture shall be transported from the mixing plant to the point of use in trucks conforming to the applicable requirements set forth in 6 e, of these Specifications. No loads shall be sent during daylight, unless artificial light satisfactory to the Engineer is provided. No hauling will be done over freshly placed pavement.

6 l. Hauling, Spreading and Finishing. The mixture shall be transported from the mixing plant to the point of use in trucks conforming to the applicable requirements set forth in 6 e, of these Specifications. No loads shall be sent during daylight, unless artificial light satisfactory to the Engineer is provided. No hauling will be done over freshly placed pavement.

6 k. Temperature Limits. The temperature to which the aggregates and bituminous cement are to be heated and at which the asphaltic concrete is to be deposited on the road shall be in accordance with the following:

- Degrees Fahrenheit to which aggregates are to be heated before mixing 250° to 325°
- Degrees Fahrenheit to which bituminous cement is to be heated before mixing 250° to 300°
- Degrees Fahrenheit at which asphaltic concrete is to be deposited on the road 250° to 300°

The motion of the roller at all times shall be slow enough to avoid displacement of the hot mixture. Any displacement occurring as a result of the reversing of direction of the roller, or from any other cause, shall be corrected at once by the use of rakes and of fresh mixture when required. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened with water but excess water will not be permitted.

Per Cent (%)	
95	Class "A" asphaltic concrete
92	Class "B" asphaltic concrete
92	Class "C" asphaltic concrete

Rolling shall be continued until the asphaltic concrete has been compressed to such extent that its specific gravity, expressed in percentage of the specific gravity of the combined aggregates, is not below the following minimum:

Each roller shall be operated by a competent, experienced roller operator and, while the work is underway, shall be kept as nearly as practicable in continuous operation. Rolling shall begin at the sides and progress gradually to the center, except that on super-elevated curves rolling shall progress from the lower to the upper edge parallel with the center line of the road and in each case uniformly overlapping each preceding track by not less than 1/3 the width of the roller until the entire surface has been completely rolled. If a 3-wheeled roller is used, the entire surface shall be covered and compacted with the rear or compression wheels.

6 m. Compacting. After the spreading, striking-off and finishing has been performed and while the mixture is still hot, the course of asphaltic concrete shall be compacted thoroughly and uniformly by rolling. The rolling shall be done with three-wheeled or tandem rollers weighing not less than 6 tons and at least one of which shall weigh not less than 10 tons. In general, one roller shall be provided for each 75 tons of mixture placed per hour or each 600 square yards of mixture placed per hour when the depth of course is such that 75 tons of mixture is spread over an area exceeding 600 square yards. On projects involving 1,000 tons or less of asphaltic concrete, only one roller (minimum weight of 10 tons) will be required.

Care shall be taken at all times to prevent segregation in the mixture as evidenced by areas of fine and coarse materials, and any portions where such segregation occurs shall be corrected with fresh mixture either spread and worked into the surface or by complete removal and replacement of segregated mixture, as directed by the Engineer.

Generally, where an adjoining strip of asphaltic concrete is to be placed against a strip which is still hot, that 6-inch width of the strip of asphaltic concrete which is nearest the joint with a successive strip shall not be rolled until the adjoining strip has been placed against it, at which time the rolling of the successive strip shall overlap the 6-inch width of the preceding strip of asphaltic concrete. During the rolling operations, hand raking and spotting shall be performed at edges and joints of the mixture to provide neat lines at edges and smooth, uniform surfaces at joints.

Along forms, curbs, headers, and walls, around manholes and catch basins, and at other places not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons or mechanical tampers. On depressed areas, a trench roller may be employed, or compression strips may be used under the roller, to transmit compression to the depressed area.

The surface of the asphaltic concrete after compaction shall be smooth and true to the established cross-section and grade. Any mixture that becomes loose or broken, mixed with dirt, or is any way defective shall be removed and replaced with fresh hot mixture, which shall be immediately compacted to conform with the surrounding area. Any areas showing an excess of bituminous cement due to improper rolling procedure shall be removed and replaced.

6 n. Transverse joints. Placing of a course or strip of asphaltic concrete shall be as nearly continuous as practicable and the roller shall pass over an unprotected end of freshly laid mixture only when the laying of the course or strip is to be discontinued long enough to permit the mixture to become chilled. In all such cases, when the work is resumed, the material previously laid and permitted to become chilled shall be cut back or removed along the end so as to produce a slightly beveled edge for the full thickness of the course and the old, cut away material shall be removed from the work. The new mixture shall be placed or raked against the fresh cut, thoroughly tamped, and rolled to provide a smooth joint exactly meeting the line, grade and cross-section of adjoining asphaltic concrete after thorough compaction.

When the end of a course or strip of asphaltic concrete is to be temporarily subjected to traffic, the end shall be left on a bevel of approximately 10:1 (horizontal to vertical), being cut back to a bevel of approximately 1:1 to provide a fresh edge against which subsequently placed asphaltic concrete is to abut.

6 o. Thickness of lifts. Those courses of pavement which are of uniform thickness shall, if their thickness does not exceed three inches, be constructed in a single lift or layer. If their thickness exceeds three inches, such course shall be constructed in two or more lifts, no one of which is more than three inches in thickness, and each lift shall be separately distributed, spread and compacted in accordance with the foregoing specifications applicable to the particular course.

The quantity to be paid for at the price bid per ton for a given class of asphaltic concrete shall be the amount of that class of asphaltic concrete mixture actually incorporated in the pavement, in accordance with the plans and

crete used in the work.
 may be called for in the proposal for the respective classes of asphaltic concrete used in the work.
 at the prices bid per ton (2,000 lbs.) or at the bid price per square yard, as pavement, in accordance with the foregoing specifications, payment will be made

6 t. Measurement and Payment. For the construction of asphaltic concrete trials entering into the work.
 the Engineer with test samples of the asphaltic concrete mixtures and all materials entering into the work.
 the completed pavement or the individual courses thereof. He shall also provide out charge, provide the Engineer with test samples of asphaltic concrete cut from

6 s. Samples. Whenever called upon to do so, the contractor shall, with-
 until expressly authorized by the Engineer.
 6 r. Protection of Work. Traffic shall not be allowed on the pavement

contract.
 class of asphaltic concrete which is listed in the bid items applicable to the and shall be classed and paid for on the same basis as applies to that particular locations. This special mix shall be proportioned as directed by the Engineer tions, connections with existing pavements, at gutter lines and at other such fine mix of asphaltic concrete for use in feathering the pavement at intersections, the contractor shall furnish and place a "1/4 inch-minus" or other
 6 q. Miscellaneous Details of Construction. When so directed by the

edge of the straight-edge will nowhere exceed one-fourth ($\frac{1}{4}$ ") of an inch.
 to the centerline of the highway, the maximum deviations of the surface from the with a 10-foot straight-edge placed on the surface with its centerline parallel free from defects of all kinds. The smoothness shall be such that when tested when finished, shall be of uniform texture, smooth, true to crown and grade and
 6 p. Surface Smoothness. The surface of the top or wearing surface course,

top surface of the finished pavement.
 directed by the Engineer, the top surface of each lift shall be parallel to the of the respective lifts shall be as the Engineer directs. Unless otherwise
 Where a course is to be constructed in two or more lifts, the thicknesses

with the foregoing specifications applicable to the particular course.
 this case, each lift shall be distributed, spread and compacted in accordance more lifts, no one of which has a maximum thickness greater than 3 inches. In where the maximum thickness is greater than 3 inches, be constructed in 2 or Any course of the pavement that is of variable thickness, shall, at places

The drying shall be done in a suitable rotary heater or dryer equipped with a fan and dust collector that will remove all excess dust contained in the aggregate. Preparatory to the proportioning of the materials, the aggregates shall

7 e. Preparation of the Aggregates. All aggregate shall be dried to the extent that it has no surface moisture and not more than four tenths per cent of contained moisture. Mixing temperatures of the aggregate shall at no time be less than 100° F. nor more than 225° F.

7 d. Preparation of Base. The base shall be properly shaped to receive the wearing course and shall be clean and dry in advance of the placing of the Portland Cold Mix.

7 c. Measurement. When the Portland Cold Mix is to be paid for by the ton in the finished pavement, the Engineer reserves the right to have selected loads weighed on public scales.

7 b. Materials. The asphaltic cement and aggregate shall conform to the requirements of Sub Sec. VII (Materials) of these "General Construction Details."

The cold mix asphalt concrete shall be composed of asphalt and mineral aggregate mixed together in the proportions specified in Sub Sec. VII (Materials) of these "General Construction Details." Hydrated lime shall also be used in mixtures numbered 1, 2 and 3.

7 a. General. Portland Cold Mix Asphaltic Concrete is considered by the City as a temporary pavement or patch and shall be used when required to provide a temporary surface for expediency or for patching of temporary pavements. Wearing surfaces consisting of one or more courses of cold laid asphalt concrete and, where required, a top dressing shall be constructed on the prepared base in conformity with the lines, grades, thickness and typical cross section shown on the plans.

7. PORTLAND COLD MIX ASPHALTIC CONCRETE

Payment, as above indicated, shall be understood to comprise full and complete payment for the asphaltic concrete pavement in place including the furnishing and hauling of all materials, the furnishing of tools, equipment, and supplies, the performing of all work and the bearing of all incidental expense. No separate or additional payment will be made for the preparation of the base, for wasted materials, or for any other detail of the work specified to be done, unless otherwise specifically provided in the Special Specifications or Preliminary Estimate (Form W-136).

specifications and the orders and directions of the Engineer. When paid for on tonnage basis, tonnages will be determined by weighing the asphaltic concrete mixture on platform weigh scales furnished by the contractor.

7 h. Mixing. The mixing of the Portland Cold Mix asphalt concrete shall be done in a mixer of the pugmill type, the paddles of which rotate at a speed of not less than 60 nor more than 85 revolutions per minute. The mixer shall be in first class condition, and the number, type, and arrangement of paddles shall be such as will quickly produce a thoroughly and properly mixed asphalt concrete.

The number of pounds of each size of grade of aggregates, the number of pounds of hydrated lime, the number of pounds of liqifier and the number of pounds of asphalt to be used in each mixer batch shall be as the Engineer orders. The quantities ordered by the Engineer shall be such, however, that the proportions of different materials will be within the limits hereinbefore specified.

Liqifier. There shall be an accurately calibrated device for the measurement of

The asphalt shall be weighed on separate dial or beam scales limited in capacity to two times the weight of asphalt required for one mixer batch. The graduations on the scales shall not be greater than one pound. If a beam scale is used it shall be equipped with a "Tell Tale" dial with graduations of not more than one pound.

7 g. Proportioning. The aggregates shall be proportioned in a weigh box mounted on approved multiple-beam or springless dial charging scales, the different sizes of aggregate being weighed into the weigh box one at a time in the proportions ordered by the Engineer.

7 f. Heating of Asphalt. The asphalt shall be heated in sumps or kettles so designed that the heat can be positively controlled at all times. Heating by steam coils is preferred. Under no circumstances will a direct flame from oil or other fuel be permitted to come in direct contact with the heating kettles. The asphalt circulating system shall be constructed of adequate size to give the proper and continuous circulation of the asphalt throughout the operating periods.

Each size and grade of the heated aggregate shall be deposited in a separate bin. The combined capacity of the bins used for the aggregates of any specified mix shall be at least 6 cubic yards. Arrangements shall be made for drawing materials from any bin into a weigh box in the proportions specified.

The screens, which shall be approved vibrating or rotary screens, shall each have an effective screening area of 22 square feet.

be separated into 3 sizes for Cold Mix No. 1, 2 sizes for Cold Mix No. 2, and 4 sizes for Cold Mix No. 3. The separations of the aggregate shall be between such limits as may be necessary to produce the mixtures specified and as the Engineer directs. One of the above sizes or grades shall be aggregate passing the No. 10 sieve.

Iron tampers.

Areas inaccessible to the rollers shall be compacted by tamping with hot

further compression is possible.

ing shall proceed continuously until all roller marks are eliminated and no
once be corrected by the use of rakes and of fresh mixture where required. Roll-
ment of the mixture, and any displacements occurring from any cause shall at
The speed of the roller shall at all times be slow enough to avoid displace-

slightly different lengths.

one-half the width of a rear wheel. Alternate trips of the roller shall be of
ward the center of the pavement overlapping on successive trips by at least
displacement. Rolling shall start longitudinally at the sides and proceed to-
than 10 tons as soon after being raked as it will bear the roller without undue
uniformly compressed with a three-wheel power-driven roller weighing not less
7 j. Compacting. After spreading, the mixture shall be thoroughly and

and surface required.

shall have the thickness specified on the plans, and will conform to the grade
layer of uniform density and correct depth so that after compaction the course
by means of hot shovels or suitable forks and spread with hot rakes in a loose
Immediately after each load is dumped it shall be distributed into place

tered, hand methods of spreading and finishing shall be used.
When areas inaccessible to the spreading and finishing machine are encoun-

by the Engineer.

under construction. The spreading machine shall be of a type or design approved
in a horizontal motion or vibrates vertically when striking off the course or lift
the mixture from the hauling trucks and a screed or cut-off device that oscillates
and finishing machine equipped with a hopper or mixture compartment to receive
course of the pavement shall be spread with a mechanical, self-propelled spreading
7 i. Spreading and Finishing. Unless otherwise specially ordered, each

after the introduction of the asphalt be less than 45 seconds.

aggregates and the capacity of the mixer, but in no case shall the mixing time
in character. The total mixing time will vary in relation to the nature of the
the mixing continued until the mixture is thoroughly uniform and homogeneous
The asphalt cement and hydrated lime shall be successively introduced and

mixer first and the mixing continued until all the stone is coated.

The properly proportioned aggregate and liquefier shall be placed in the

The weight of the batch of mixed materials shall not be greater than the
manufacturer's rated capacity of the mixer.

7 k. Application of Seal Coat. After the rolling of the wearing course has been satisfactorily completed, the Cold Mix Seal Coat, when required, shall be evenly applied in sufficient quantity to fill the surface voids without adding a separate layer. From 5 to 12 pounds of Cold Mix Seal Coat per square yard shall be applied. After the Cold Mix Seal Coat has been satisfactorily distributed, the surface of the pavement shall again be compacted with at least one complete rolling with either of the two types of roller described heretofore.

The seal coat mixture shall be paid for at the same price per ton as the cold mix pavement to which it has been applied.

7 l. Miscellaneous. Where the Portland Cold Mix is to be placed against a concrete or stone curb, or on a concrete base or on an old concrete pavement, or against a hardened pavement joint, and where it is to be placed against any metal surface, a thin paint coat of cutback asphalt shall be applied in advance of the placing. The application shall be thin and uniform, care being exercised to avoid accumulation of asphalt in depressions.

Subsec. II Sewers

Standard manholes and drop manholes shall have an elliptical cross section

1. c. Manholes - Monolithic Concrete

All manhole bases shall be of cast in place monolithic concrete. Where sewer lines enter or pass through manholes, the invert channel shall be smooth and semi-circular in cross section and may be formed directly in the concrete of the manhole base, may be half tile laid in the concrete or may be constructed by laying the sewer lines continuously through the manhole and breaking out the top exposed section and neatly trimming the edges after the surrounding concrete has hardened. Changes of direction of flow within the manhole shall be made with a smooth curve with as long a radius as possible. The floor of the manhole outside the channels shall be smooth and slope toward the channel, not less than one inch per foot.

1. b. Manhole Bases

Free drop inside the manhole will not be permitted except for street inlet connections of 10" diameter or less.

Subgrade soil for all concrete sewer structures regardless of type shall be firm, dense and thoroughly consolidated and shall be free from mud and muck. When necessary, a layer of concrete of sufficient strength and thickness to withstand subsequent construction shall be installed below the specified subgrade elevation and the structure concrete deposited thereon. Coarse gravel or crushed stone may be used for sub-soil reinforcement if results satisfactory to the Engineer can be obtained thereby. Such material shall be applied in thin layers, each layer to be entirely bedded in the sub-soil by thorough tamping. Finished elevation of any sub-soil reinforcement shall not be above the specified subgrade.

Except where special construction in unstable soil is authorized, all manholes and other structures shall be founded on and shall be in direct contact with firm, undisturbed soil. All unauthorized excavation below the specified subgrade shall be replaced, at the expense of the Contractor, with concrete monolithic with that of the structure slab or foundation above.

Concrete manholes and other concrete structures or parts thereof which do not have footings extending beyond exterior wall faces may be poured directly against the excavation faces without the use of outer forms if the excavation face is firm and stable.

Manholes shall be constructed at the locations, of the type or types, and at the grades specified in the Special Specifications or as shown on the Plans.

All Portland cement concrete used in connection with the installation of manholes, drop manholes, special structures and their appurtenances, shall conform to the requirements of subsection V (concrete) of these "General Construction Details."

1. a. General

1. MANHOLES, DROP MANHOLES AND SPECIAL STRUCTURES

Unless otherwise specified in the Special Specifications, a lump sum price will be paid for the construction of diversion manholes, special manholes and special structures. With the exception of excavation and surfacing, all other materials and labor required for the completion in conformity with the Plans and ready for service, shall be included and absorbed in the lump sum price bid.

1. g(2) Diversion Manholes, Special Manholes and Special Structures

Unless otherwise specified in the Special Specifications, a lump sum price will be paid for Standard Precast, Monolithic and Drop Manholes. This lump sum price shall include the particular type of manhole in place complete with ring, cover, steps and any excavation outside of the trench pay width.

1. g(1) Precast, Monolithic and Drop Manholes

1. g. Pay Quantities

All manhole rings and covers and inlet frames and gratings shall conform to the standard Plans and Subsec. VII (Materials) of these "General Construction Details."

1. f. Manhole Frames and Covers and Inlet Frames and Gratings

Manhole steps shall be made of 3/4" genuine round wrought iron and shall be of the design or designs as shown on the Plans. No galvanizing or coating will be required. Steps shall be in line and uniformly spaced on 12-inch centers. No progress or final payments will be made for manholes until the Contractor has furnished the City a signed copy of the supplier's invoice for Genuine Wrought Iron Manhole steps.

1. e. Manhole Steps

All joint surfaces of precast sections and the face of the manhole base shall be thoroughly clean and wet prior to the placing of the precast sections. Joints shall be set in Class C mortar conforming to the requirements of Sub-section V (Concrete) of these "General Construction Details."

Standard Precast concrete manholes shall be constructed on a poured-in-place concrete base with precast concrete rings, a taper section, and cast iron frame and cover. The manhole base shall be as specified herein and the precast sections shall be reinforced concrete pipe and taper sections manufactured in conformity with the Plans and Special Specifications.

1. d. Manholes - Precast Concrete

3'0" by 4'0" in conformity with the Standard Plans. For sewers up to and including 24" diameter the 4-foot axis shall be in line with the sewer. For sewers from 27" up to and including 36" diameter the 4-foot axis shall be transverse. For sewers with diameters exceeding 36" the offset type of manhole shall be used except as noted in the Special Specifications or the Plans.

2. PIPE SEWERS

2. a. General

Pipe sewers shall be laid with non-reinforced sewer pipe, reinforced concrete sewer pipe, vitrified clay sewer pipe or such other pipe as may be called for in the Special Specifications, or as designated on the Plans. Pipe, unless otherwise noted, shall conform to the requirements of Subsec. VII (Materials) of these "General Construction Details."

2. b. Connections to Existing Sewers

Connections to existing sewers, manholes, and other structures shall be made in a workmanlike manner, shall be tight, and shall have smooth flow surfaces and curves. Unless otherwise noted in the Specifications, payment shall be made for connections on a lump sum basis.

2. c. Concrete Bedding for Pipe

Where shown on the Plans, or ordered by the Engineer, the pipe shall be laid on a standard American Concrete Pipe Association Class "A" Bedding. The excavation shall be carried below the bottom of the pipe to an additional depth equal to one-fourth (1/4) the inside diameter, or as required by the Engineer. The pipe shall be laid and supported either on a bed of concrete or pre-cast concrete blocks of approved form. After laying, the space under and around the pipe, up to a depth of one-fourth (1/4) the outside diameter above the outside bottom of the pipe, shall be backfilled with concrete, which shall be worked around the pipe. Concrete for bedding shall be 2000 lbs. 2" to 4" slump conforming to the requirements of Subsec. V of these "General Construction Details."

2. d. Solid Rock Bedding Provisions

When the tunnel or trench bottom is in solid rock and has been excavated "General Construction Details" the bottom of the trench or tunnel shall be backfilled to grade with a sand bedding material as approved by the Engineer.

2. e. Trench or Tunnel Bottom Stabilization

When the tunnel or trench bottom is in water-saturated earth and has been excavated as required by Subsec. IV (Excavation) of these "General Construction Details" the bottom of the trench or tunnel shall be stabilized and back-filled to grade with bank-run gravel or other suitable stabilizing material approved by the Engineer.

2. f. Pipe Laying

Before being laid, all pipe shall be carefully examined and passed upon by the Inspector. The accepted pipes before being lowered into the trench shall be fitted together, if necessary, matched and marked in the order in which they are to be laid. The trench shall be carefully shaped and graded to the required line and grade. Bell holes deep enough to receive the bell of the pipe shall be shaped in the bottom of the trench so that the pipe shall have a solid bearing along its entire length.

The offsets from the grading line to the pipe invert grade shall be made with a leveling board, equipped with an accurate level, and a measuring pole equipped with a plumb bob and fitted with an iron shoe at the lower end. The shoe to extend at least eight inches from the pole at exactly 90° from the same. The pole shall be made from planed, straight-grained lumber of the

2. f(3) Measuring Pole

A line parallel to, and at a convenient number of feet above the invert grade of the sewer, may be used to line and grade each pipe to its proper position in the trench.

2. f(2) Grading Line

After being laid, the inside of each joint shall be carefully scraped smooth with a circular disk or swab to remove any surplus or foreign material entering the sewer.

After the insertion of the spigot into the bell, when using self-centering pipe and after caulking of non self-centering pipe, the remainder of the bell shall be filled with Class B cement mortar well rounded out onto the body of the pipe.

When a Portland cement mortar joint is utilized, the pipe furnished shall have been designed for exclusive use with a mortar joint. Before being laid, the outside of the spigot and the inside of the bell of the pipe shall be carefully cleaned. Except when using self-centering pipes, the lower half of the bell of the preceding pipe shall have placed in it a strand of ship oakum or untarred hemp saturated with a thick grout or neat cement before the insertion of the spigot end. The pipe shall then be pressed into place so that the spigot end shall enter the bell to its full depth and be in contact with the end of the pipe previously laid. On large pipes 18 inches in diameter and over, the lower half of the pipe joint must be pointed from the inside of the pipe. The pipe shall then be lined and graded and the upper half of the bell finished with a strand of grouted hemp or oakum after which the grouted hemp or oakum shall be well caulked into place with force enough to firmly compact the caulking material, but not enough to split the bell. The two halves of the gasket must overlap enough to make a continuous ring of material without voids or vacant places in the gasket.

2. f(1b) Mortar Joints

Unless otherwise provided for in the plans or specifications, the pipe and joint shall conform to the requirements of Subsec. VII (Materials) of these "General Construction Details."

2. f(1a) Rubber Type Gasket Joints

Unless otherwise provided for in the Special Specifications or authorized by the Engineer, a rubber-type gasket joint as approved by the Engineer shall be used.

2. f(1) Joints

The gravity sewer line shall be tight against leakage. The Engineer

2. h(2) Sanitary Sewer Line

The Contractor, in contracting to do the work covered by these specifications, agrees that the tests and leakage allowances hereinstated are fair and practical.

2. h(1) General

2. h. Tests of Workmanship

Pipe encasement shall be constructed in accordance with the requirements of the Plans, Specifications or the Engineer.

2. g. Pipe Encasement

In order to insure adequate lateral and vertical stability of the installed pipe during pipe jointing and embedment operations, a sufficient amount of acceptable pipe embedment material to hold the pipe in rigid alignment shall be uniformly deposited and thoroughly compacted on each side of each pipe laid; this requirement shall apply to both concrete, and vitrified clay pipe sewers.

2. f(7) Initial Lateral Support

To get a true line and grade through short tunnels, a straight edge or a line shall be used or two pipes may be connected together and after jointing materials have set, laid as one pipe through the tunnel.

2. f(6) Line and Grade Through Short Tunnels

The Contractor shall, at his own expense, furnish and put in place, as required, all grade, batter boards or targets. These grade boards or targets shall be of new lumber not less than 1" x 3" in cross section. They shall be placed in the proper position and held firmly in that position until the pipe has been laid between the manholes, so that frequent checks can be made of the pipe grade and alignment. At no time must there be less than three grade boards or targets in position. All poles, bobs, lines, levels, as well as such spikes, tacks or nails sufficient to do proper work shall be furnished by the Contractor at his own expense.

2. f(5) Grade Boards - Check Lines, Etc.

A plumb bob shall be used to align the pipe in the trench by holding the plumb line very tightly against the grading line with the bob just clearing the bell of the pipe being laid. After the bob has come to rest, the bell end of the pipe shall be moved so that its center is exactly under the point of the bob.

2. f(4) Use of Plumb Bob

proper cross section for the work and marked at intervals of one foot. The zero end of the pole to be at the bottom of the shoe.

extension.

All wyes, tees or stubs shall be plugged with flexible-jointed caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or

2. h(7) Plugging of Wyes, Tees or Stubs

All lateral branches included in the test section shall be taken into account in computing allowable leakage. An allowance of .2 GPH per foot of head above invert shall be made for each manhole included in a test section. If a test produces more than the allowable leakage the contractor should test manholes and line separately.

2. h(6) Inclusion of Laterals and Manholes

At the Contractor's option, pipe may be filled up to 24 hours prior to time of exfiltration testing to permit normal absorption into the pipe walls to take place. Where water for infiltration is supplied by flooding the trench, such flooding shall be commenced at the Engineer's option, up to 24 hours prior to time of testing or until such lesser time as measured infiltration becomes reasonably constant.

2. h(5) Allowance for Absorption

Leakage up to 25% in excess of the above limits will be approved in any tested section, provided the excess is offset by leakage measurements in adjacent sections such that the combined leakages are within the amount allowable for the combined sections; provided all visible leaks other than beads or damp spots on the pipe shall be repaired and provide sections producing less than the allowable leakage may be used to balance other sections only to the extent that the combined leakage is within the allowable limits.

2. h(4) Balancing

Pipe and joints shall sustain a maximum limit of 0.4 GPH per inch diameter per 100 ft. when field tested by actual infiltration conditions. If exfiltration testing is required or necessary, the joints shall perform equally well, except that an allowance of additional 10 per cent of gallowage shall be permitted for each additional two (2) ft. head over a basic four (4) ft. minimum internal head. Head shall be measured from the crown of the lower end of the pipe section being tested.

2. h(3) Allowances

The fact that an entire system may pass the test requirements will not relieve the Contractor of repairing or replacing faulty joints or sections known to be contributing a considerable portion of the leakage water.

shall, without prior notice to the Contractor, make a hydrostatic test on any or all portions of the completed line. The test may be either interior or exterior and shall have a head that will cover all joints by four (4) feet. Should the line fail to pass the test as defined below, it shall either be repaired or replaced so that it will pass the test.

The Contractor, at his own expense, shall furnish all necessary testing equipment, and shall perform the tests in a manner satisfactory to the Engineer. Any arrangement of testing equipment which will provide readily observable and reasonably accurate measurements of leakage under the specified conditions will be permitted.

In the event the Contractor elects to test large diameter pipe one joint at a time, leakage allowances shall be converted from GPH per 100 ft. to GPH per joint, by dividing by the number of joints occurring in 100 ft.

2.h(9) Trial Test

The first section of pipe, not less than 300 ft. in length, installed by each crew shall be tested, if required by the Engineer, in order to qualify the crew and/or the material; and successful installation of this section shall be prerequisite to further pipe installation by the crew.

2.i Pay Quantities

2.i(1) Measurement of Pipe for Payment

For all sizes of pipe on less than fifteen per cent (15%) grade, payment of standard manholes, which shall cover and include split pipe used in manholes. Where the grade of the sewer is on more than fifteen percent (15%) grade, the payment for pipe shall be made on the basis of the slope distance center to center of standard manholes. No deduction shall be made for the length of wyes, and the bid price for each wye shall cover the differential in cost between the wye and the corresponding length of straight pipe. For sewers entering diversions, special manholes or special structures, the length of pipe shall be allowed to the outside of the wall of the structure. If split pipe is used in diversions, special manholes or special structures, its cost shall be absorbed in the cost of these structures.

2.i(2) Sand Bedding and Trench or Tunnel Stabilization

Sand bedding material and trench or tunnel bottom stabilization material shall be paid for on the basis of truck measure.

2.i(3) Concrete Bedding

Concrete for monolithic bedding of pipe shall be computed on a cubic yardage basis for the required section as shown on the standard plans. Pay width of bedding section shall be the pay width for excavation as given in Subsection IV (Excavation) of these "General Construction Details." No allowance shall be made for filling excess excavation beyond the designated limits.

2.i(4) Pipe Encasement

Pipe encasement shall be paid for at the unit price bid per lineal foot for the actual length constructed, measured along a line parallel with the center line of the pipe.

2.h(8) Testing Equipment and Procedure

3. MONOLITHIC CONCRETE SEWERS

3.a. General

All concrete used in connection with the installation of monolithic concrete sewers and their appurtenances shall conform to the requirements of Subsection V (Portland Cement Concrete) of these "General Construction Details."

3.b. Reinforcement

When called for on the Plans or in the Special Specifications, monolithic concrete sewers shall be reinforced with steel conforming to the requirements of Subsection V (Portland Cement Concrete) of these "General Construction Details."

3.c. Sewer Invert

The invert portion or base of the sewer shall be formed between templates spaced at proper intervals to form convenient sections for construction. The concrete shall be mixed dry enough to stand in place after being tamped and wet enough to be dense without excessive tamping. If required, the surface of the concrete in the invert shall be brought to proper distance below the flow line to allow for invert lining.

3.d. Sewer Barrel Placing

After the invert of the sewer is constructed, the remaining portion of the barrel of the sewer between transverse joints shall be placed in one continuous operation.

3.e. Connections to Existing Sewers

Connections to existing sewers, manholes, and other structures shall be made in a workmanlike manner, shall be tight, and shall have smooth flow surfaces and curves. Unless otherwise noted in the Special Specifications, payment shall be made for connections on a lump sum basis.

3.f. Tests of Workmanship

Finished monolithic sewers shall be substantially tight against leakage from either the inside or outside. Upon completion of the sewer and prior to final acceptance, any visible leaks shall be corrected to satisfaction of the Engineer by grouting and other means. Any cracks other than hair cracks, visible from the inside shall be cut out to a depth permitting caulking and calked with neat cement or lead wool.

3.g. Pay Quantities

For all sizes of pipe on less than fifteen (15%) per cent grade, payment for pipe shall be made on the basis of the horizontal distance from outside wall to outside wall of manholes or construction joint adjacent thereto as shown on the Plans. On grades in excess of fifteen (15%) per cent grade, the measurement shall be the slope distance. The lineal foot price bid for the monolithic concrete sewer pipe in place shall cover all costs less excavation.

4. HOUSE BRANCHES

4.a. Standard House Branches

The Contractor shall place as many wye branches in pipe sewers and stubs in monolithic concrete sewers as may be shown on the Plans or as required by the Engineer. The wye branches and stubs shall be six inches (6") in diameter, except as noted on the Plans, and they shall be inclined upward at an angle not greater than forty-five degrees (45°) from the horizontal or a standard riser conforming to the requirements of the standard Plan shall be installed unless otherwise specified or ordered by the Engineer. The length of each stub in a monolithic concrete sewer, excluding the bell, shall be the thickness of the masonry in which it is placed.

The house connections shall be six inches (6") in diameter, except as noted on the Plans, and shall be joined to the wye with eighth bends of the same diameter. Each house connection shall be laid in a separate trench on a straight line and gradient from the eighth bend or the stub to the end of the branch at the curb line where it shall be eight feet below the curb grade and laid to a minimum grade of one fourth inch (1/4") to the foot, unless otherwise ordered by the Engineer.

House connections shall not be laid in an ungraded street until the Engineer has given curb grade and cut or fill stakes for each house connection. Where required by the Engineer, on house and inlet connections, the Contractor will use a grading line and lay the pipe with the same accuracy as on the main sewer. A swab shall be used when laying house connections and inlet connections.

If the wye branch, stub or house branch is not extended at the time the trench is backfilled, then a concrete disc, made for that purpose, shall be placed in the bell and sealed with cement mortar on the outside only.

4.b. Deep Sewer House Branches

For house branches to deep sewers: Where the slope from a house branch at the curb to the wye in the pipe sewer is greater than forty-five degrees (45°) the house branch shall be installed as shown on the Standard Plans entitled "House Branches to Deep Sewers", and properly dug, for future connections to the sewer. It shall be the duty of the Engineer to furnish the Contractor with riser locations.

4.c. Pay Quantities

The actual length of the pipe laid in the house connection and inlet connections will be the basis of payment for the pipe. Excavation for house connection trenches will be paid for on the basis of the length of pipe laid plus one foot for the eighth bend.

Subsec. III Structures

SUBSEC. III STRUCTURES

1. Steel Structures

The quality, handling and fabrication of the materials for steel structures, and the erection and contractor responsibilities shall, unless otherwise required by the Special Specifications, conform to the requirements of Division II Section 10 of the AASHO "Standard Specifications for Highway Bridges" dated 1957.

2. Timber Structures

Timber structures shall be constructed in conformance with the requirements of Division II, Section 20, of the AASHO "Standard Specifications for Highway Bridges" dated 1957, and the Plans and Special Specifications. Timber and lumber shall be of the kind and grade specified in the Special Specifications or on the Plans and shall conform to the requirements of Sub Sec. VII of these "General Construction Details."

3. Aluminum Construction

3a. General

Fabrication and erection shall be done in accordance with the requirements for Steel Structures, Division II Section 10 of the AASHO "Standard Specifications for Highway Bridges," dated 1957, with the following exceptions:

3b. Type of Fabrication

Joints shall be riveted, bolted, expanded or welded as required by the Plans.

3c. Cutting

Material 1/2 in. thick or less may be sheared, sawed or milled. Material over 1/2 inch thick shall be sawed or milled.

Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be filleted by drilling prior to cutting.

3d. Bending

Material may be heated to a temperature not exceeding 400°F. for a period not exceeding 30 minutes to facilitate bending.

Welding shall be done by an arc welding process in which no welding flux is used. Welding is not permitted except as specifically called for on the Plans.

3h. Welding

The portion of aluminum alloy or other metal anchor bolts which is intended to be exposed above the finished concrete line shall be given a protective coat of grease or heavy oil before the concrete is poured.

3g. Bolting

(5) Hot rivets shall be transferred from the furnace to the work and driven with a minimum loss of time.

(4) The rivet temperature shall be held between 990° and 1050°F. for not less than 15 minutes and not more than one hour before driving.

(3) Rivets shall be heated in a hot air type furnace providing uniform temperatures throughout the rivet chamber and equipped with automatic temperature controls.

(2) Cone-point heads shall have a diameter not less than 1.4 and over-all height not less than 0.65 times the nominal rivet diameter. The included angle at the apex of the cone shall be approximately 127 degrees.

(1) Flat heads shall have a diameter not less than 1.4 and height not less than 0.4 times the nominal rivet diameter.

The driven heads of rivets preferably shall be of the flat or the cone-point type. Rivets shall be driven by squeeze riveters when practical, otherwise by pneumatic hammers of approved size. Rivets 1/2 in. or less in diameter shall be driven cold. Rivets over 1/2 in. in diameter may be driven hot.

3f. Riveting

- a. Slotted bolt holes to take care of expansion shall be provided as called for on the plans.
- b. Anchor bolt holes may be up to 50 per cent greater than the nominal bolt diameter with a maximum of 1/2 inch greater than the nominal bolt diameter.

Rivet and bolt holes shall be drilled to finished size or subpunched smaller than the nominal diameter of the fastener and reamed to size. The amount by which the diameter of a subpunched hole is smaller than that of the finished hole shall be at least one-quarter the thickness of the piece. The finished diameter of holes shall be not more than seven (7%) per cent greater than the nominal diameter of the fastener except:

3e. Rivet and Bolt Holes

Aluminum alloy bridge railing material either plain or fabricated shall be stored at the bridge shop above the ground on platforms, skids or other supports. The materials shall be kept free from grease, dirt, and contact with

3m. Storage of Materials

The line and grade of the railing shall be true to that shown on the plans and not follow any unevenness in the superstructure. Unless otherwise specified or shown on the Plans, the handrail and curbs on bridges, whether super-elevated or not, shall be vertical.

31. Line and Grade

Where shims are required for alignment of posts, such shims shall be made from the fully annealed aluminum alloy known commercially as 2S-0.

3k. Alignment of Posts

The wood shall have at least three coats of highly waterproof paint, and the aluminum surfaces contacting such wood shall be coated with an aluminum impregnated calking compound.

3j(3) Contact with Wood

The contacting surfaces shall be thoroughly coated with an aluminum impregnated calking compound; or where bond between aluminum and concrete is desired, the aluminum shall be coated with zinc chromate paint and allowed to dry before installation.

3j(2) Contact with Concrete, Stone or Masonry

The contacting surfaces shall be thoroughly coated with an aluminum impregnated calking compound, or a synthetic rubber gasket shall be used. Aluminum alloys shall not be placed in contact with copper, copper base alloys, lead or nickel.

3j(1) Contact with other Metals

Where aluminum alloys come in contact with other materials the contacting surfaces shall be protected as follows:

3j. Contact with other Materials

Tubular vertical balusters may be fastened to horizontal rails by expanding the tubes where they pass through the rails. The holes shall be drilled to a size not more than 1/32 in. greater than the nominal diameter of the baluster tube. A standard self-feeding tapered roll expander shall be used. Balusters shall be expanded sufficiently to give a tight fit in all rails.

3i. Expanded fit for Balusters

Bearing piles shall be furnished and driven in conformance with the requirements of Subsection VII (Materials) of these "General Construction Details" and Division II, Section 3, of the AASHTO "Standard Specifications for Highway Bridges" dated 1957.

4. Bearing Piles

To take care of condensation in hollow members, it is required that drainage holes be provided at the lowest point.

30. Condensation

Bridge railing materials, before being laid off or worked must be straight. If straightening is necessary, it shall be done by methods that will not injure the appearance or integrity of the metal. Sharp kinks and bends shall be cause for rejection of the material. Portions of the work that are exposed to view shall be neatly finished.

3n. Condition of Materials

dissimilar metals, and protected, as far as practicable, from moisture until they have been properly installed.

Subsec. IV Excavation, Backfill and Embankment

SUBSEC. IV - EXCAVATION, BACKFILL AND EMBANKMENT

1. GENERAL

The Contractor shall make all necessary excavation and filling and backfilling for the proper construction of the project as shown on the Plans or called for in the Specifications. Excavation shall include the removal of all water and materials of any nature which interfere with the work.

Slopes of excavation and embankment shall be finished true, smooth and straight in conformity with the lines, grades and slopes as required by the Plans, Specifications and/or Engineer.

All materials within the street area interfering with the work, such as private gratings, vault openings, trees, rockeries, etc., shall be removed by the owner or shall become the property of the contractor. Inlet and manhole hardware removed and not replaced shall remain the property of the City of Portland.

All shrubs, trees and landscaping not interfering with the project and not in violation of the City ordinances shall be protected from the contractor's operations by the contractor.

2. DUST

Where dust conditions may arise, the contractor shall provide and distribute sulphite liquor, water or other dust palliative to the satisfaction of the Engineer. In the event of notice to the contractor and his subsequent failure to control the dust condition to the satisfaction of the Engineer, the City will provide such dust control and shall recover the cost thereof from the contractor or, in case work is being performed under a permit, from the owner, agent or contractor.

3. BRACING, LAGGING AND SHEET PILING

The Contractor shall furnish, install and maintain such bracing, lagging or sheet piling as is necessary to support the sides of excavations and any adjacent structure and to prevent any movement of the ground or danger to life or property.

Should any timbering, lagging, bracing or sheet piling which has been installed, be in any way insufficient for its purpose, the contractor shall immediately provide additional and adequate materials. Nothing shall relieve the contractor of his responsibility for the adequacy of his precautions.

Unless otherwise ordered by the Engineer, all such bracing, lagging or sheet piling shall be removed during backfilling in such a way as to prevent any movement of the ground. The space left by such removal shall be immediately

Unless otherwise required by the Special Specifications or noted in the proposal, clearing and grubbing shall be at the contractor's expense. Under this specification, the contractor shall, unless otherwise directed by the Engineer or by other provisions of the specifications, clear the whole of the "area to be cleared", and that area is hereinafter defined, and

6. a. General

6. CLEARING AND GRUBBING

Material from excavation not suitable or not required for backfill shall be wasted at the site as directed by the Engineer or removed by the contractor. All costs of loading, hauling, placing and grading or otherwise disposing of excess excavation shall be included in the unit bid price for excavation and backfill. The contractor will be permitted to dispose of removed material at his option, and shall be entitled to receive any reimbursement that he can secure from the sale of such material.

5. DISPOSAL OF SURPLUS EXCAVATION

Dewatering of a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure. The areas to be occupied by concrete shall be kept dry to the extent that reinforcing steel will not be placed in water. Water will not be permitted to rise over any reinforcing steel before the concrete has been placed. Flowing water shall not be permitted to damage the concrete.

When water in the excavation is detrimental to construction operations, dewatering will be required as directed by the Engineer. The removal and disposal of water shall be at the contractor's expense. Discharge from dewatering, upon approval of the Engineer, shall be conducted to natural drainage channels, gutters, drains or storm sewers. Precautions shall be taken to exclude mud, silt or other unsatisfactory materials from the dewatering discharge. Surface water shall be diverted and prevented from entering the excavation.

4. DISPOSAL AND HANDLING OF SEEPAGE AND STORM WATER

The cost of furnishing, installing, maintaining and removing bracing, lagging and/or sheet piling, as specified or required, including the cost of unsalvageable material, should cut off be ordered, shall be considered as included in the unit price bid per cubic yard for excavation and no additional allowance will be made therefor. When the Engineer orders that sheet piling, lagging and bracing shall be left in place, such sheeting and lagging shall be cut off as directed and the upper part withdrawn. Filled with approved backfilling material and thoroughly compacted.

The area referred to herein as the "area to be cleared" shall be the area or areas indicated by the clearing limit lines shown on the plans or, if no such limit lines are shown on the plans, it shall be all of such areas as are to be occupied by excavations, embankments and structures involved under the contract or involved within the limits of the project including, but not necessarily limited to, areas for material sources, cutbank rounding, approach roads, road connections, channel changes, borrow, drain, bridges, structures, sewers, and other facilities whether the same are located within or outside of the right of way or street limits. At the sites of bridges, structures and sewers, the "area to be cleared" shall include adjoining areas as necessary to permit construction of the project.

6.c. Definition of "Areas to be Cleared"

The removal of stumps and embedded roots will not be required on either of the portions of the right of way which are outside of the "areas to be grubbed" as those areas are defined hereinafter, or on those portions of the "areas to be grubbed" which are to be occupied by embankment having a depth or height greater than 4 feet.

6.b. Project Limitations

The following things and kinds of matter shall be considered exceptions and their removal shall not be considered part of the work to be done as clearing and grubbing under this specification unless specifically so provided in the Special Specifications or Plans: culverts, sewers, drain pipe, manholes, catch basins, water pipes, gas pipes, telephone lines, telegraph lines, power lines, railway tracks, abandoned buildings and structures, remains of buildings partially or wholly removed or destroyed, walls, floors, walks, chimneys, stairways, bridges, concrete curbs, concrete gutters and street and highway pavements. There shall be no other exceptions unless specifically mentioned in the Special Specifications.

The things and the kinds of matter to be removed from the right of way and other specified areas shall include, but shall not be limited to, the following: trees, snags, down timber, brush, logs, stumps, roots, branches, sticks, boards, planks, timbers, and fences.

Also, under this specification, the contractor shall perform such cleaning-up work on all areas occupied by him in the performance of the contract as may be required to leave the areas in a neat and clean condition upon completion of the contract.

remove therefrom all things and all matter, the removal of which is necessary or desirable as a preliminary to the grading work and other work to be performed under the contract or within the limits of the project, or desirable from the standpoint of safety.

Within those portions of the areas to be grubbed which are within the limits of required excavation or within the limits of required embankment having a depth or height of less than 4 feet, all stumps shall be completely removed by grubbing, blasting or other suitable means. Also, within those portions of said areas to be grubbed, all roots and other embedded wood shall be removed to a depth not less than 6 inches below the limit lines of excavations or (if within embankment areas) to a depth not less than 1 foot below the subgrade or slope surface to which the embankment is to be constructed.

6.g. Grubbing

Trees and snags of which less than one-third of the diameter of the lower portion of the trunk is within the "area to be cleared" may be left in place unless they lean toward the right of way centerline or are so located as to interfere with other work to be done under the contract, in either of which cases they shall be removed.

All trees, snags, brush and other timber shall be felled onto the area to be cleared as that area is hereinbefore defined.

In the cutting of trees, snags, brush and other timber and timber growth, the cuts shall, if the stumps are to be left in the ground, be so made that no stump extends above the ground surface more than one-half its diameter, unless the diameter of the stump is less than 8 inches, in which case the stump may extend above the ground surface not to exceed 4 inches. Stumps within embankment areas shall be further cut back so that the tops are at least 3 feet below the subgrade or slope surface to which the embankment is to be constructed.

6.f. Cutting of Trees, Brush, Etc.

The term "stump" as used in this Specification, shall be understood to include the bottom portion of trees, snags, fallen timber, brush and other timber growth as well as stumps from prior cutting and stumps resulting from the contractor's own cutting.

6.e. Definition of Stump

The area referred to herein as the "area to be grubbed" shall be all of the area within the limits of the "area to be cleared" which is also within the limits of required excavations and required embankment construction.

6.d. Definition of "Area to be Grubbed"

The clearing and grubbing work shall be performed in strict compliance with all State and Federal laws and requirements pertaining to clearing and burning, and particularly shall it be performed in conformity with the provisions of ORS 477.246, and all subsequent amendments, which provisions require, among other things, the filing with the State Forester, prior to the commencement of clearing operations of a general description of the right of way to be cleared. The said provisions require, also, the performance of the clearing work in conformity with the terms of the permit which the State Forester will issue following the filing with him of the said general description of right of way.

6.j. Compliance with Laws

In removing concrete, masonry and other unburnable material, the structures or things involved shall be cut or broken into pieces which can be disposed of in the manner hereinafter specified without being detrimental to the work or otherwise objectionable.

Such things as are removed under this provision shall be removed to an elevation not less than 2 feet below that established for the roadbed or slope surface at the site of the thing removed, or if the above provision is not pertinent, to a depth of at least 1 foot below the level of the existing ground on which they are encountered.

Structures and other articles and things of concrete, masonry and other unburnable matter, such for instance as concrete and masonry walls, concrete floors, chimneys, steps, walks, bridges, headwalls, etc. shall be broken up and removed unless they are of such nature and at such grade and in such position that they will be buried in embankments and can be so buried without affecting the stability or permanence of the completed work or being objectionable in some other respect.

6.i. Removal of Concrete and Masonry

Heavy grass, grass roots, growing crops and like growth occurring within the embankment area shall be removed and burned or otherwise disposed of in a manner satisfactory to the Engineer.

6.h. Removal of Grass, Roots Etc.

Holes resulting from the removal of stumps, roots and other embedded wood shall be filled with suitable embankment material, the material being placed in layers of thickness not greater than 8 inches and each layer being thoroughly compacted as it is placed.

The Contractor will be required to use new materials when replacing macadam pavement over trenches, except when in the opinion of the Engineer the old material will be equally satisfactory.

8. b. Macadam Pavement

All surfaces of improved roadways encountered along the route of the project shall be cut to true lines and the minimum width necessary for the excavation. The contractor may use pavement breakers or other labor saving devices not prohibited by these Specifications; however, the use of any machine or device that breaks pavement by blows struck by a falling or driven hammer or weight is prohibited where damage may be done to an existing utility or improvement. The use of the device known as a "headache ball" shall be prohibited except with the permission of the Engineer.

8. a. General

8. CUTTING AND REPLACING ORIGINAL SURFACE, SIDEWALKS AND CURBS

Solid rock will include solid rock in ledges, bedded deposits unstratified masses and conglomerate deposits so firmly cemented as to present all the characteristics of solid rock, all of which materials require drilling and/or blasting for removal; including also boulders more than 1/2 cu. yd. in volume.

Concrete will include items encountered in the work composed of Portland cement concrete or asphaltic concrete.

"solid rock." Earth will include all materials not defined as "concrete", or

When classified, the various items shall be as defined herein:

Unless otherwise provided in the Special Specifications, all trench and tunnel excavation shall be unclassified, and will be paid for at the unit prices bid therefor.

7. CLASSIFICATION OF EXCAVATION

Unless otherwise specified by the Engineer or the Special Specifications, the contractor will receive no extra allowance for any clearing and grubbing which may be done in connection with the construction of this project.

6. k. Pay Quantities

8. c. Oiled Macadam, Oiled Gravel, and Asphaltic Concrete Pavement

Where oiled macadam, oiled gravel, or asphaltic concrete pavement is to be replaced over a trench, asphaltic concrete class "B" conforming to the requirements of the "Materials" subsection of these "General Construction Details" shall be used.

8. d. Gravel Surface Cuts

In replacing gravel over trenches in gravel streets, the surfacing material must contain enough binding material to make the trench area as good as the original roadway. The roadway shall be restored to its original condition using the material necessary to accomplish this result.

8. e. Concrete Pavement, Sidewalks & Curbs

Replacement of Portland Cement concrete pavement, sidewalks and curbs shall be in kind and conform to the requirements of the "Streets" Subsec. I of these "General Construction Details."

8. f. Care of Lawns, Trees and Shrubbery

On any portion of the project crossing private property, the Contractor shall remove and replace any shrubs, plants or sod, designated by the property owner, within the construction area, that cannot economically be preserved by the construction of short tunnels. All shrubs or plants shall be bailed by experienced men, carefully handled and kept watered, and replaced in the original position without damage. The plants or shrubs designated which are not preserved in their original form must be paid for or replaced by the Contractor. Sod shall be handled in a like manner. Wherever the sod can not be saved and restored, the ground must be properly prepared and reseeded and cared for at the expense of the Contractor until a stand of grass is re-established, the Contractor shall excavate the top soil and store it separately from the subsoil, and shall conduct the backfilling in a manner that will restore original conditions. It is the intent of this paragraph that the Contractor shall not meet unreasonable demands of the property owners, but shall leave the surface and planting in substantially the same condition as before the project was undertaken. The negotiation and expense of tree preservation shall be the responsibility of the Contractor.

8. g. Pay Quantities

The unit price for cutting and replacing pavement over trench and standard manholes, also for special manholes, shall cover generally all forms of hard surface pavement, including concrete, sheet asphalt and various types of asphaltic concrete. The unit price for cutting and replacing

Excavation of trenches shall not extend below an elevation 4 inches above the bottom of the pipe. All additional excavation necessary for preparation of the trench bottom shall be done manually. The sub-grade upon which the pipe is to be constructed or laid shall be firm, thoroughly compacted and true to grade. If the material in the bottom of the trench is ledge rock, mechanical excavation of trenches shall extend to a depth of six inches or more below the bottom of the pipe and replaced with a bedding of crushed rock, gravel or sand required by the Plans, Special Specifications or the Engineer. Excavation below grade which is made inadvertently or without authority shall be restored to grade by backfilling with approved material unless otherwise specified in the Special Specifications at the expense of the Contractor. When the bottom of the trench is water-saturated earth, and upon authorization of the Engineer, mechanical excavation shall extend to such depth as required by the Plans, Special Specifications or the Engineer, and be replaced with suitable material. Stabilization

Trench excavation shall follow lines parallel to and equidistant from the center line. Trenches shall be excavated to the depth required to accommodate the construction as follows:

9.a. General

9. TRENCH EXCAVATION

The pay quantity in cubic yards, for base and leveling course, as specified herein, will be computed on the basis of the actual length, depth, as specified or as ordered by the Engineer, and the width as the allowable trench pay width plus one foot.

other types of sheet surfacing shall cover gravel, crushed rock, macadam and all other types either water or oil bound. The area of pavement or sidewalk allowed shall be the product of the actual length traversed, measured along the center line of the trench, from center to center of standard manholes and a fixed pay width which shall be the trench pay width plus one (1) foot. Where diversion manholes, special manholes, and special structures are encountered along the trench, the allowable pay length over sewer trenches will terminate eighteen (18) inches short of the outside face of the structure, and the area of pavement allowed over these structures will be the product of the length plus three (3) feet and the width plus three (3) feet. The area of sidewalk shall also include an allowance for squaring out blocks actually cut within the pay width specified above. If the curb has been cut the length of curb to be allowed shall be the distance along the curb between the points where the sides of the trench of allowable pay width intersect the curb.

<u>Width of Trench</u>	<u>Size of Pipe</u>
4.65	36
4.42	33
4.08	30
3.75	27
3.50	24
3.08	21
2.79	18
"	15
"	12
"	10
"	8
2.50	6 inch

The Contractor, with exclusions as noted below, will be allowed payment for excavation and backfill of trenches at the contract price therefor on the basis of quantities computed as the product of the length center to center of standard manholes, the vertical depth from the undisturbed surface to the invert and the width as tabulated:

9.c. Pay Quantities

Except by special permission of the Engineer, the trench at any one location, shall not be open for more than 400 feet, including excavation, construction and backfilling.

9.b. Maximum Length of Open Trench

of the trench bottom shall be accomplished under direction of the Engineer by backfilling to the grade required with backfill gravel conforming to the requirements of Subsec. VII (Materials) of these "General Construction Details" or other acceptable material.

Where tunnel is not specified but is permitted at the request of the Contractor, payment for the work will be made as for open cut excavation as herein specified, and payment for curbs, sidewalk, pavement and related base courses will be allowed whether cut or not.

The excavation of the tunnel and backfilling around the pipe after construction, unless otherwise specified in the Special Specifications, shall be paid for at the unit price bid per lineal foot of tunnel as measured along the center line of the tunnel between portals. Any extra width or additional excavation of the trench as approaches to tunnel portals or the construction of shafts not called for on the Plans, but required by the Contractor for tunneling operations shall be at the expense of the Contractor.

10. b. Pay Quantities

The sub grade upon which the pipe is to be constructed or laid shall be firm, thoroughly compacted, true to grade, and with at least six (6") inches of soil or bedding material as authorized by the Engineer, under the pipe. If the material in the bottom of the tunnel is ledge rock, excavation of the tunnel shall extend to a depth of 6 inches below the bottom of the pipe or more, as required by the Plans, Special Specifications or the Engineer, and a bedding of crushed rock, gravel, sand or concrete shall be provided as required by the Specifications of the Engineer. Excavation below grade which is made inadvertently or without authority shall be restored to grade by backfilling with approved material unless otherwise specified in the Special Specifications at the expense of the Contractor.

Tunneling will be permitted when shown on the Plans, called for in the Special Specifications, or approved by the Engineer. Before beginning work the Contractor must inform the Engineer what method of tunneling he intends to use and have the same approved before construction begins.

10. a. General

10. TUNNEL EXCAVATION

In the case of trenches for pipe over 36 inches in diameter or for monolithic conduit, payment will be made for a trench 12 inches greater than the outside width of the pipe or conduit barrel, unless otherwise specified. Where undercutting is required, the vertical depth shall be increased by such additional depth ordered. Where diversion manholes, special manholes and special structures are encountered along the trench, the allowable pay length of trench shall terminate at a neat line one foot beyond the outside face of the structure.

In backfill and embankments or portions thereof other than where ninety five percent (95%) of "Maximum density" is required, as herein set forth, the materials shall have a density not less than ninety percent (90%) of "maximum density."

In the upper three (3) feet of completed backfill and embankments and in the whole of backfills and embankments of three (3) feet or less in height, the materials shall have a density not less than ninety five percent (95%) of "maximum density."

Backfill and embankments, which are of earth, gravel or fine rock shall be compacted in place by whatever equipment is necessary and at such moisture content that when tested in accordance with the "Method of Test for Density of Soil in Place by the sand cone method", ASTM Designation: D-1556, the compacted materials shall have a percentage of the "maximum density" of the materials, as determined by the "Method of Test for The Moisture Density Relations of Soils using a 5.5 lb. rammer and 12 inch drop," ASTM Designation: D-698 as follows:

12.b. Compaction

All material used for backfill and embankment shall be of a quality acceptable to the Engineer and shall be free from large or frozen lumps, large rocks and wood or other organic material. All spaces excavated and not occupied by abutments, piers or other permanent work shall be refilled with suitable material up to the surface of the surrounding ground. All backfill shall be compacted and its top surface shall be neatly graded.

12.a. General

12. EMBANKMENT AND BACKFILL

Excavation and backfill for the diversion manholes, special manholes and special structures, shall be allowed at the trench excavation unit price to lines one foot beyond the outside face of the concrete. Other types of structural excavation and backfill, unless otherwise noted, shall be paid for in a lump sum.

11.b. Pay Quantities

If excavations for foundations are inadvertently made below the elevations shown on the Plans, the excavation shall be filled to grade by the contractor with at least 2000 lb. 3 inch to 5 inch slump concrete at the expense of the Contractor.

11.a. General

11. STRUCTURAL EXCAVATION

Unless otherwise specified, all precast pipe sewers shall be protected from lateral movement or possible damage from impact or unbalanced loading during backfilling operations by being adequately embedded in suitable material. Except where loading or sub-soil conditions require the use of concrete embedment or encasement, all pipe embedment materials placed at any point below an elevation 12 inches above the top of the pipe shall be deposited and compacted in layers not to exceed 6" in uncompacted depth and such deposition and compaction shall be done simultaneously and uniformly on both sides of the pipe; all such material shall be placed with hand tools in such manner that it will be scattered or spread along side the pipe and not dropped into the trench in compact masses.

12. f(1) Precast Pipe Backfill

12.f. Trench Backfill

Any void outside of the outer surface of the sewer barrel shall be backfilled with approved material compacted by hand-operated mechanical tampers, or other approved method, to a degree satisfactory to the Engineer.

12.e. Tunnel Backfill

Backfill shall not be placed against any abutment or wing wall until permission has been given by the Engineer and preferably not until the structure has been in place 14 days, and/or until test methods show the strength to be twice the working stress used in the design. The fill behind abutments and wing walls of all structures shall be deposited in horizontal layers not to exceed 12 inches in thickness and well compacted. The backfill in front of such units shall be placed first to prevent the possibility of forward movement. Special precautions shall be taken to prevent any wedging action against the masonry, and the slope bounding the excavation for abutments and wing walls shall be destroyed by stepping or roughening to prevent wedge action. Hydraulic placement of the fill behind abutments and wing walls will not be permitted. Fill placed around piers shall be deposited on both sides to approximately the same elevation at the same time.

12.d. Structural Backfill

Embankment material shall be deposited in approximately horizontal layers not exceeding eight inches (8") in thickness and thoroughly compacted before the next layer is deposited thereon.

12.c. Embankment

When compacting by other than puddling or jetting methods, fill materials which do not contain sufficient moisture to compact in accordance with the requirements, shall be uniformly wetted to optimum moisture either during excavation or while being placed in embankment. Materials containing an excess of moisture shall be dried to optimum moisture before being compacted.

The pay quantity, in cubic yards, for gravel backfill, as specified herein, shall be computed on the basis of the actual length and depth as specified or as ordered by the Engineer, and the width as the pay width of trench allowed in the pay quantity for trench excavation.

12. f(4b) Pay Quantities

In paved areas when the backfilled material is unstable and would provide inadequate support to the pavement subgrade, the Contractor shall backfill the top portion of the trench below the subgrade of the pavement with an approved gravel backfill material to the length and depth as required by the Plans, Special Specifications, or the Engineer and to the full width of the actual excavation. The gravel backfill material shall conform to the requirements of the "Materials" subsection VII of these "General Construction Details."

12. f(4a) General

12. f(4) Gravel Backfill

Backfill for manholes shall be evenly placed around the manhole as the filling progresses otherwise backfilling procedure for precast or monolithic manholes will follow the recommendations of precast or monolithic pipe respectively.

12. f(3) Manhole Backfill

When the concrete has attained adequate supporting strength, the space between the monolithic pipe and the sides of the trench shall be backfilled by hand on both sides and thoroughly compacted by an approved method. Whenever possible, all outside forms shall be removed. From the top of the arch of the monolithic pipe, the trench shall be backfilled as specified for precast pipe in these Specifications.

12. f(2) Monolithic Pipe Backfill

After the precast pipe has been placed, inspected and approved by the Engineer and the pipe embedment placed, the trench backfill shall be placed and compacted in accordance with the requirements of these specifications. All material three (3) inches and larger shall be separately surrounded with earth filling. In case there shall be any deficiency of suitable backfilling material, the Contractor shall supply the same without additional cost.

Subsec. V Portland Cement Concrete

1. GENERAL

These Specifications apply generally to the use of Portland cement concrete in the construction of structures, monolithic sewers, streets, curbs and sidewalks, and shall be considered as supplemental to the Special Specifications. For the concrete mix to be used in various locations, and for special conditions and methods of construction, the Plans and the Special Specifications shall govern.

2. FORMS

2. a. General

All forms shall be of an approved material and shall be built mortartight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations. Forms shall be constructed and maintained so as to prevent warping and the opening of joints due to shrinkage of the lumber.

Forms shall remain in place for periods which shall be determined as hereinafter specified. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the work shall be stopped until the defects have been corrected.

The shape, strength, rigidity, watertightness and surface smoothness of used forms shall be maintained at all times. Forms which are unsatisfactory in any respect shall not be re-used.

Forms for exposed surfaces shall be made of dressed lumber of uniform thickness, with or without a form liner of an approved type, and mortartight. Forms shall be filled at all sharp corners and shall be given a bevel or draft in the case of all projections, such as girders and copings, to insure easy removal.

For narrow walls and columns, where the bottom of the form is inaccessible, the lower form boards shall be left loose so that they may be removed for the cleaning out of extraneous material immediately before the placing of the concrete.

All forms shall be treated in a manner acceptable to the Engineer prior to the placing of the concrete. Any material which will adhere to or discolor the concrete shall not be used.

Forms shall not be removed until the concrete has attained a strength fully adequate to support itself, carry any superimposed loads, and permit the removal of forms without breaking corners or defacing the surface. Subject to these limitations the forms for exposed surfaces shall be removed as early as possible to permit repair of defects and surface grinding while the concrete is still green.

2.e. REMOVAL OF FORMS

Outside forms for monolithic sewers may be of wooden panel construction or built in place. They shall be shaped to the section required, tight, and adequate in strength to permit rapid placement of concrete to the full height of the sewer.

2.d(2) Outside Forms

Inside forms for monolithic sewers shall have hinged inspection and tamping openings with flush doors to permit convenient distribution and working of the concrete. Wooden inside forms for non-rectangular sewers shall be accurately built up from narrow strips and so shaped to give a smooth, curved surface. Metal inside forms shall have the bolt and rivet heads countersunk on the face to insure a smooth surface.

2.d(1) Inside Forms

2.d. MONOLITHIC SEWER FORMS

All form lumber shall conform to the requirements of the "Materials" subsection of these "General Construction Details." Form lumber shall be of the proper dimensions for the work and any unfit lumber shall be removed from the work.

2.c. FORM LUMBER

Metal ties or anchorage within the forms shall be so constructed as to permit their removal to a depth of at least 2 inches from the face without injury to the concrete. In case ordinary wire ties are permitted, all wires, upon removal of the forms, shall be cut back at least 1/4 inch from the face of the concrete with chisels or nippers; for green concrete, nippers are necessary. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. The cavities shall be filled with cement mortar and the surface left smooth, even and uniform in color.

2.b. FORM TIES

In the determination of the time for the removal of falsework, forms and housing, and the discontinuance of heating, consideration should be given to the location and character of the structure, weather, concrete mix and other conditions influencing the setting of the concrete.

If field operations are controlled by approved tests, the removal of forms, supports and housing, and the discontinuance of heating and curing may be begun when the strengths reach values which shall have been fixed by the Engineer for the particular method of testing which is to be used. The tests shall be made under conditions which are not more favorable than the most unfavorable conditions for the portions of the concrete which the tests represent.

3. JOINTS IN CONCRETE.

3. a. CONSTRUCTION JOINTS

3. a(1) GENERAL

The general program for placing concrete shall be submitted to and be approved by the Engineer. Where a section cannot be placed continuously, or where construction joints may be necessary or desirable to provide for shrinkage, such joints shall be located as provided in the drawings or approved by the Engineer to create the minimum weakening of the finished structure.

When the placing operation is interrupted for any reason, construction joints shall be placed either horizontally or vertically as needed, (the placement of the joint must be approved by the Engineer) and provided with keys to resist shear and dowels to develop bond, as directed by the Engineer. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulkhead.

To avoid visible joints as far as possible upon exposed faces, the top surface of the concrete adjacent to the forms shall be smoothed with a trowel. Before depositing new concrete on or against concrete which has hardened, the surface of the hardened concrete shall be roughened in a manner which will not leave loosened particles of aggregate or damaged concrete at the surface. The surface of the concrete shall be chipped to remove all laitance and expose the aggregate. The surface of the concrete shall then be thoroughly saturated with clean water and coated with neat cement or mortar, as directed by the Engineer.

Where a "feather edge" might be produced at a construction joint, as in the sloped surface of a wing wall or sewer, an inset formwork shall be used to produce a block-out portion in the preceding layer which shall produce an edge thickness not less than 6 inches in the succeeding layer.

Generally, where walls or floors are required to be watertight, a keyway will be required to increase the length of the leakage path and a continuous metal plate or water stop will be placed in the middle of the keyway. Joints not shown on the plans and placed to suit the operations of the Contractor shall be in every way equal to those definitely shown, and it shall be the responsibility of the Contractor to secure complete watertightness in the finished structure. Otherwise, methods used shall correspond to those specified for construction joints.

3. a(4) WATER TIGHT CONSTRUCTION JOINTS

Construction joints in columns and walls shall be made at the underside of floor members and at floor levels. Haunches and column capitals shall be considered as part of and continuous with the floor or roof. Construction joints in floors shall be located near the middle of the span of slabs, beams or girders, unless a beam intersects a girder at this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam and adequate inclined reinforcement shall be made to provide for shear.

Construction joints in retaining walls shall be made where shown on the Plans or approved by the Engineer.

3. a(3) CONSTRUCTION JOINTS IN STRUCTURES

The preferred plan shall be to skip key sections of approximately two feet in length and to concrete these two-foot sections after the abutting sections have taken their setting shrinkage and just prior to backfilling. All transverse construction joints shall be provided with keyways and the longitudinal steel shall be continuous through the construction joints.

Transverse construction joints in monolithic sewers shall be located and constructed to minimize and localize transverse cracking due to contraction of the concrete. Transverse construction joints in monolithic sewers shall be provided at intervals not exceeding 40 feet and the position of construction joints in the invert and the arch shall coincide.

3. a(2b) TRANSVERSE JOINTS

Longitudinal construction joints in monolithic sewers shall be located and be provided with keyways as shown on the Plans or as approved by the Engineer.

3. a(2a) LONGITUDINAL JOINTS

3. a(2) MONOLITHIC SEWER CONSTRUCTION JOINTS

Metal reinforcement shall not be straightened or rebent in a manner which will damage the metal. Bars with kinks or bends not

4. c (1) GENERAL

4. c. BENDING

Steel reinforcement shall be protected at all times from damage. When placed in the work, it shall be free from dirt, detrimental scale, paint, oil or other foreign substance.

4. b. PROTECTION OF MATERIALS

The reinforcement for concrete shall conform to the "Materials" subsection of these "General Construction Details."

4. a. MATERIALS

4. REINFORCEMENT

Curb expansion joints shall be placed at all points of curvature and at maximum intervals of 18 feet. When points of curvature and tangency occur in a crosswalk, the joints shall be placed at the extension of street right of way lines. These joints shall consist of a strip of expansion joint filler 1/4 inch thick extending the full depth and width of the curb.

3. b(4) CURB EXPANSION JOINTS

At the extension of street right of way lines, at all intersections, at maximum intervals of 18 feet of longitudinal pour and for the full distance that a walk is in contact with poles, buildings, vaulted sidewalks or other utility or private installations, an expansion joint shall be constructed at the time the concrete is placed. This joint shall be 1/4 inch thick, the depth of the concrete in height and the width of the walk in length. This expansion joint shall also be constructed so that all walks and driveways are separated from the main sidewalk.

3. b(3) SIDEWALK EXPANSION JOINTS

Expansion joints shall be placed at a maximum of 25 feet apart and shall be 3/8 inch in thickness, the depth of the concrete pavement in height and the width of the pavement in width.

3. b(2) CONCRETE PAVEMENT EXPANSION JOINTS

The expansion joint shall be placed in accordance with the requirements of the plans, specifications and/or the Engineer. The expansion joint material shall conform to the "Materials" subsection of these "General Construction Details" and be acceptable to the Engineer.

3. b(1) GENERAL

3. b. EXPANSION JOINTS

Bending (Cont'd.)

called for on the drawings shall not be used. All reinforcement shall be bent cold except in special cases where the entire operation of heating and bending is specifically approved by the Engineer.

4. c(2) STIRRUPS AND TIE BARS

Stirrups and tie bars shall be bent around a pin having a diameter not less than two times the minimum thickness of the bar.

4. c(3) OTHER BARS

Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness except for bars larger than 1 inch in which case the bends shall be made around a pin of eight bar diameters.

4. c(4) COLUMN SPIRALS

Spirals shall be provided with one and one half extra turns at both top and bottom to provide anchorage.

4. d. SPLICING

4. d(1) GENERAL

All reinforcement shall be furnished in the full lengths indicated on the plans. Splicing of bars, except where shown on the plans, will not be permitted without the approval of the Engineer. When splicing is shown on the plans or approved by the Engineer and unless otherwise required, splicing shall be done by lapping. Permitted splices shall be staggered as far as possible.

4. d(2) WELDING

Welding of reinforcement shall be done only if detailed on the Plans or if authorized by the Engineer. Welding shall conform to the current Specifications for Welded Highway and Railway Bridges of the American Welding Society.

4. d(3) LAPPING

4. d(3a) STRAIGHT BAR SPLICES

Splices of bars in the bottom of beams, girders, walls, columns and haunches shall be lapped 20 diameters. Splices of bars near the top of beams and girders having more than 12 inches of concrete under the bars and for concrete with a strength greater than 3000 psi at 28 days shall be lapped 24 diameters. The bars shall be placed in contact and wired together in such a manner as to maintain a clearance of not less than the minimum clear distance to other bars.

Distances from the forms shall be maintained by means of stays, blocks, ties, hangers, or other approved supports. Blocks for holding reinforcement from contact with the forms shall be precast mortar blocks of approved shape and dimensions or approved metal chairs. Metal chairs which are in contact with the exterior surface of the concrete shall be galvanized. Layers of bars shall be separated by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal

4. f(4) BAR SUPPORTS

In situations in which the bars will not be subject to loadings or abuse which will displace them, the Engineer may notify the Contractor of reduced tying requirements; otherwise bars shall be tied at all intersections, except where spacing is less than one foot in each direction in which case alternate intersections shall be tied.

4. f(3) BAR TIES

The metal reinforcement shall be protected by the thickness of concrete specified in the Plans. When the use of the ground as a form is permitted by the Engineer, the concrete thickness shall be increased to provide a minimum of three (3) inches clear cover for the metal reinforcement.

4. f(2) CONCRETE COVER FOR REINFORCEMENT

Reinforcement in any member shall be accurately and securely placed in the positions shown on the Plans and then inspected and approved by the Engineer before the placing of concrete begins. Concrete placed in violation of this provision may be rejected and removal required.

4. f(1) GENERAL

4. f. PLACING AND FASTENING

Substitutions of different size bars will be permitted only with specific authorization by the Engineer.

4. e. SUBSTITUTIONS

Sheets of mesh reinforcement shall overlap each other not less than one mesh to maintain uniform strength and shall be securely fastened at the end and edges.

4. d(3c) MESH REINFORCEMENT

When necessary to splice spirals, it shall be done by welding or by a lap of one and one half turns.

4. d(3b) COLUMN SPIRAIS

When hand or batch mixed on the job, and unless otherwise required by the Plans, Special Specification, and/or the Engineer, the different classes of concrete shall conform to the following limiting requirements and shall contain not less than the quantity of cement specified. The cement content is an absolute minimum to insure workability and strength.

5. c (2) JOB MIXED CONCRETE CLASSES

Minimum ultimate 28 day compressive strength in psi	slump (inches)
2000	3 to 5
2500	3 to 5
3000	2 to 3
3000	2 to 4
3000	3 to 5

5. c (1) READY MIXED CONCRETE CLASSES

5. c. CONCRETE CLASSES

Admixtures will be used only when specified in the Plans and Specifications or with approval of the Engineer. Air entrained concrete shall conform to "Specifications for Air-Entraining Admixtures for Concrete" A.S.T.M. Designation C-260. In all cases the particular admixture and method of use shall be subject to the approval of the Engineer.

5. b. ADMIXTURES

Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate and water, proportioned and mixed as specified. Portland Cement, Aggregates and water shall conform to the requirements of the "Materials" subsection of these "General Construction Details."

5. a. GENERAL

5. CONCRETE MIXING

If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.

4. f (5) MESH REINFORCEMENT

When spiral reinforcement is used and wooden blocks shall not be permitted. When spiral reinforcement is used spacers shall be furnished with each spiral to hold the spiral rods firmly in place and properly spaced during the placing of concrete.

The slump of concrete shall be determined in accordance with the requirements of A.S.T.M. "Method of Test for Slump of Portland Cement Concrete" Designation C-143.

5. d. SLUMP TEST

GROUT shall be composed of Class C Mortar diluted with water to required consistency but not exceeding a one to one weight ratio of water to cement (sand moisture included).

5. c(5) GROUT

Class of Mortar	Example of Uses	Sacks of Cement	Cu.Ft. Sand
A	Caiking pipe joints	1	1 1/2
B	Mortar and plaster for retaining walls, brick manhole exteriors and bulkhead walls in sewers and sewer structures.	1	2
C	Mortar and plaster for brickwork exposed to concentrated sewage; brick manhole inverts, and brick sewer inverts.	1	1

5. c(4) MORTAR

Tremie Concrete shall conform to the requirements of the "Special Specifications" for the particular work involved.

5. c(3) TREMIE CONCRETE

Class	Slump (inches)	Quantity Ratio	Minimum ultimate 28-day compressive strength in psi
	3 to 5	1 : 2 1/2 : 5	2000
	3 to 5	1 : 2 : 4	2500
	3 to 5	1 : 2 : 3	3000

Cement-fine aggregate - coarse aggregate (by volume)

Sand, gravel and cement for concrete shall be measured by weight only, unless the amount of concrete required for any one job is 25 cubic yards or less, in which case the sand, cement and gravel may be measured by weight or volume. In measuring the materials by volume, one full sack of cement in the original package containing 94 lbs. will be accepted as one cubic foot. If barrel cement is used, one barrel containing 376 pounds of cement (exclusive of the weight of the container) will be accepted as four cubic feet. If bulk cement is used, 94 pounds of cement will be accepted as one cubic foot. When volumetric measurement is used, splitting of sacks of cement, except for hand mixing, will not be permitted.

5. g(2) MEASURING MATERIALS

Fine and coarse aggregate shall be kept in separate piles and in such a manner as to avoid the inclusion of dirt or foreign materials. Frozen aggregate shall not be used until thawed and approved by the Engineer.

Gement shall be delivered to the site a sufficient length of time in advance of use to permit sampling and testing. It shall be stored in a dry shed or on a platform elevated above the ground and covered with a tent or canvas in such a manner that the canvas does not come in contact with the sacks. Cement must meet the Specification requirements at the time of use, and shall not be released from storage without the express permission of the Engineer. Sacks shall be tiered up in such a manner as to facilitate counting and shall be hauled away only with the knowledge and approval of the Engineer.

5. g(1) STORAGE OF MATERIALS

5. g. MIXING ON THE JOB

Plant mix concrete shall be discharged at the job and placed in its final position in the forms within 1½ hours after the introduction of the mixing water to the cement and aggregate.

The use of central mixing plants and transporting equipment, and the use of truck mixers or truck agitators will be permitted under these Specifications provided that the concrete of the class specified by the Special Specifications or the Plans is produced and delivered in conformity to the "Specifications for Ready Mixed Concrete" A.S.T.M. Designation C-94 with the limitations as noted in these "General Construction Details."

5. f. GENERAL MIXED AND MIXED IN TRANSIT CONCRETE

Retempering of concrete or mortar which has partially set will not be permitted.

5. e. RETEMPERING OF CONCRETE

Concrete shall be done in a batch mixer of approved type which will insure a uniform distribution of the materials throughout the mass so that the mixture is charging hopper, water storage and a water measuring device controlled from a case that can be kept locked and so constructed that the water can be discharged only while the mixer is being charged. It shall also be equipped with an attachment for automatically locking the discharge lever until the batch has been mixed the required time after the materials are in the mixer. The entire contents of the drum shall be discharged before recharging. The mixer shall be cleaned at frequent intervals while in use. The volume of the mixed materials per batch shall not exceed the manufacturer's rated capacity of the mixer. The mixing period shall be not less than one and one-half (1½) minutes for mixers having a rated capacity of one (1) cubic yard or less and two (2) minutes for larger mixers; the mixing periods being measured from the time when all solid materials are in the mixer drum, providing that all of the water shall be added before one-fourth of the mixing time has elapsed.

5. g(3) BATCH MIXING

The mixing of concrete, unless otherwise authorized by the Engineer, shall be done in a watertight platform of the proper size. The cement and fine aggregate shall first be mixed dry until the whole is of a uniform color. The water and, for concrete, the coarse aggregate shall then be added and the entire mass turned not less than three times or until a homogeneous mixture of the required consistency is obtained.

5. g(4) HAND MIXING

When hand mixing is authorized by the Engineer, it shall be done on a watertight platform of the proper size. The cement and fine aggregate shall first be mixed dry until the whole is of a uniform color. The water and, for concrete, the coarse aggregate shall then be added and the entire mass turned not less than three times or until a homogeneous mixture of the required consistency is obtained.

6. PLACING OF CONCRETE

6. a. GENERAL

When beginning the placement of concrete, surfaces of contact at construction joints shall be cleaned and prepared as herein specified. Forms shall be cleaned and wetted or oiled. All debris shall be removed from the space to be occupied by the concrete, the forms shall be free of frost, snow, ice, or excess water. The area to be occupied by concrete shall be kept dry to the extent that reinforcing steel will not be placed in water. Water will not be permitted to rise over any reinforcing steel before the concrete has been placed. Flowing water shall not be permitted to damage the concrete.

Concrete shall begin only after all mixing and conveying equipment is clean and all other conditions have been inspected and given final approval by the Engineer. Concrete shall generally be deposited continuously, or in layers of such thickness that fresh concrete shall not come in contact with concrete which has hardened sufficiently to prevent bond or create planes of weakness. Each layer shall also be placed and compacted before the preceding batch has taken initial set in order to prevent injury to the green concrete.

In placing concrete in walls, curbs, and slabs, the work shall progress from corners and ends of the forms toward the center, rather than toward corners and ends, thus avoiding accumulation of mortar and wetter concrete in those parts of the structures where exposure is most severe. The temperature of the concrete shall be not more than 105°F. degrees when placed.

6. c(1) GENERAL

6. c. PLACING IN STRUCTURES

Chuting shall be done only after the plant set-up has received specific approval of the Engineer, and with equipment of such size and design as will insure a continuous flow in the chute. Chutes preferably shall be rubber, metal or metal lined, with a uniform slope of not less than one vertical to two horizontal. The discharge end of the chute shall be provided with a baffle plate, and if the height of the discharge end above the surface of the concrete for slabs is more than 3 times the thickness of the layer being deposited, a spout or trunk shall be used and the lower end shall be kept close to the surface. When the operation is intermittent, the chute shall discharge into a hopper. It is the intent of these Specifications that no segregation of concrete shall take place between the mixing plant and the point of final placement in the forms, and the methods of handling shall be strictly under the control of the Engineer.

For ordinary structures, the method of placing concrete shall be by use of buglies, bottom dump buckets, or other approved containers. The concrete shall not be allowed to drop freely more than 5 feet; for drops greater than 5 feet, the concrete shall be placed with a drop chute. Drop chutes should be provided in several lengths or should be in sections which can be hooked together so that the length can be adjusted as concreting progresses. As far as practicable, the pipes shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete. When the concrete will be placed by the use of a chute, which will discharge directly through an opening in the forms, there is the danger of segregation, and an outside "pocket" should be installed at the opening to let the concrete flow over the lip of the opening.

6. b. PLACING BY BUGGIES, BUCKETS AND/OR CHUTES

Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicably by methods which prevent the separation or loss of the ingredients. It shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling. It shall not be placed in large quantities at a given point or points and allowed to run, be worked or vibrated over a distance in the forms. The concrete shall be poured in layers of 6 to 12 inches for thin sections and up to 18 inches for mass work. Except in pavement, curbs and sidewalks where the surface must follow the grade line, the concrete shall be so deposited as to maintain, until the completion of the unit, a plastic surface approximately horizontal.

Concrete in T-beam or deck girder spans may be placed in one continuous operation or may be placed in two separate continuous operations; first, to the top of the girder stems, and second, to completion. In the latter case, the bond between stem and slab shall be positive and mechanical, and shall be secured by means of suitable shear keys in the top of the girder stem. Unless otherwise indicated on the Plans or Special Specifications, suitable keys may be formed by the use of timber blocks approximately 2 by 4 inches in cross-section and having a length 4 inches less than the width of the girder stem. These key blocks shall be spaced along the girder stems as required, but the spacing shall be not greater than 1 foot center to center. The blocks shall be beveled and oiled in such manner as to insure their ready removal, and they shall be removed as soon as the concrete has set sufficiently to retain its shape.

The floors and girders of through girder superstructures shall be placed in one continuous operation unless otherwise specified, in which case special shear anchorage shall be provided to insure monolithic action between girder and floor.

Concrete in slab spans shall be placed in one continuous operation for each span unless otherwise provided.

Concrete in girder haunches less than 3 feet in height shall be placed at the same time as that in the girder stem, and the column or abutment tops shall be cut back to form seats for the haunches. Whenever any haunch or fillet has a vertical height of 3 feet or more, the abutment or columns, the haunch and the girder shall be placed in three successive stages; first, up to the lower side of the haunch, second, to the lower side of the girder; and third, to completion.

6. c(3) NONMONOLITHIC STRUCTURES

When slabs and beams and the supporting walls and columns are cast monolithically, the concrete in the top 2 or 3 feet of the walls and columns should be of the lowest slump that can be vibrated properly and should be fully consolidated at the surface. Before placing concrete in the top fillets, slabs and beams, the concrete in the walls and columns should be allowed to settle as long as possible without allowing it to become so hard that a running vibrator will not penetrate it of its own weight. This will be 1 to 3 hours or more, depending on the temperature and other conditions.

6. c(2) MONOLITHIC STRUCTURES

Pumping will be permitted if authorized by the Engineer. Equipment used in placing concrete by pumping must be suitable in construction and adequate in capacity for the work. An agitating hopper shall be provided immediately ahead of the pump and the operation shall be such that a continuous flow of concrete without air pockets is produced. The length of discharge line shall be limited to 1000 feet with a minimum number of bends and special pipe with detachable couplings shall be used. All precautions shall be taken to avoid segregation at the point of discharge and an air booster at the end of the line shall be used only with great care and subject to the approval of the Engineer. When pumping is completed, the concrete remaining in the line shall be ejected by methods which will avoid addition of water to the concrete or separation of its ingredients. After this operation and before re-use, the entire equipment shall be thoroughly cleaned.

6. f. PLACING BY PUMPING

The Contractor is reminded of his responsibility for the quality and strength of any concrete laid under this contract and any concrete injured by frost action shall be removed and replaced at the Contractor's expense in a manner acceptable to the Engineer.

6. e. PLACING IN COLD WEATHER

The concrete shall be deposited on the subgrade to the required depth over the entire width of the section being constructed by the use of an approved self-propelled mechanical concrete spreading machine or by shovels. The placing of concrete pavement shall not progress down slope on grades exceeding five (5%) per cent without the permission of the Engineer. Concrete shall not be placed on frozen subgrade or where the subgrade under adjacent pavement is frozen.

6. d. PLACING IN PAVEMENT SLABS

Concrete in columns shall be placed in one continuous operation unless otherwise directed. The concrete shall be allowed to set at least 12 hours before the caps are placed. Work shall not be discontinued within 18 inches of the top of any face, unless provision has been made for a coping less than 18 inches thick, in which case, if permitted by the Engineer, the construction joint may be made at the under side of the coping.

Nonmonolithic Structures (Cont'd.)

(3) The intensity of vibration shall be such as to visibly affect a mass of concrete of one (1") inch slump over a radius of at least 18 inches.

(2) Vibrators shall be of a type and design approved by the Engineer. They shall be capable of transmitting vibration to the concrete at frequencies of not less than 4500 impulses per minute.

(1) The vibration shall be internal unless special authorization of other methods is given by the Engineer or as provided herein.

Concrete, during and immediately after depositing, shall be thoroughly compacted as required by the Engineer. The compaction shall be done by mechanical vibration subject to the following provisions:

7. a. VIBRATION AND VIBRATORS FOR STRUCTURAL CONCRETE

7. COMPACTON OF CONCRETE

Immediately following the discontinuation of placing of concrete, all accumulation of mortar splashed upon the reinforcing steel and the surfaces of forms shall be removed; dried mortar and dust shall not be puddled into the concrete. If the accumulation is not removed prior to the concrete becoming set, care then shall be exercised not to break the concrete steel bond at and near the surface of the concrete, while cleaning the reinforcing steel.

6. h. CLEANING OF FORMS AND REINFORCING STEEL

Where concrete is conveyed and placed by pneumatic means, the equipment shall be suitable in kind and adequate in capacity for the work. The machine shall be located as close as practicable to the place of deposit. The position of the discharge end of the line shall be located as close as practicable to the place of deposit not exceeding ten (10') feet, and the methods of placement shall be such as will avoid segregation of the concrete. The discharge lines shall be horizontal or inclined upwards from the machine, and at the conclusion of placement, the entire equipment shall be thoroughly cleaned.

6. g. PNEUMATIC PLACING

Pneumatic placing of concrete will be permitted only if specified in the Special Specifications or authorized by the Engineer. The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete.

Wherever a tamping template is referred to, a vibrating screed or an automatic screeding and tamping machine may be substituted by the contractor subject to approval of the Engineer. The operation of the equipment used shall be such that a satisfactory compaction of the concrete is produced and the surface of the pavement is uniform, true to grade and cross section.

The concrete shall be compacted by means of vibrating screeds, mechanical tampers, tamping templates, and such other implements as may be necessary and as hereinafter described.

7. b. TAMPING OF PAVEMENT SLABS

(8) The provisions of this article shall apply to the filler concrete for steel grid floor except that the vibrator shall be applied to the steel.

(7) Vibration shall be supplemented by such spading as is necessary to insure smooth surfaces and dense concrete along form surfaces, in corners and locations where impractical to use mechanical equipment.

(6) Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. Vibrators shall not be used to transport concrete in the forms.

Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective.

Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localized areas of grout are formed.

(5) Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and imbedded fixtures and into the corners and angles of the forms.

(4) The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms.

After the forms are removed all defects shall be repaired at once in a manner acceptable to the Engineer.

8b. (1) GENERAL

8b. REPAIRING OF BOLT HOLES AND DEFECTS

Railing balusters and other precast members shall be protected during the placing and finishing of adjacent portions of the structure by wrapping in burlap, paper, canvas or other approved cover. Any such members which have been disfigured by drippings from the construction operations shall be thoroughly cleaned by an approved method and washed with a dilute solution of muriatic acid. After washing, the acid shall be thoroughly removed from the concrete surfaces.

Concrete that is to have a showing face, even though no particular finish is called for, shall be mixed, placed and compacted in a manner that will insure a uniform distribution of aggregates free from void spaces and of uniform texture. Irregularities shall be repaired as noted herein.

8a. GENERAL

8. FINISHING

The concrete upon being placed in the forms shall be struck off with a rigid straight edge and then be thoroughly tamped with an approved expanded metal type tamper until the course aggregate has been forced down and a layer of mortar about one-fourth (1/4") inch thick covers the surface and water flushes to the surface.

7c. TAMPING OF SIDEWALK SLABS

Immediately after placing concrete upon the subgrade and before initial set has occurred, the concrete shall be struck off and tamped by means of a tamping template, used at right angles to the center line of the street, until the concrete is thoroughly consolidated to the specified grade and crown section and sufficient mortar is brought to the surface for finishing purposes. If the design or location of the base to be constructed is such as to preclude the possibility of tamping as previously described, such as a variable crown section, curb being constructed monolithic with base, in alleys, or where the grade exceeds ten (10%) per cent; other equally suitable methods of obtaining the prescribed results shall be employed.

A long handled longitudinal float with a troweling or smoothing surface from 6 to 12 inches wide and of sufficient length shall then be used to obtain a surface meeting the tolerances specified herein. This shall be applied

Concrete in roadway slabs shall be placed and compacted as specified herein. After the concrete is placed and compacted, it shall be struck true to lines, grades and cross section as shown on the Plans. After the concrete has been struck it shall be floated to a smooth, even texture with a wood float or an approved equal.

8. c. ROADWAY AND ALLEY FINISHING

Honeycombed and otherwise defective areas shall be chipped out, all loose and defective concrete and aggregate removed, and the edges cut perpendicular to the surface or slightly undercut to key lock the edges of the patch. Lens-shaped and feather-edged patches will not be permitted.

8. b(5) DEFECTS

Bolt holes shall be carefully and tightly packed with a cement-sand mortar containing only enough water for tight compaction in place. Smaller tie rod holes may be filled with plastic mortar that can be forced in by pressure gun.

8. b(4) BOLT HOLES

Matching of the color of repairs to surrounding concrete shall not be neglected. Repairs usually tend to be darker than the original color and this can be corrected by using white cement for a part of the cement in the patch mix. The quantity required may be determined by making a few small quantity test mixes.

8. b(3) MATCHING OF COLOR

Bonding of repairs to surrounding concrete with grout shall be insured by keeping the patch area and surrounding concrete wet for several hours before any patch material is placed, and thoroughly coating the entire bonding surface with a grout of Portland cement and water just before the repair material is placed. The use of any approved bonding agent according to the manufacturer's instructions shall be acceptable.

8. b(2) BONDING OF REPAIRS

After troweling, and before jointing or edging, the surface of the walk shall be lightly brushed in a transverse direction with a soft brush or finished with a scratch trowel. "V" shaped grooves with at least one-fourth (1/4) inch depth and one-fourth (1/4) inch radius shall then be made with a suitable tool at least two and one-half (2½) inches wide dividing the sidewalk into blocks of such dimensions as will correspond with the markings in existing walk, or as designated by the Engineer. The marking shall be done straight and true with the sidewalk and in a workmanlike manner, the transverse grooves shall be at right angles to the edges of the walk. All edges, except the driveway lip, shall be finished to a radius of at least one-fourth (1/4) inch. The driveway lip shall have the same radius as the curb face. On grades steeper than four (4%) per cent, the surface shall be finished with a stipple brush or as the Engineer may direct.

Unless otherwise authorized by the Engineer, the surface shall be struck off, tamped, floated with a wood float or approved equal, and finished to match existing adjacent sidewalks.

8. d. SIDEWALK AND DRIVEWAY FINISH

Quality of workmanship shall be such that the finished work, when tested with a ten (10) foot straightedge, shall show no deviation greater than one-eighth (1/8) inch from the required grade and cross section.

Upon completion of the brooming, all joints requiring tooling and all edges of slabs shall be tooled and edged as required. All edging shall be done with edging tools acceptable to the Engineer. The edging tool for joints shall have a bearing width of at least two (2) inches on each side of the joint and shall edge both sides of the joint in one operation with a radius of one-eighth (1/8) inch on each edge.

Following the float finish and at the proper set, the surface shall be given a broom finish. The broom to be drawn transversely across the pavement with not more than one stroke per width of broom.

To the surface of the concrete with its length parallel to the center line of the street and shall be operated from bridges, planing off the high places and filling the low places. Successive applications of this float shall lap preceding applications by at least one half its length. If after such planing, low places are discovered in the surface of the concrete, additional concrete shall be added to fill in and bring such low places to grade.

The surface may be prepared as in "Brush Finish" and then finished with a rough carpet float or other suitable device leaving the surface even, but distinctly sandy or pebbled in texture.

8. f(3) FLOAT FINISH

After the concrete has been struck off as above described, the surface shall be thoroughly worked and floated with a wood float or an approved equal. The operation shall be performed by skilled and experienced concrete finishers and before this last finish has set, the surface shall be lightly striped with a fine brush to remove the surface cement film, leaving a fine-grained, smooth but sanded texture.

8. f(2) BRUSH FINISH

The final finish for caps and railings shall be obtained in one of the following ways:
All upper horizontal surfaces such as the tops of handrail posts and caps and the tops of parapets, copings and bridge seats shall be formed by placing an excess of material in the forms and removing or striking off such excess with a wooden template, forcing the coarse aggregate below the mortar surface.

8. f(1) GENERAL

8. f. HORIZONTAL SURFACES NOT SUBJECT TO WEAR

Immediately following the stripping of the front forms either a mortar course composed of one part Portland cement and one and one-half (1½) part sand shall be applied to the face of the curb to a point two (2") inches below the gutter line, or if the concrete is still "green", the face of the curb shall be rubber floated to a point two (2") inches below the gutter line. The back form shall not be removed until the front face has been finished.

8. e. CURB FINISHING

An edging tool shall be used on all edges and at all expansion joints. Except where the new sidewalk abuts an existing sidewalk, the surface shall not vary more than one-eighth (1/8") of an inch under a ten (10') foot straight-edge. Where the new sidewalk abuts the old sidewalk, a transition to the abutting surface shall be made in the last squares. The surface shall then be broom finished and marked off in squares. In case of rain the sidewalk shall be protected until the concrete has taken its final set.

8. g. RUBBED FINISH

8. g(1) GENERAL

The surfaces of all concrete masonry with rubbed finish shall be thoroughly worked during the operation of placing. The working shall be such as to force all coarse aggregate from the surface and thoroughly work the mortar against the forms to produce a smooth finish free from water and air pockets or honeycomb. Modification or waiver by the Engineer of the rubbed finish requirements will be made when exposed surfaces, upon form removal, are free from form marks, honeycomb or other defects, and are of uniform and neat appearance.

8. g(2) CLASS 1

As soon as the pointing has set sufficiently, the entire surface shall be thoroughly wet with a brush and rubbed with a carborundum stone or an abrasive of equal quality, bringing the surface to a paste. The rubbing shall be continued sufficiently to remove all form marks and projections, producing a smooth, dense surface without pits or irregularities. The paste shall then be allowed to set. The surface shall, after being thoroughly saturated with water, be painted with a mixture of eighty-five (85%) per cent cement and fifteen (15%) per cent hydrated lime with sufficient water to give a creamy consistency. This mixture shall be rubbed into the surface with a coarse carborundum stone and brushed out with a damp brush. Brushing shall be done in the long direction of the surface being finished.

8. g(3) CLASS 2

After the pointing has set sufficiently to permit it, the entire surface shall be thoroughly wetted and rubbed with a carborundum stone or an abrasive of equal quality to bring the surface to a smooth texture and remove all form marks. The paste formed by the rubbing as above described may be finished by carefully striping with a clean brush or it may be spread uniformly over the surface and allowed to take a reset, after which it may be finished by floating with a canvas, carpetfaced, or cork float, or rubbed down with dry burlap. Brushing shall be done in the long direction of the surface being finished.

8. h. SPECIAL SURFACE FINISHES

When so specified, special surface finishes may be employed for ornamentation, panels, copings, and like construction. In general, the method and manner of performing this work will be fully provided for in the Special Specifications.

Concrete surfaces exposed to conditions causing premature drying shall be protected by covering. The covering shall be a liquid which forms a membrane and prevents evaporation, a canvas, straw, burlap, sand or other satisfactory material and kept moist, or an approved equal. If the surfaces are not covered, they shall be kept moist by flushing or sprinkling. All curing methods shall be subject to written approval of the Engineer. Unless otherwise required by the Special Specifications, Plans or Engineer, the curing shall continue for a period of not less than seven days after placing the concrete. If high-early strength cement is used, this period may be reduced, as directed by the Engineer. Other precautions to insure the development of strength shall be taken as the Engineer may direct.

9. CURING OF CONCRETE

In each case the contractor shall be required to prepare test or sample panels under the direction of the Engineer, and the method and manner of finish, the choice and selection of the aggregate, and other features affecting the work shall be approved before any further work is done.

Subsec. VI Paint, Galvanizing and Other Coatings

SUBSEC. VI, PAINT, GALVANIZING AND OTHER COATINGS

1. Paint and painting

1.a. General. The painting of metal structures shall include, unless otherwise provided in the contract, the preparation of the metal surfaces, the application, protection and drying of the paint coatings, and the supplying of all tools, tackle, scaffolding, labor and materials necessary for the entire work.

1.b. Paint. The paint used shall conform to the requirements of Section 2: 14.2 of AASHTO "Standard Specifications for Highway Bridges" - 1957, and as specified in the special provisions or on the Plans.

1.c. Number of Coats and Color. All steel shall be painted one shop or prime coat, and with not less than two field coats, as specified in Section 2: 14.3 of AASHTO "Standard Specifications for Highway Bridges" - 1957. The color shall be as specified or determined by the Engineer. The costs shall be sufficiently different in color to permit detection of incomplete application.

1.d. Mixing of Paint. Paint shall be factory mixed except as provided in Section 14 of AASHTO "Standard Specifications for Highway Bridges" - 1957. All paint shall also be field mixed before applying in order to keep the pigments in uniform suspension.

1.e. Weather Conditions. Paint shall not be applied when the air temperature is below 40°F. or when the air is misty, or when, in the opinion of the Engineer, conditions are otherwise unsatisfactory for the work. It shall not be applied upon damp or frosted surfaces.

Materials painted under cover in damp or cold weather shall remain under cover until dry or until weather conditions permit its exposure in the open. Painting shall not be done when the metal is hot enough to cause the paint to blister and produce a porous paint film.

1 f. Application.

1 f.(1) General. Painting shall be done in a neat and workmanlike manner. Paint may be applied with hand brushes or by spraying except that aluminum paint preferably shall be applied by spraying. By either method the coating of paint applied shall be smoothly and uniformly spread so that no excess paint will collect at any point. If work done by spraying is not satisfactory to the Engineer, hand brushing will be required.

1 f.(2) Brushing. When brushes are used, the paint shall be so manipulated under the brush as to produce a smooth, uniform, even coating in close contact with the metal or with previously applied paint, and shall be worked into all corners and crevices.

Three methods of cleaning are provided herein. Any of these methods may be used unless otherwise specified.

1 f.(1) General. Surfaces of metal to be painted shall be thoroughly cleaned, removing rust, loose mill scale, dirt, oil or grease and other foreign substances. Unless cleaning is to be done by sand blasting, all weld areas, before cleaning is begun, shall be neutralized with a proper chemical, after which it shall be thoroughly rinsed with water.

1 j. Cleaning of Surfaces.

Before painting galvanized surfaces they shall be treated as follows: In one (1) gallon of soft water dissolve 2 ounces each of copper chloride, copper nitrate, and sal ammoniac, then add 2 ounces of commercial muriatic acid. This should be done in an earthen or glass vessel, never in tin or other metal receptacle. Apply the solution with a wide flat brush to the galvanized surface, when it will assume a dark, almost black, color which, on drying, becomes a grayish film.

For the purpose of conditioning the surface of galvanized surfaces for painting, the painting shall be deferred as long as possible in order that the surface may weather.

1 i. Painting of Galvanized Surfaces. Galvanized surfaces which are required to be painted shall be treated as follows:

1 h. Thinning of Paint. Paint, as delivered in containers when thoroughly mixed, is ready for use. If it is necessary in cool weather to thin the paint in order that it shall spread more freely, this shall be done only by heating in hot water or on steam radiators, and liquid shall not be added nor removed unless permitted by the Engineer.

1 g. Removal of Paint. If the painting is unsatisfactory to the Engineer, the paint shall be removed and the metal thoroughly cleaned and repainted.

1 f.(4) Inaccessible Surfaces. On all surfaces which are inaccessible for paint brushes, the paint shall be applied by spraying or with sheepskin dabbers to insure thorough covering.

Paint, when applied with spray equipment, shall be immediately followed by brushing when necessary to secure uniform coverage and to eliminate wrinkling, blistering and airholes.

1 f.(3) Spraying. Power spraying equipment shall apply the paint in a fine, even spray without the addition of any thinner. In cool weather, the paint may be warmed to reduce the viscosity for use. Such warming shall be accomplished by heating the paint containers in water or by placing them on steam radiators.

Promptly after the application of the flames, the surfaces of the steel shall be wire brushed, hand scraped wherever necessary, and then swept and dusted to remove all free material and foreign particles. Compressed air shall not be used for this operation.

The surfaces to be painted shall be cleaned and dehydrated (freed of occluded moisture) by the passage of oxyacetylene flames which have an oxygen to acetylene ratio of at least one. The inner cones of these flames shall have a ratio of length to port diameter of at least 8 and shall be not more than 0.15 inch center to center. The oxyacetylene flames shall be traversed over the surfaces of the steel in such manner and at such speed that the surfaces are dehydrated; and dirt, rust, loose scale, scale in the form of blisters or scabs, and similar foreign matter are freed by the rapid intense heating by the flames. The flames shall not be traversed so slowly that loose scale or other foreign matter is fused to the surface of the steel. The number, arrangement and manipulation of the flames shall be such that all parts of the surfaces to be painted are adequately cleaned and dehydrated.

Oil, grease and similar adherent matter shall be removed by washing with a suitable solvent. Excess solvent shall be wiped from the work before proceeding with subsequent operations.

1 j.(4) Flame Cleaning. Unless otherwise provided in the Special Specifications, all metal, except the exposure of the inside of boxed members and other surfaces which will be inaccessible to the flame cleaning operation after the member is assembled, shall be flame cleaned in accordance with the following operations:

1 j.(3) Sandblasting. All steel shall be cleaned by sandblasting. The sandblasting shall remove all loose mill scale and other substances down to the bare metal. Special attention shall be given to cleaning of corners and reentrant angles. Before painting, sand adhering to the steel in corners and elsewhere shall be removed. The cleaning shall be approved by the Engineer prior to any painting. The material shall be painted before rust forms.

1 j.(2) Hand Cleaning. The removal of rust, scale and dirt shall be done by the use of metal brushes, scrapers, chisels, hammers or gasoline or benzine. Bristle or wood fiber brushes shall be used for removing loose dust.

Structural steel which is to be welded shall not be painted before welding is complete. If it is to be welded only in the fabricating shop and subsequently erected by bolting, it shall receive one coat of paint after shop welding is finished. Steel which is to be field welded shall be given one coat of boiled linseed oil or other approved protective coating after shop welding and shop fabrication is completed.

Surfaces which will be in contact with concrete shall not be painted.

Surfaces not in contact but inaccessible after assembly or erection shall be painted three coats. The shop contact surfaces shall not be painted. Field contact surfaces shall receive a shop coat of paint, except main splices for chords of trusses and large girder splices involving multiple thickness of material where a shop coat of paint would make erection difficult. Field contact surfaces not painted with the shop coat shall be given a coat of approved lacquer or other protective coating if it is expected that there will be a prolonged period of exposure before erection.

1 k. Shop Painting. Unless otherwise specified, steelwork shall be given one coat of approved paint after it has been accepted by the inspector and before it is shipped from the plant.

The inside surfaces of boxed members and other surfaces which will be inaccessible to the flame cleaning operation after the member is assembled, shall be cleaned as specified herein, and wire brushed but not painted before the member is boxed or assembled. After all fabrication of the member is completed, its inside surfaces shall be hand wire brushed or hand scraped wherever necessary in order to remove dirt and other foreign substances which may have accumulated after the surfaces were originally cleaned. The outside surfaces of the members shall then be cleaned and dehydrated, wire brushed, and hand scraped wherever necessary. All surfaces shall then be swept and dusted to remove free material and foreign particles and the member completely painted.

Unless otherwise provided, the exposure of the inside of boxed members and other surfaces which will be inaccessible to the flame cleaning operation after the member is assembled shall be cleaned by Hand Cleaning. If flame cleaning of such surfaces is required, it shall be so stated in the Special Specifications and the following will apply:

Paint shall be applied promptly after the steel has been cleaned and while the temperature of the steel is still above that of the surrounding atmosphere, so that there will be no recondensation of moisture on the cleaned surfaces.

Surfaces of iron and steel castings, either milled or finished, shall be given one coat of paint.

With the exception of abutting joints and base plates, machine-finished surfaces shall be coated as soon as practicable after being accepted, with a hot mixture of white lead and tallow or other approved coating, before removal from the shop.

Erection marks for the field identification of members and weight marks shall be painted upon surface areas previously painted with the shop coat. Material shall not be loaded for shipment until it is thoroughly dry, and in any case not less than 24 hours after the paint has been applied.

1. Field Painting. When the erection work is complete, including all riveting and straightening of bent metal, all adhering rust, scale, dirt, grease or other foreign material shall be removed as specified under Cleaning of Surfaces.

As soon as the inspector has examined and approved all field rivets driven, the heads of such rivets and field bolts, all welds and any surfaces from which the shop or first coat of paint has become worn off or has otherwise become defective, shall be cleaned and thoroughly covered with one coat of shop-coat paint.

Surfaces to be riveted in contact and surfaces which will be in contact with concrete shall not be painted. Surfaces which will be inaccessible after erection shall be painted with such field coats as are called for on plans or authorized. When the paint applied for retouching the shop coat has thoroughly dried and the field cleaning has been satisfactorily completed, such field coats as are called for on the plans or are authorized shall be applied. In no case shall a succeeding coat be applied until the previous coat has dried throughout the full thickness of the paint film. All small cracks and cavities which were not sealed in a watertight manner by the first field coat shall be filled with a pasty mixture of red lead and linseed oil before the second coat is applied.

The following provision shall apply to the application of both field coats. To secure a maximum coating on edges of plates or shapes, rivet head and other parts subjected to special wear and attack, the edges shall first be striped with a longitudinal motion and the rivet heads with a rotary motion of the brush, followed immediately by the general painting of the whole surface, including the edges and rivet heads.

If, in the opinion of the Engineer, traffic produces an objectionable amount of dust, the contractor shall, at his own expense, allay the dust for the necessary distance on each side of the bridge and take any other precautions necessary to prevent dust and dirt from coming in contact with freshly painted surfaces or with surfaces before the paint is applied.

The application of the second field coat shall be deferred until adjoining concrete work has been placed and finished. If concreting operations have damaged the paint, the surface shall be recleaned and repainted.

The contractor shall protect pedestrian, vehicular and other traffic upon or underneath the bridge, and also all portions of the bridge superstructure and substructure, against damage or disfigurement by spatters, splashes and smirches of paint or paint materials.

2. Galvanizing

2 a. General. Steel and iron required to be galvanized shall be fabricated into the largest practicable sections before galvanizing.

Structural steel shapes, plates, bars, and their products, which are required to be galvanized shall be hot-dip galvanized in accordance with the requirements of A.S.T.M. "Specifications for zinc (Hot Galvanized) coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip" Designation A 123, which provide for a zinc coating of not less than 1.8 ounces per square foot of actual surface in any individual specimen.

Hardware, and small structural steel or cast steel articles, such as bolts, nuts and washer, which are required to be galvanized shall be hot-dip galvanized in accordance with the requirements of A.S.T.M. "Specifications for zinc coating (Hot-Dip) on iron and steel hardware" Designation A 153, which provide for zinc coatings ranging from not less than 0.85 ounce per square foot of surface in the case of nails, screws, and small bolts, to not less than 1.80 ounces in the case of rolled, pressed, and forged articles.

The galvanizing of other iron or steel products shall be in accordance with the requirements of the appropriate A.S.T.M. Specifications.

2 b. Payment. No direct or additional payment will be made for galvanizing, full compensation for which, and for all incidental work, shall be included in the price or prices bid for the structures or parts thereof to be galvanized, or for any other appropriate Bid Item or Items.

Subsec. VII Materials

SUBSECTION VII MATERIALS

GENERAL: The requirements of this subsection VII (Materials) do not take precedence over any other subsection in Sec. F (General Construction Details).

1. PORTLAND CEMENT

1.a. Type Portland cement shall conform to the requirements of "Standard Specifications for Portland Cement" A.S.T.M. Designation C-150.

Type I For use in general concrete construction when special properties specified for Types II, III, IV and V are not required.

Type II For use in general concrete construction exposed to moderate sulfate action or when moderate heat of hydration is required.

Type III For use where high early strength is required.

Type IV For use where low heat of hydration is required.

Type V For use where high sulphate resistance is required.

When not otherwise specified by the Special Specifications, Type I shall be used; but the contractor may at his option use Type III Portland Cement (High early strength) in lieu of Type I in the identical quantity specified for the later.

All cement shall be delivered to the work in good condition in the original package with the name and brand of the manufacturer marked thereon, unless shipped in bulk, in which case this information shall be contained in the shipping invoices accompanying the shipment. A bag shall contain 94 lbs. net, and a barrel shall contain 376 lbs. net. Proper means shall be provided to protect cement from dampness, and all cement storage facilities shall be subject to approval by the Engineer and shall be such as to permit easy access for inspection and identification.

1.b. Tests Certified mill tests of the cement when required shall be furnished to the Engineer for approval prior to its use, and the Engineer may elect to sample the cement at the mill and/or at the site of the work. All cement, the samples of which do not pass the specifications, and all cement which may have become damaged by exposure to moisture, shall be immediately and permanently removed from the work.

2. PORTLAND CEMENT - AIR ENTRAINING

Air entraining Portland cement shall be of the type specified in the Special Specifications and shall conform in all respects to A.S.T.M. Specifications - Designation C 175 for air entraining Portland cement. If no type is specified, then Type A shall be used.

Screen	For Cement Concrete	For Mortar And Grout
3/8" square opening	100%	100%
No. 4 standard sieve	90%-100%	95%-100%
No. 8 standard sieve	65%- 90%	70%- 85%
No. 16 standard sieve	45%- 70%	40%- 55%
No. 30 standard sieve	25%- 45%	10%- 25%
No. 50 standard sieve	10%- 20%	3%- 9%
No. 100 standard sieve	2%- 8%	

Percentage Passing by Weight

The size and grading of sand to be used in concrete, mortar, and grout when tested in accordance with A.S.T.M. C-136 shall be such as to conform with the following requirements:

Sand used as fine aggregate in the preparation of Portland cement concrete, mortar and grout, shall conform to the requirements of "Specifications for Concrete Aggregates" ASTM. Designation C-33, with the revision as noted herein, shall be thoroughly washed, and shall be entirely free of oil and similarly deleterious substances. Bank sand will not be permitted.

5. FINE AGGREGATE FOR PORTLAND CEMENT CONCRETE

Calcium chloride shall be added to the concrete mix in solution in water. The solution shall contain not more than 1 pound of calcium chloride per quart of water. The weight of calcium chloride added to the mix shall not be greater than 2% of the cement weight. The solution shall be in lieu of an equal amount of mixing water as specified for the particular mix.

When used as an admixture to accelerate setting of concrete, calcium chloride shall meet the requirements of A.S.T.M. "Specifications for Calcium Chloride" Designation D-98.

4. CALCIUM CHLORIDE

Hydrated lime shall conform to the requirements of "Specifications for special normal finishing hydrated lime" A.S.T.M. C-6 and C-206 "Specifications for special finishing hydrated lime."

3. HYDRATED LIME

6. COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE

The gravel used shall be equivalent to what is known as Willamette River gravel. If bank gravel is used it shall be clean material and in every respect shall be satisfactory to the Engineer. Coarse aggregates shall conform to the requirements of "Specifications for Concrete Aggregates" A.S.T.M. Designation C-33.

7. FILLER MATERIAL FOR ASPHALTIC CONCRETE

Filler Material shall conform to the "Specifications for Mineral Filler for Sheet Asphalt and Bituminous Concrete Pavements" A.S.T.M. Designation D-242. Collector dust may be used as mineral filler, in whole or in part, provided the dust or the resultant mineral filler mixture conforms to these requirements.

8. FINE AGGREGATE FOR ASPHALTIC CONCRETE

Fine aggregate (aggregate passing the U.S. No. 4 sieve) shall conform to the requirements of "Specifications for Fine Aggregate for Bituminous Paving Mixtures" A.S.T.M. Designation D-1073 and shall consist of finely crushed stone, fine sand and other finely divided mineral matter containing not more than 2 per cent by weight of clay, loam, vegetable matter and other objectionable matter occurring either free or as a coating on the particles.

The grading of the fine aggregate shall be such that when mixed with the coarse aggregate and mineral filler the resultant mixture will be of the sizes and gradings specified hereinafter in a following paragraph.

Materials containing fines passing a No. 40 sieve shall be tested to determine the plasticity index of the fines, as follows:

1. That part of the material which passes the No. 40 sieve, (No. 40-0 size) shall be separated from the whole and its percentage of the whole, by weight, shall be determined.
2. That part of the material which passes the No. 40 sieve shall be subjected to the "Method of Calculating the Plasticity Index of Soils", A.A.S.H.O. Designation: T-91 and its plasticity index shall be determined.

When tested as above provided, the material to be furnished under the specification shall conform with the following requirements:

Percentage of No. 40-0 Size in Material to be Furnished	Maximum Plasticity Index
0.1 to 3.0 inclusive	20
3.1 to 4.0 inclusive	15
4.1 to 5.0 inclusive	12

Size of screen which all aggregate must pass

1 1/2-inch	3/4-inch	1/2-inch
Concrete	Concrete	Concrete
Asphaltic Class "C"	Asphaltic Class "B"	Asphaltic Class "A"

TABLE

The materials of which the asphaltic concrete is composed shall be of such sizes and gradings that, when proportioned and mixed together, they will produce a uniform mixture which, when tested by means of laboratory screens, will conform to the requirements indicated in the following table and to such other requirements as are stated in the following paragraphs:

Which of the classes are to be used on a given project or in a given part of the work shall be as the Plans and Special Specifications indicate.

10 a. General This specification provides for three classes of asphaltic concrete, the different classes being referred to as Class "A", Class "B", and Class "C". The classes differ, one from another, in sizes of aggregates and in proportion of aggregates and bituminous cement.

10. ASPHALTIC CONCRETE MIXES

The coarse aggregate, or the rock or gravel from which it is manufactured, shall show a percentage of wear not exceeding 30 when subjected to the "Method of Test for Abrasion of Coarse Aggregate by the Use of the Los Angeles Machine," A.S.T.M. Designation C-131.

The coarse aggregate, when separated on consecutive laboratory screens, shall contain in each size not less than 60 per cent by weight of fragments with at least one fractured face produced by mechanical crushing.

Coarse aggregate (aggregate retained on the U.S. No. 4 sieve) shall consist of uniform quality, clean, tough, durable fragments of rock or gravel, free from flat, elongated, soft or disintegrated pieces and other objectionable matter occurring either free or as a coating on the stone.

9. COARSE AGGREGATE FOR ASPHALTIC CONCRETE

5.1 to 10.0 inclusive	6
10.1 to 15.0 inclusive	4
15.1 to 20.0 inclusive	3
20.1 to 25.0 inclusive	2
Over 25	0

All percentages stated in this specifications are percentages by weight. Screens for determining the percentages of the different sizes of aggregate shall be screens having square openings.

The exact proportions of the several constituents to be used in the production of the bituminous mixture shall, within the limits above specified, be fixed by the Engineer. The proportions so established shall be known as the "job mix" and shall be changed only upon his order.

The percentages stated in the table are percentages of the weight of the complete asphaltic concrete mixture including the weight of the bituminous cement. The ranges in percentages are the extreme ranges of tolerance that must not be exceeded regardless of any "job mix" formula that may be set up.

Material	1 1/2-inch to 3/4-inch	3/4-inch to 3/8-inch	3/8-inch to No. 4 sieve	No. 4 sieve to No. 10 sieve	No. 10 sieve to No. 40 sieve	No. 40 sieve to No. 80 sieve	No. 80 sieve to No. 300 sieve	Percentage of bituminous cement
Class "A" Asphaltic Concrete	13 to 25	30 to 38	---	8 to 18	9 to 17	2 to 8	2 to 6	4.5 to 6.5
Class "B" Asphaltic Concrete	---	40 to 52	---	11 to 21	12 to 20	3 to 9	3 to 7	5 to 7
Class "C" Asphaltic Concrete	---	---	28 to 40	16 to 28	16 to 26	3 to 11	2 to 8	5 to 7

TABLE CONT'D

Classes of Mixtures	No. 1	No. 2	No. 3	No. 4	Seal Coat
Cold Mix	Cold Mix	Cold Mix	Cold Mix	Cold Mix	Cold Mix
Size of square opening which all aggregate must pass	5/8"	1/4"	1"	1/4"	.....
Pass 1", retained 5/8"	.....	.....	25-45	.....	.....
Pass 5/8", ret. 3/4"	35-55	.....	20-40	.....	.....
Pass 3/4", ret. #10	30-50	80-90	15-30	.....	.....
Washed bank gravel	.....	.....	.....	80-90	.....
passing 3/4" screen	.....	.....	.....	.....	.....
Passing a 10-mesh screen	5-10	5-20	5-10	15-20	96.2
Hydrated lime	0.2-1.0	0.2-1.0	0.2-1.0	.....	.....
Asphalt	4.5-5.5	4.5-5.5	4.5-5.5	4.0-5.0	3.0
Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent

11. PORTLAND COLD MIX ASPHALTIC CONCRETE

Each day the Engineer shall be permitted to take as many samples as he considers necessary, for checking the uniformity of the mixture. When unsatisfactory results or other conditions make it necessary or desirable, in the opinion of the Engineer, the Engineer may establish a new job mix formula. Should a change in source of materials be made, a new job mix formula shall be established before the mixture containing the new materials is produced.

Constituent of Mixture	Tolerance (Plus or minus to job mix percent)
Aggregate, 1 1/2 to 3/4"	4.0
Aggregate, 3/4" to No. 4 sieve	4.0
Aggregate, 1/2" to No. 4 sieve	4.0
Aggregate, No. 4 sieve to No. 10 sieve	4.0
Aggregate, No. 10 sieve to No. 40 sieve	3.0
Aggregate, No. 40 sieve to No. 80 sieve	2.0
Aggregate, No. 80 sieve to No. 200 sieve	2.0
Aggregate, passing No. 200 sieve	2.0
Bituminous cement	0.3

10.b. Tolerances. After the job mix is established as prescribed above, the several constituents of the mixture furnished under the contract shall conform to the job mix within the following ranges of tolerance:

90 Minimum	Other Courses
45 Minimum	Bottom Course
<u>Retained on 1/4-inch Sieve</u>	<u>Course of Base</u>
Percentage of Fracture in Material	

When crushed gravel is used in constructing one or another of the courses of the base for street pavement, that portion of the materials therein which is retained on a 1/4-inch sieve shall contain minimum percentages by weight of particles which shall have at least one fractured face produced by mechanical crushing. These minimum percentages of fracture and the course of the base to which they apply shall be as follows:

12.b. Crushed Gravel All crushed gravel shall be crushed from hard, tough gravel which will not pass a 2" ring, and which is free from shale, clay and silt. Each fragment shall have at least one broken surface.

Gravel and rock shall be hard and durable, and, when subjected to the "Method of Test for Abrasion of Coarse Aggregate by use of the Los Angeles Machine" A.S.T.M. Designation G-131, shall show a wear percentage not in excess of 30.

"Rock"; Crushed or uncrushed material from natural deposits of solid mineral matter or from natural deposit of weathered mineral matter, having angular surfaces.

"Gravel"; Crushed or uncrushed material from water or glacial deposited accumulations having rounded or sub-rounded surfaces.

12.a. General The materials covered by these specifications include all mineral aggregates of sizes and qualities considered suitable for construction purposes and defined as follows:

12. GRAVEL AND ROCK

The exact proportions of the several constituents to be used in the production of the bituminous mixture shall, within the limits above specified, be fixed by the Engineer, and the proportions so established shall be changed only upon his order.

Pass U.S. No. 10 sieve, retained on U.S. No. 40	40-75
Pass U.S. No. 40 sieve, retained on U.S. No. 80	14-45
Pass U.S. No. 80 sieve	5-20

The material passing a No. 10 sieve, when considered separately from the remainder of the aggregate shall meet the following sieve test:

Percentage

Screen Sizes	Specified Aggregate Sizes										Maximum % Passing by Weight										
3"	100	65	--	25	--	10	--	--	--	--	100	100	60	75	60	40	--	--	--	--	100
2 1/2"	100	100	85	75	60	40	--	--	--	--	100	100	70	85	70	50	30	15	--	--	100
2"	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1 1/2"	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1"	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3/4"	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3/8"	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3/4"-0 Gravel (Not Crushed Dirty Topping)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3"-0 Gravel (Not Crushed)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3/4"-0 Crushed Rock or Crushed Gravel	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1 1/2"-0 Crushed Rock or Crushed Gravel	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
2 1/2"-0 Crushed Rock or Crushed Gravel	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3"-0 Crushed Rock or Crushed Gravel	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

12.e. Gradation Requirements In specifying any of the above sizes, it shall be understood that each size shall be well and uniformly graded from the largest to the smallest dimensions and within the tolerances indicated in the following table:

12.d. Determination of Sizes and Gradings The determination of sizes and gradings of materials shall be made by means of laboratory screens or sieves having square openings according to "Method of Test for Sieve Analysis of Fine and Coarse Aggregates," A.S.T.M. Designation C-136.

12.c. Crushed Rock Crushed rock shall be free from dirt, dust or other foreign substances, and shall be a hard, dark-colored basaltic rock of uniform texture and sharp edges, or stone of an equal hardness having a specific gravity of not less than 2.7. Not more than five per cent (5%) of the stone shall have rounded surfaces and in size shall range between the limits fixed in the specifications in the particular kind of construction.

The manufacturer or shipper of the asphalt shall furnish in duplicate at the time of shipment of each tank car or truck load of asphalt, a report showing shipment number, contract or order number, quantity and results of sampling and tests provided for in the above specified tests.

Asphalt cement to be used in pavement construction shall conform to the requirements of "Specifications for Asphalt Cement for Use in Pavement Construction" A.S.T.M. Designation D-946, and other standards as noted herein for the particular item.

16. ASPHALTIC CEMENT FOR PAVEMENT CONSTRUCTION

Water used in making concrete shall be fresh and clean, free from oil and alkali or vegetable matter.

15. WATER

14.c. River-Run Gravel
River-run gravel for use in backfilling, where it is desired to stabilize the trench bottom to minimize future settlement shall come from approved sources. It shall contain substantially no material over 3 inches and shall be uniformly graded from coarse to fine.

14.b. Bank-Run Gravel
Bank-run gravel for use in backfilling, where it is desired to stabilize the trench bottom to minimize future settlement shall come from approved sources. It shall contain substantially no material over 3 inches and shall be uniformly graded from coarse to fine.

14.a. Washed Gravel
Gravel used for backfilling over drains shall consist of crushed or naturally occurring granular material from approved sources, and shall be washed to remove clay and fine material. All shall pass a 2-inch round, opening screen. No more than 75% shall pass a 1-inch round opening screen nor more than 5% shall pass a 1/2-inch square screen.

14. BACKFILL GRAVEL

13.b. Washing
Crushed gravel and crushed rock listed herein as: 3/4" to 1 1/2", 1/2" to 3/4", 3/8" to 1/2", 1/4" to 3/8", and bank gravel listed as: 3/4" to 1" (bank gravel-washed) shall be washed for use in oiling operations.

13.a. General
Oiling rock shall conform to the applicable requirements of gravel and rock.

13. OILING ROCK

Pipe for Corrugated Metal Pipe Culverts shall conform to the "Specifications for Corrugated Metal Culvert Pipe" A.A.S.H.O. Designation M 36.

20. CORRUGATED METAL PIPE CULVERTS

Drain tile shall conform to the requirements of A.S.T.M. "Specifications for Drain Tile" Designation C 4 and shall be of the class and material specified in the Special Specifications.

19. DRAIN TILE

Common brick shall conform to the requirements of A.S.T.M. "Specifications for Building Brick" Designation C-62, and shall be of the size and grade called for in the Special Specifications.

18. COMMON BRICK

Joint filler material shall be in accordance with the requirements of A.S.T.M. "Specifications for Pre-formed Expansion Joint Fillers for Concrete" Designation D-1751 and D-1752 and shall be the type most suited for the purpose intended. It shall meet the requirements of A.S.T.M. "Methods of Testing Pre-formed Joint Fillers for Concrete" Designation D-545. Where stiffness is lacking in pre-formed expansion joint filler, the strip shall be encased in saturated felt, asphalt-impregnated cotton webbing or other satisfactory material. Any material so used for encasement shall be firmly sealed to the body of the joint filler and shall not become detached therefrom after immersion in water for a period of 48 hours.

Expansion joint material shall consist of strips of a durable resilient non-extruding compound.

17. EXPANSION JOINT MATERIAL

Emulsified asphalt shall conform to the requirements of "Specifications for Emulsified Asphalt" A.S.T.M. Designation D-977.

16.d. Emulsified Asphalt

Emulsified asphalt shall conform to the requirements of "Specifications for Cut-Back Asphalt-Medium Curing Type" A.S.T.M. Designation D-598.

16.c. Cut-Back Asphalt - Medium Curing Type (M.C.)

Cut-Back Asphalt - Rapid Curing Type shall conform to the requirements of "Specifications for Cut-Back Asphalt - Rapid Curing Type" A.S.T.M. Designation D-597. and shall conform to the requirements of "Specifications for Cut-Back Asphalt - Rapid Curing Type shall be the 85-100 penetration grade

16.b. Cut-Back Asphalt - Rapid Curing Type

21. CAST IRON AND CAST IRON PIPE

Cast Iron shall conform to the requirements of the "Standard Specifications for Gray Iron Castings" A.S.T.M. Designation A 48 - for the class specified.

The contractor at his own expense shall furnish test bars for tensile and transverse tests of the number, diameter and length as called for in the aforementioned Standard Specification. Tests on such bars will be made by the Engineer at no expense to the Contractor. All castings made from any heat of which test bars fail to meet the requirements of the Specifications will be rejected.

Castings shall be made in strict accordance with the dimensions shown on the drawings and none shall be accepted which is more than 5% below the standard weight and no excess of more than 5% above the standard weight will be paid for.

Each casting shall have distinctly cast upon it the initials of the maker firm and the year of the cast. These characters shall be no less than $\frac{1}{8}$ inches in length and $\frac{1}{8}$ " in relief.

Cast iron pipe and fittings shall be in accordance with Federal Specifications for Cast Iron Water Pipe (Bell and Spigot) W P 421. Fittings shall be in accordance with the A.W.W.A. Standard Specifications for Cast Iron Water Pipe and Fittings.

Flanged cast iron pipe and fittings shall conform to the above A. W. W. A. Specifications and flanges in accordance with A.S.A. Specifications for flanges.

22. CAST STEEL

Steel Castings shall conform to the requirements of A.S.T.M. "Specifications for Mild to Medium Strength Carbon-Steel Castings" Designation A-27 for the particular grade of steel casting called for in the Special Specifications.

The Contractor shall deliver to the Engineer at least one test specimen from each melt. Such test piece to be cut cold from coupons to be molded and cast on some portion of a casting. It shall receive the same treatment as the casting before being cut off. Such test pieces shall be provided by the Contractor at his own expense. Tests of these test pieces will be made by the Engineer at no cost to the Contractor. Castings made from any heat of which test bars fail to meet the requirements of the Specifications will be rejected.

Castings shall be made in strict accordance with the dimensions shown on the drawings and none shall be accepted which is more than 5% below the standard weight and no excess of more than 5% above the Standard weight will be paid for.

Each casting shall have distinctly cast upon it the initials of the maker and the year of the cast. These characters shall be not less than $\frac{1}{8}$ inches in length and $\frac{1}{8}$ " in relief.

23. STEEL FOR BRIDGES AND BUILDINGS

Unless otherwise called for in the Special Specifications or indicated on the plans, structure steel and steel for bolts shall conform to the requirements of A.S.T.M. "Standard Specifications for Steel for Bridges and Buildings." Designation A-7 except that steel made by the acid-Bessemer process shall not be used. Finished rolled material shall be free from loose mill scale, cracks, flaws, injurious seams, laps, blisters and other defects. It shall have a smooth, uniform finish and shall be straightened in the mill before shipment.

24. STEEL FOR RIVETS

Rivet steel shall be in accordance with the requirements of A.S.T.M. "Standard Specifications for Structural Rivet Steel" Designation A-141.

25. STEEL FORGINGS FOR STRUCTURAL PURPOSES

Steel forgings shall be made from steel of forging quality and shall conform to the requirements of A.S.T.M. "Standard Specifications for Carbon Steel Forgings for General Industrial Use" Designation A-235. They shall be class C forgings with a maximum carbon content of 0.35 per cent and shall be given a thorough annealing. They shall be free from defects. The metal shall have a minimum Brinell hardness number of 130 and a maximum of 190 when tested in accordance with "Standard Method of Test" A.S.T.M. Designation E-10.

26. REINFORCING STEEL

26.a. Bars Steel reinforcing bars shall be of the grade specified in the Special Specifications and shall conform to the requirements of A.S.T.M. "Specifications for Billet-Steel Bars for Concrete Reinforcement" Designation A-15, A.S.T.M. "Specification for Rail Steel Bars for Concrete Reinforcement" Designation A-16 or A.S.T.M. "Specification for Axle Steel Bars for Concrete Reinforcement" Designation A-160. All reinforcing bars except number 2 bars shall meet the A.S.T.M. "Specifications for Minimum Requirements for the Deformation of Deformed Steel Bars for Concrete Reinforcement" Designation A-305. Bars which do not conform to these specifications shall be used only with the written approval of the Engineer.

26.b. Steel Wire Fabric Steel wire fabric for concrete reinforcement shall be fabricated from steel wire and electrically welded at all joints and points of intersection in accordance with the requirements of A.S.T.M. "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement" Designation A-185.

26.c. Sampling Reinforcing bars may be sampled by the Engineer at the mill or at the work or both. Steel samples shall be identified by heat number and accompanied by mill analysis and test reports. All test samples shall be furnished by the Contractor without charge therefor to the City.

The length of each steel pile may be built up by welding identical sections either before or during the driving operation. The connections shall be made by

Steel piles shall be H beams of the sections shown on the plans or specified and shall be structural steel in accordance with the requirements of A.S.T.M. "Specifications for Steel for Bridges and Buildings." Designation A-7 except that steel manufactured by the acid Bessemer process will not be used.

30. STEEL PILES

29.b. Preservative Treatment The recommendations of the A.W.P.A. shall be followed.

Length of piles - minimum butt and tip diameter and any treatment or creosoting of piles or timber will be as called for in the Special Specifications.

All piles shall be peeled and all knots shall be trimmed close to the body of the pile.

29.a. General Unless otherwise required by the Special Specifications, timber piling shall comply with A.S.T.M. "Specifications for Round Timber Piles" Designation D-25 Class "A" with the following limitations and requirements. All timber piling shall be winter cut Douglas Fir (coast region) or Western Red Cedar from live trees. Piling shall have no unsound knots but sound knots will be permitted if the diameter of the knot does not exceed 3 inches or 1/3 the small diameter of the pile. Any defect or combination of defects which will impair the strength of the pile more than the maximum allowable knot will be cause for rejection. Piling shall be so straight that a straight line from the center of the butt to the center of the tip shall be wholly within the body of the pile, and the pile shall have no short or reverse bends or kinks.

29. TIMBER PILING

28. LUMBER AND TIMBER Unless otherwise specified, when lumber or timber is referred to by grade it shall mean the grade of Douglas Fir under the rules of the West Coast Lumbermen's Association and when required, the Contractor shall furnish the Engineer with a certificate as to grade from the Pacific Lumber Inspection Bureau of that Association. The grade of lumber furnished shall be as specified in the Special Specifications.

"Specifications for Rolled-Wrought Iron Shapes and Bars" Designation A-207, "Specifications for Uncoated Wrought-Iron Sheets" Designation A-162, "Specifications for Wrought-Iron Plates" Designation A-42.

When wrought iron is specified it shall be in accordance with the requirements of the appropriate A.S.T.M. Specifications as follows:

27. WROUGHT IRON

butt welding the entire cross-section of the beams. The sections shall be welded and shall be properly aligned during welding so that the axis of each completed pile will be linear. The minimum length of sections before welding and the number of welded connections in any pile shall be as shown on the plans or as specified.

31. CONCRETE PILES

31.a. Cast In Place Cast-in-place concrete piles which include driven steel pipe shells filled with plain or reinforced concrete shall be as shown on the plans and called for in the special specifications, unless otherwise specified, concrete shall be 3500# 1" to 3" slump to which an approved admixture has been added to decrease the permeability of the concrete to water. The amount of admixture added and the compensating reduction in the amount of mixing water used shall be as specified in the Special Specifications. Wire for spiral reinforcement shall comply with A.S.T.M. "Specifications for Cold Drawn Wire for Concrete Reinforcement." Designation A-82.

Steel pipe shells to be filled with concrete shall comply with the A.S.T.M. "Specification for Welded and Seamless Pipe Piles." Designation A-252, grade 2. Diameter and wall thickness of pipe shall be as called for in the Special Specifications or plans. Shells driven without a mandrel shall be equipped with heavy steel points and all joints in the shell shall be welded.

31.b. Precast Precast concrete piles shall be constructed of reinforced concrete, cast in a horizontal position in accordance with the design and details shown on the plans and as called for in the Special Specifications.

32. NON-REINFORCED CONCRETE SEWER PIPE

Unless otherwise specified in the special specifications, non-reinforced concrete sewer pipe shall conform to "Specifications for Concrete Sewer Pipe" A.S.T.M. Designation C-14. These specifications cover two classes of concrete pipe "Standard Strength Non-reinforced Concrete Sewer Pipe" and "Extra Strength Non-reinforced Concrete Sewer Pipe." The class to be used shall be as called for on the Plans or in the Special Specifications.

33. REINFORCED CONCRETE SEWER PIPE

Reinforced concrete sewer pipe shall conform to "Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe" A.S.T.M. Designation C-76. Pipe manufactured under these specifications is of five classes and each class of several wall thickness. Pipe furnished under these specifications shall be of class and wall thickness specified in the Special Specifications.

34. CONCRETE SEWER PIPE WITH RUBBER GASKET JOINTS

The Bidder shall submit with his bid a detailed dimensional design and essential specifications for the pipe and joint he proposes to furnish and

38.a. General Black Bridge Paint shall conform to the requirements of A.A.S.H.O. Designation: M 68.

38. BLACK BRIDGE PAINT

M-69. Aluminum Paint shall conform to the requirements of A.A.S.H.O. Designation:

37. ALUMINUM PAINT

36.b. General Requirements The paint shall be well-ground, shall not settle or cake badly in the container and shall be readily broken up with a paddle to a smooth uniform paint of good brushing consistency. The paint, when brushed on a smooth vertical metal surface, shall dry hard and elastic within the specified period without running, streaking or sagging.

36.a. General Red Lead Ready-Mixed Paint shall conform to the requirements of A.A.S.H.O. Designation: M 72.

36. RED LEAD READY-MIXED PAINT

Vitrified clay pipe and fittings shall be installed in accordance with A.S.T.M. "Recommended practice for installing vitrified clay sewer pipe" Designation C-12, and A.S.T.M. "Specifications for Vitrified Clay Pipe Joint Using Materials Having Resilient Properties" Designation C-425.

Unless otherwise specified in the special specifications, vitrified clay sewer pipe shall conform to "Specifications for Standard Strength Vitrified Clay Sewer Pipe" A.S.T.M. Designation C-13 and "Specifications for Extra Strength Vitrified Clay Sewer Pipe" A.S.T.M. Designation C-200. The class to be used shall be called for in the special specifications or as shown on the plans.

35. VITRIFIED CLAY SEWER PIPE

"The joint design shall consist of a bell on one end of a unit of pipe and a spigot on the adjacent end of the joining pipe. The taper on the conic surface of the inside of the bell and the outer surface of the spigot shall not be more than two degrees (2°) measured from a longitudinal trace on the inside surface of the pipe. The proposed pipe and joint shall be, in every particular, subject to approval by the Engineer."

Such pipe and joint with respect to materials used, method of making physical tests, and other matters not covered in the plans and specifications submitted by the Bidder shall conform to the A.S.T.M. "Specifications for Non-Reinforced Concrete Pipe" Designation C-14, or "Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe," Designation C-76, and "Specifications for Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible, Watertight, Rubber-Type Gaskets" A.S.T.M. Designation C-443 with the deletion of the existing paragraph 5 (b) and insertion therein of the following revision:

Alkyd resin varnish. - Federal Specification TT-R-266, Type II

Mineral spirits. - A.S.T.M. Designation D-235.

Drier. - A.S.T.M. Designation D 600, Class B, with proper metals to give proper drying characteristics of paint.

Pale heat bodied linseed oil. - Federal Specification TT-O-367, Type II.

Raw linseed oil. - A.S.T.M. Designation D-234.

Chrome oxide green. - A.S.T.M. Designation D 263.

Zinc Oxide. - A.S.T.M. Designation D 79.

Basic carbonate white lead. - A.S.T.M. Designation D-81.

following requirements:

39.b. Materials. The materials used in manufacture shall conform to the

of A.A.S.H.O. Designation: M 67.

39.a. General. Foliage green bridge paint shall conform to the requirements

39. FOLIAGE GREEN BRIDGE PAINT

approval of the Engineer.

Any materials used in manufacture not specifically covered above shall meet the

with proper metals to give proper drying characteristics of paint.

Drier. - A.S.T.M. Designation D-600, Class B,

Mineral Spirits. - A.S.T.M. Designation D-235.

Turpentine. - A.S.T.M. Designation D-13.

Raw linseed oil. - A.S.T.M. Designation D-234.

Carbon Black. - A.S.T.M. Designation D 561.

Iron oxide. - A.A.S.H.O. Designation M 129.

Red lead (97% Pb₃O₄) - A.A.S.H.O. Designation M 71.

following requirements:

38.b. Materials. The materials used in manufacture shall conform to the

42.a. General. All castings shall be true to size and tolerances noted on the standard plan and be within $\pm 5\%$ of the specified weight, and the bearing seat shall have not more than 1/16" rock when checked in a test jig.

42. INLET FRAMES AND GRATINGS AND MANHOLE FRAMES AND COVERS

Lampblack shall be produced from oils and shall not contain more than 1 per cent of ash. It shall conform to the requirements of "Specifications for Lampblack" ASTM Designation D-209.

41. LAMPBLACK

Drier. - ASTM Designation D-600, Class B, with proper metals to give proper drying characteristic of paint.

Mineral spirits. - ASTM Designation D-235.

Turpentine. - ASTM Designation D-13.

Heat-bodied linseed oil. - Federal Specifications TT-0-367, Type II (low acid) Viscosity Z-2.

Raw linseed oil. - ASTM Designation D-234.

Leaded zinc oxide. - ASTM Designation D-80.

Basic sulfate white lead. - ASTM Designation D-82.

Zinc oxide: acicular type. - ASTM Designation D-79.

Basic carbonate white lead. - ASTM Designation D-81.

Magnesium silicate. - Shall be a fibrous type conforming to ASTM Designation D 605.

Titanium dioxide (rutile) non-chalking. - ASTM Designation D 476, Type II, Class II.

Titanium dioxide (anatase). - ASTM Designation: D 476, Type I.

40.b. Materials The materials used in manufacture shall conform to the following requirements:

40.a. General White and tinted ready-mixed paint shall conform to the requirements of A.A.S.H.O. Designation: M-70.

40. WHITE AND TINTED READY-MIXED PAINT

42.d. Manhole Frames and Covers and Inlet Frames. The material used in manhole frames and covers and inlet frames (Standard Drawings #207, 208 and 213) shall conform to "Specifications for Gray Iron Castings", A.S.T.M. Designation A-48, with the following revisions:

100°F. per hour to 400°F.
At the request of the Engineer and at no cost to the City, 1 Keel block and/or photomicrograph and/or actual results of either shall be furnished of every furnace tap and/or 1000 lbs.
I Keel block shall be cast from the last of each furnace tap and/or 1000 lbs.

All castings shall be stress relieved @ 1050°F. for 1 hour per inch of metal thickness or 1 hour minimum and cooled at a rate not exceeding 100°F. per hour to 400°F.
At the request of the Engineer and at no cost to the City, 1 Keel block and/or photomicrograph and/or actual results of either shall be furnished of every furnace tap and/or 1000 lbs.

Tensile Strength 60,000 psi
Yield Strength 45,000 psi
Elongation 10% - 30%

42.c. Inlet Gratings. The material used in the inlet grating (Standard Drawing 214) shall conform to "Specifications for Nodular Iron Castings" ASTM Designation A-339 with the following revisions:

1. Moulding of keel block and/or transverse bar.
2. Casting of keel block and/or transverse bar.
3. Shot blasting of castings.
4. Start of heat treatment.
5. Gauging and final inspection.

42.b. Inspection. The City's authorized inspector must be notified at least 24 hours in advance of each of the following processes:

The Foundry shall provide all test gauges and make available to the Engineer the continuous record of heat treatment of these units. The Foundry shall not sub-contract any phase of this work other than testing procedure, patterns, machining and cartage. The castings shall not be made by the open-mold method and all shall be free of blow holes, cracks, welding or any other defects that may effect their strength for the service intended. All castings shall be shot blasted and the application of paint or other coating will not be permitted on these castings.

Tensile Strength
 Transverse Strength:
 1.2" Bar - 18" Centers
 Load pounds
 Deflection inches
 Damping Capacity:
 20,000 psi torsional stress
 Energy dissipated 1st cycle
 Brinell Hardness (as cast)
 All castings and transverse bars
 shall be stress relieved @ 1000°F. for 1 hour per inch of metal
 thickness or 1 hour minimum and cooled at a rate not exceeding 100°F.
 per hour to 400°F. The Foundry shall certify the tensile, damping
 capacity, brinell hardness and transverse properties and the City of
 Portland reserves the right to ask for a Rough Transverse bar (size
 of test bar 1.2" Dia. 20" long) for each 20 castings or heat when
 less than 20 castings are made. The test bars shall be cast hori-
 zontal and in the same type of sand.

30,000 psi
 2,600 - 3000
 .22 - .34
 30%
 173-200

SECTION C

SPECIAL SPECIFICATIONS

INCORPORATION OF STANDARD SPECIFICATIONS

All applicable provisions of the City of Portland Specifications entitled "Specifications Applying to Streets, Sewers, Bridges & Structures" as adopted by the City Council in Section 5-501 of the Public Works Code and filed in the office of the City Auditor January 14, 1963, shall apply to any contract for this project, and all work done and materials used on this project and the legal relations between the parties and the contractor's requirements shall be as set forth in said Standard Specifications, except as specially and specifically modified or deleted by these Special Specifications.

BID GUARANTEE

Section D, Paragraph 3, "Bid Guaranty, of the Standard Specifications Applying to Streets, Sewers, Bridges and Structures, dated January 14, 1963, is amended as follows:

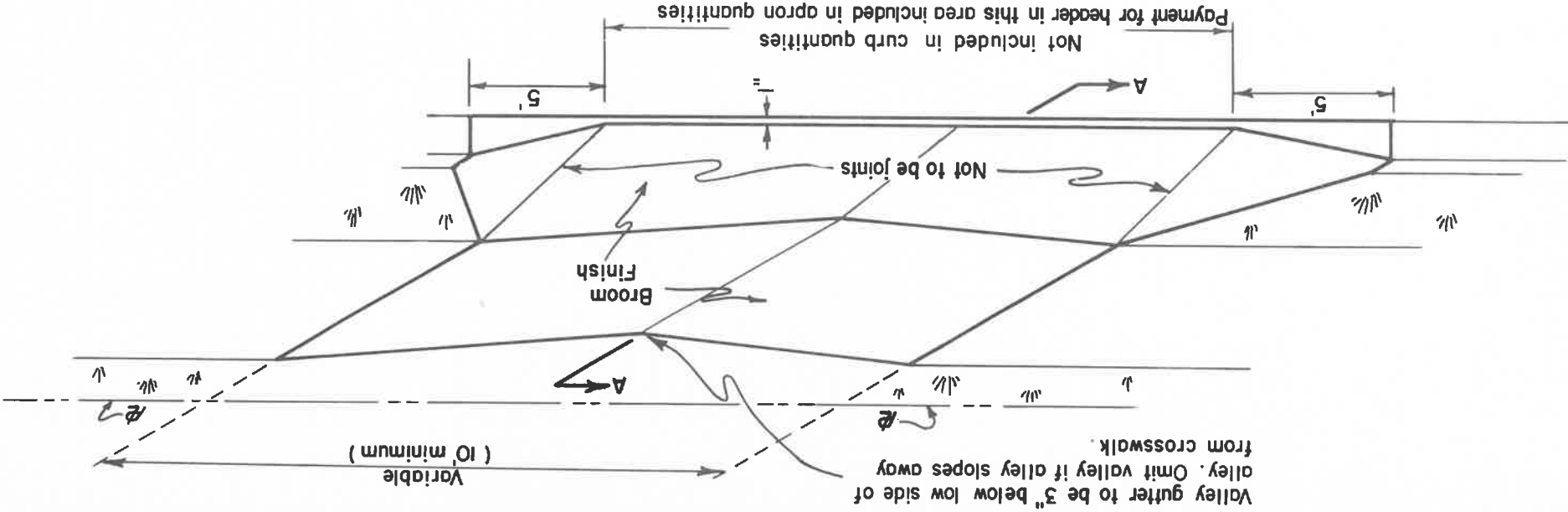
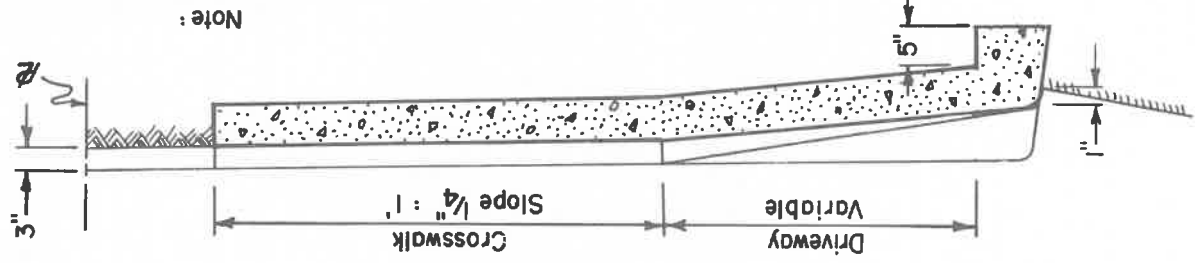
"Unless covered by an annual bid bond filed in the office of the City Auditor, all bids must be accompanied by a certified or cashier's check payable to the order of the City of Portland, or a bidder's bond for the single bid submitted, in amount of at least ten per cent (10%) of the amount of the proposal, to be forfeited as liquidated damages in case the bidder shall fail to execute the contract within ten (10) days after receiving said contract from the City Auditor for execution.

The bid guarantees will be retained in accordance with the provisions of Section 4-1301.2 (Retention of Bid Guaranty) of the Finance Code of the City of Portland. If the bid bond is submitted in lieu of a certified check, such bond shall be on the form included with these specifications."

SECTION G
PLANS

Note:
 Alley crosswalk to be constructed of 3000 lb.
 2 to 4 slump concrete 6" thick.

SECTION A-A



CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W. M. A. BOWES COMMISSIONER

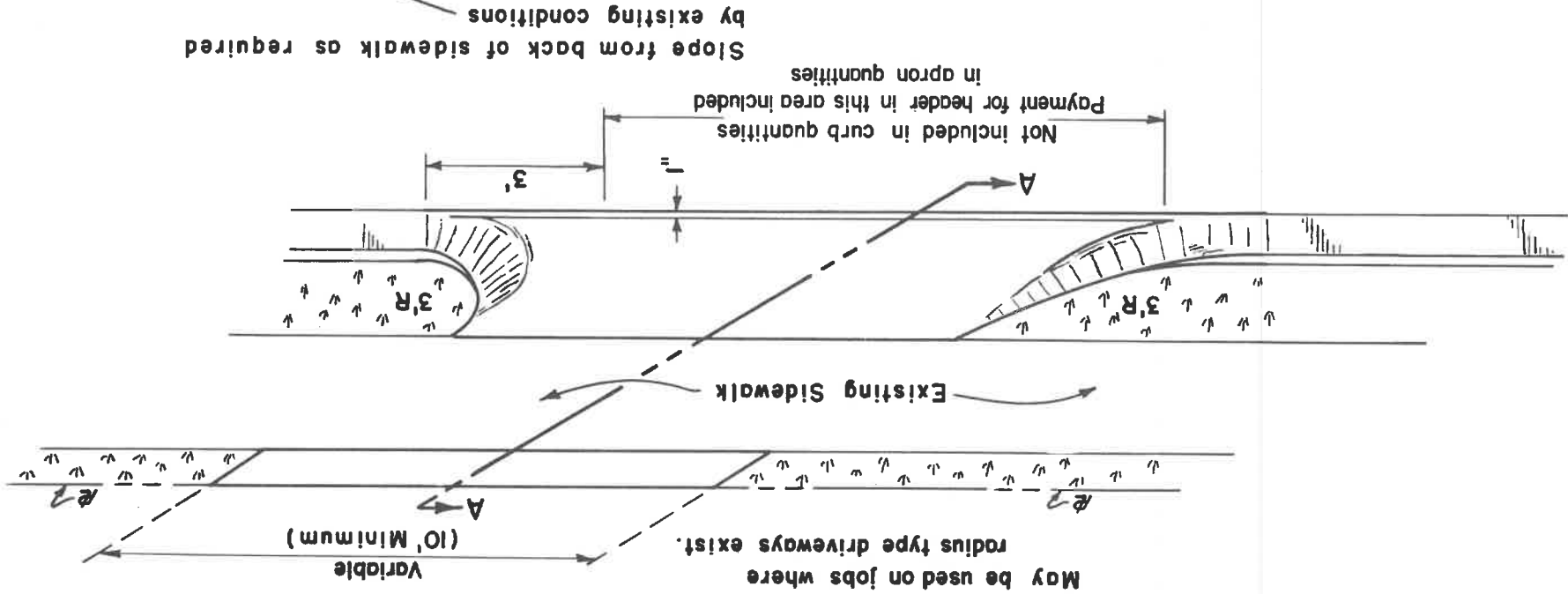
STANDARD ALLEY CROSSWALK
 AND DRIVEWAY

APPROVED

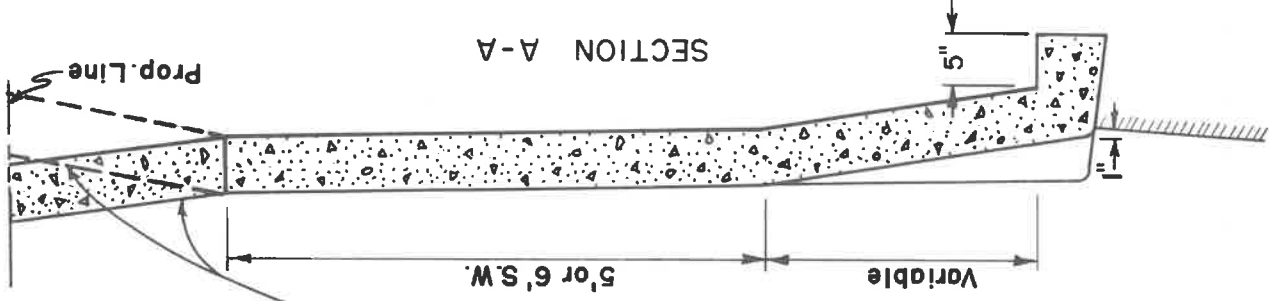
W. M. A. Bowes
 CITY ENGINEER

DATE

BUREAU OF DESIGN
 OCT., 1962
 STANDARD PLAN NO 102
 Rev. 8-17-65



Note:
 Driveway to be constructed of 3000# 2" to 4" slump concrete 6" thick.



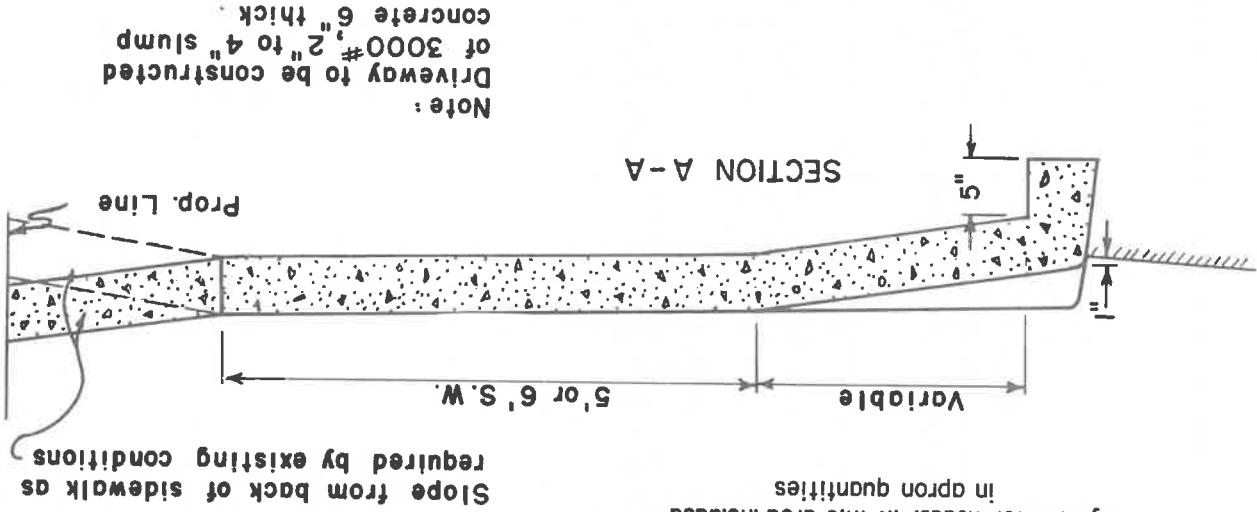
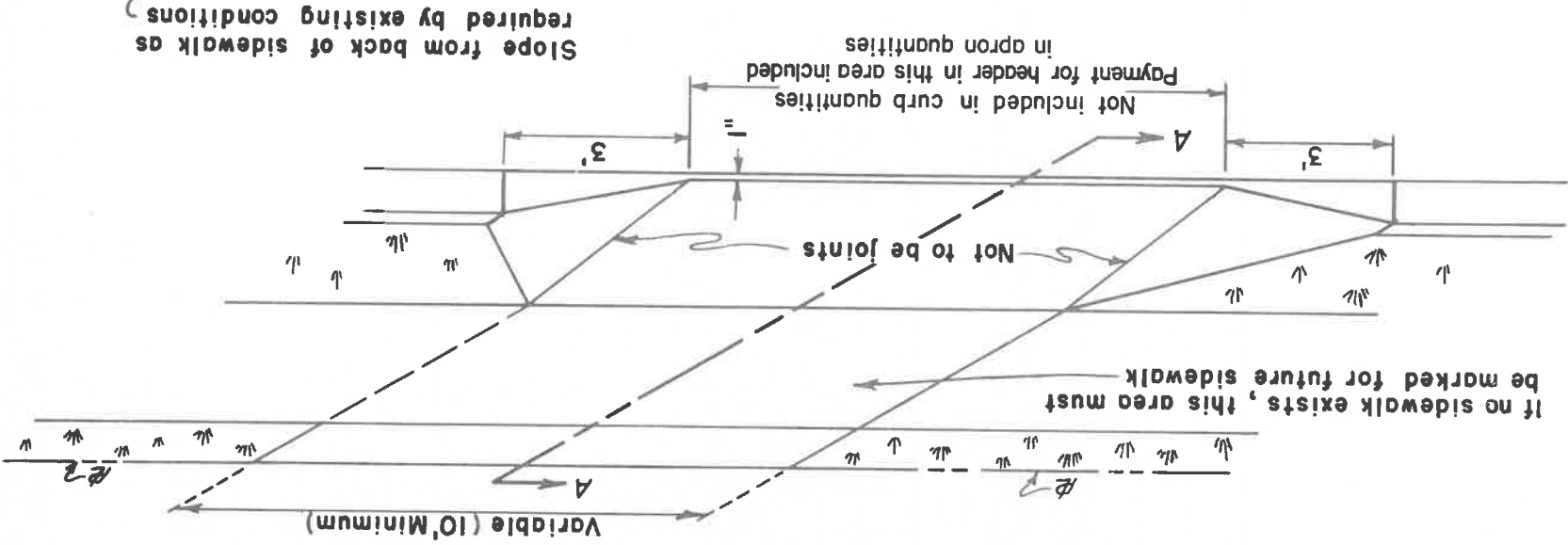
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWEN COMMISSIONER

RESIDENTIAL DRIVEWAY

APPROVED *[Signature]* DATE *9/6/65*
 CITY ENGINEER

BUREAU OF DESIGN
 STANDARD PLAN NO 103

OCT., 1962
 Rev. 8-17-65



Note:
 Driveway to be constructed of 3000# 2" to 4" slump concrete 6" thick.

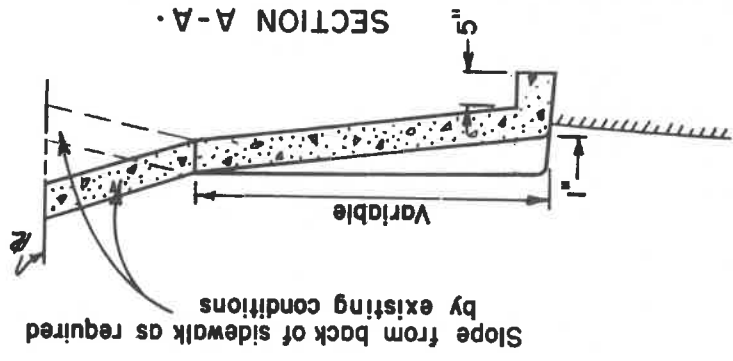
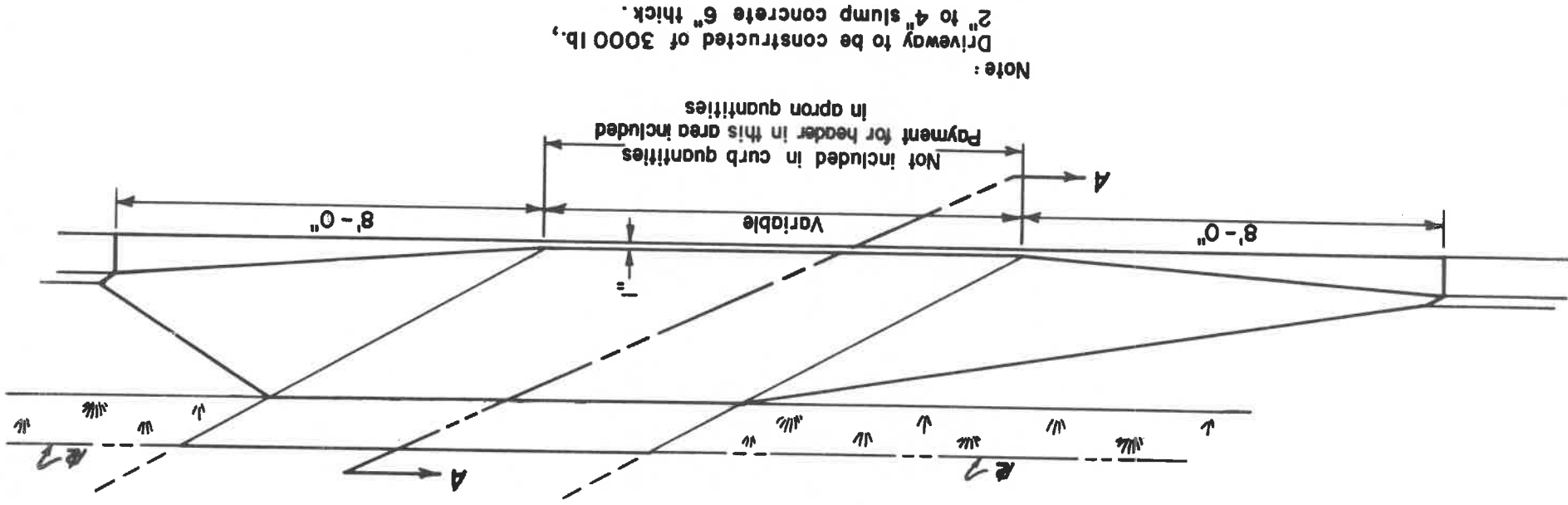
Slope from back of sidewalk as required by existing conditions

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES COMMISSIONER

RESIDENTIAL DRIVEWAY

APPROVED *[Signature]* DATE *[Signature]*
 CITY ENGINEER

BUREAU OF DESIGN
 STANDARD PLAN NO 104
 OCT., 1962
 Rev. 8-17-65



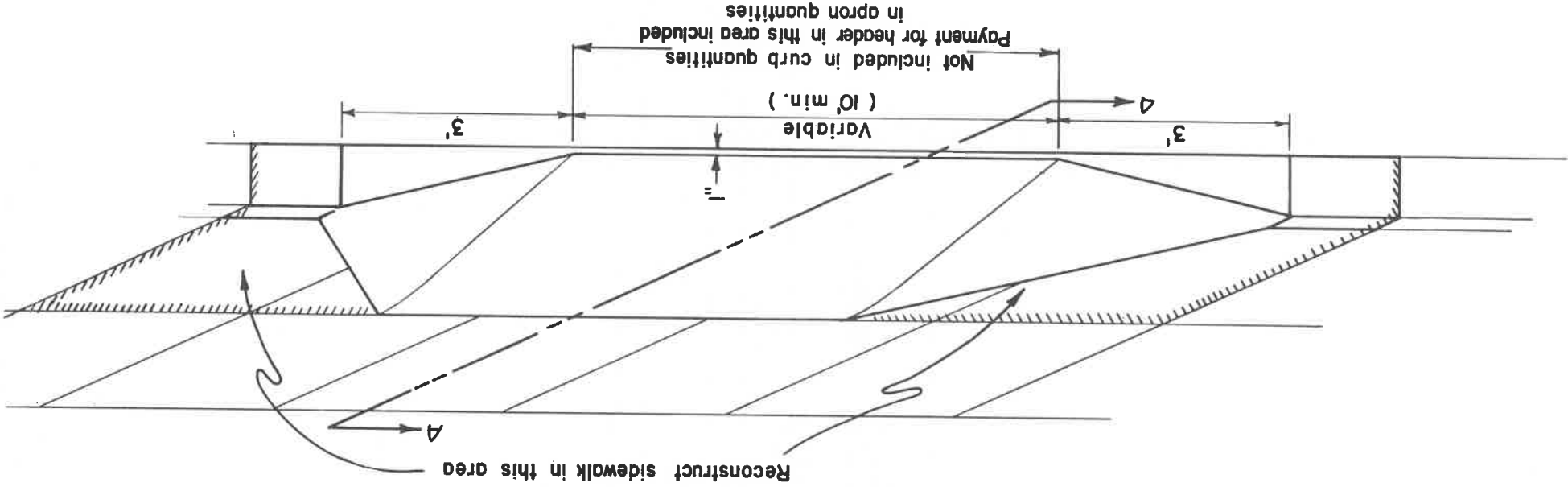
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 WM. A. BOWES
 COMMISSIONER

RESIDENTIAL DRIVEWAY IN
 COMBINATION CURB
 AND SIDEWALK

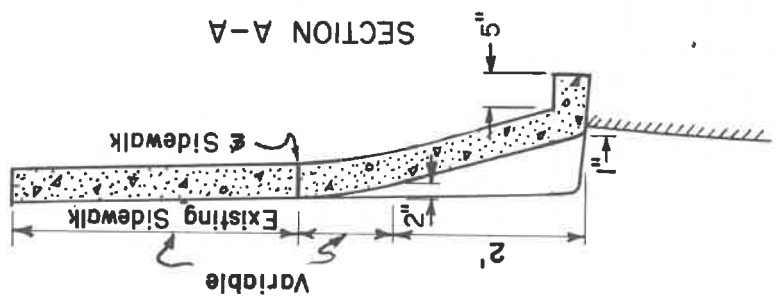
APPROVED
 CITY ENGINEER

W. A. Bowes
 DATE 4/21/66

BUREAU OF DESIGN
 STANDARD PLAN NO 105
 OCT., 1962
 Rev. 8-17-65



Note:
 Driveway to be constructed of 3000 lb.,
 2" to 4" slump concrete 6" thick



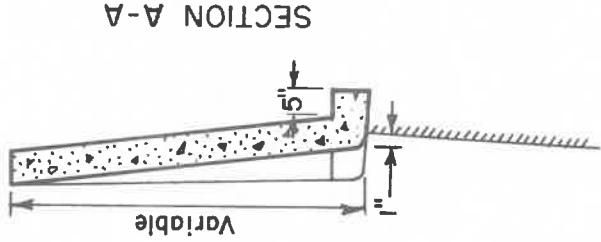
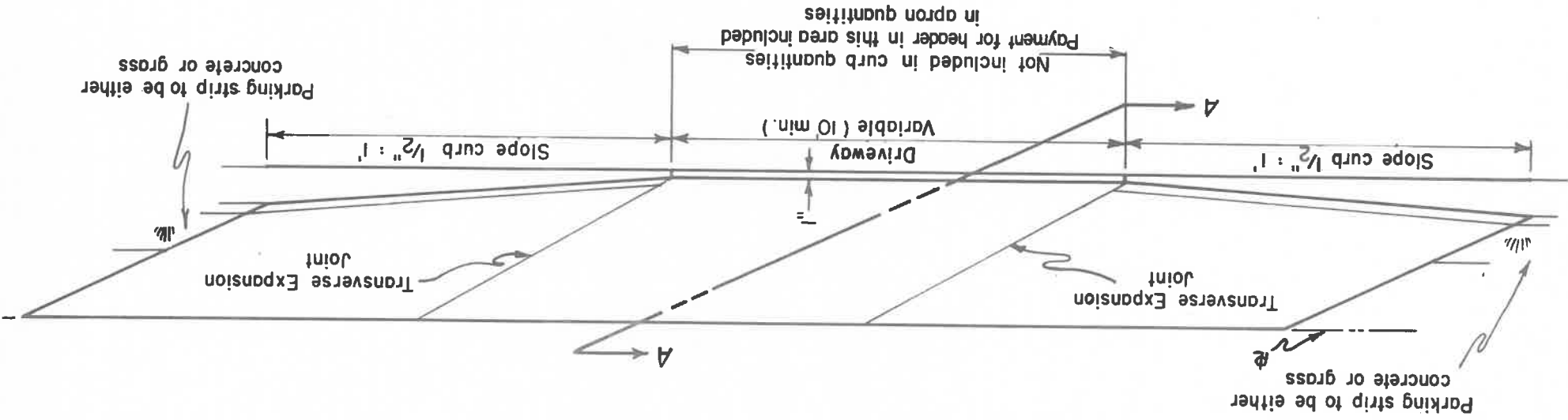
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES COMMISSIONER

DRIVEWAYS IN EXISTING
 COMBINATION CURB AND
 SIDEWALK AREAS

APPROVED *[Signature]* DATE *9/16/65*
 CITY ENGINEER

BUREAU OF DESIGN
 OCT., 1962 STANDARD PLAN NO 106
 Rev. 8-17-65

Note: Driveways to be constructed of 3000 lb. 2" to 4" slump concrete 6" thick. Driveways exceeding 30' in width shall have additional expansion joints.



CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES COMMISSIONER

COMMERCIAL RAMP-TYPE
 CONCRETE DRIVEWAY

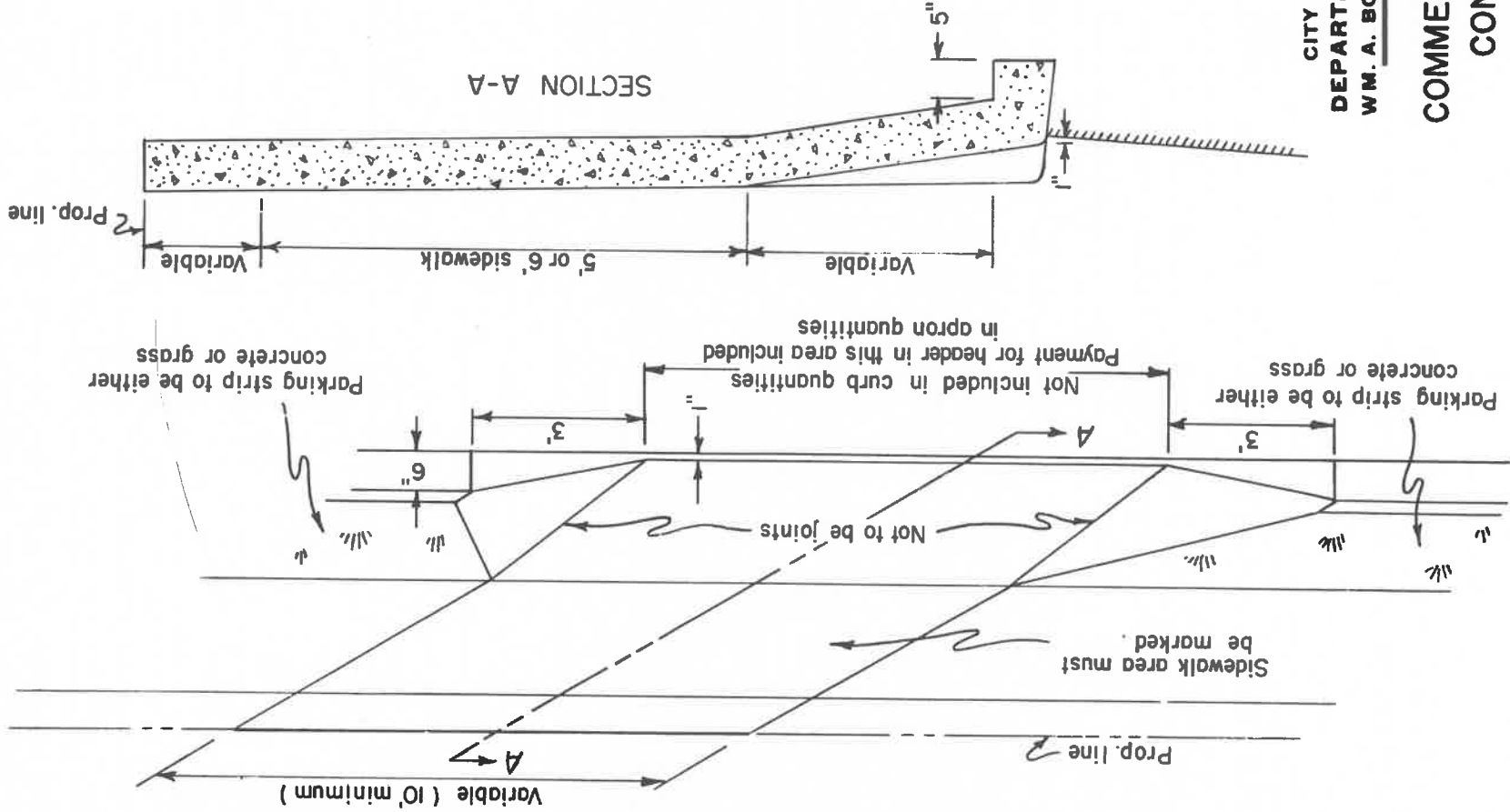
APPROVED

[Signature]
 CITY ENGINEER

DATE

BUREAU OF DESIGN
 STANDARD PLAN NO 107

Rev. 8-17-65



Note:
 Driveway to be constructed of 3000 lb.,
 2" to 4" slump concrete 6" thick.

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 WM. A. BOWES COMMISSIONER

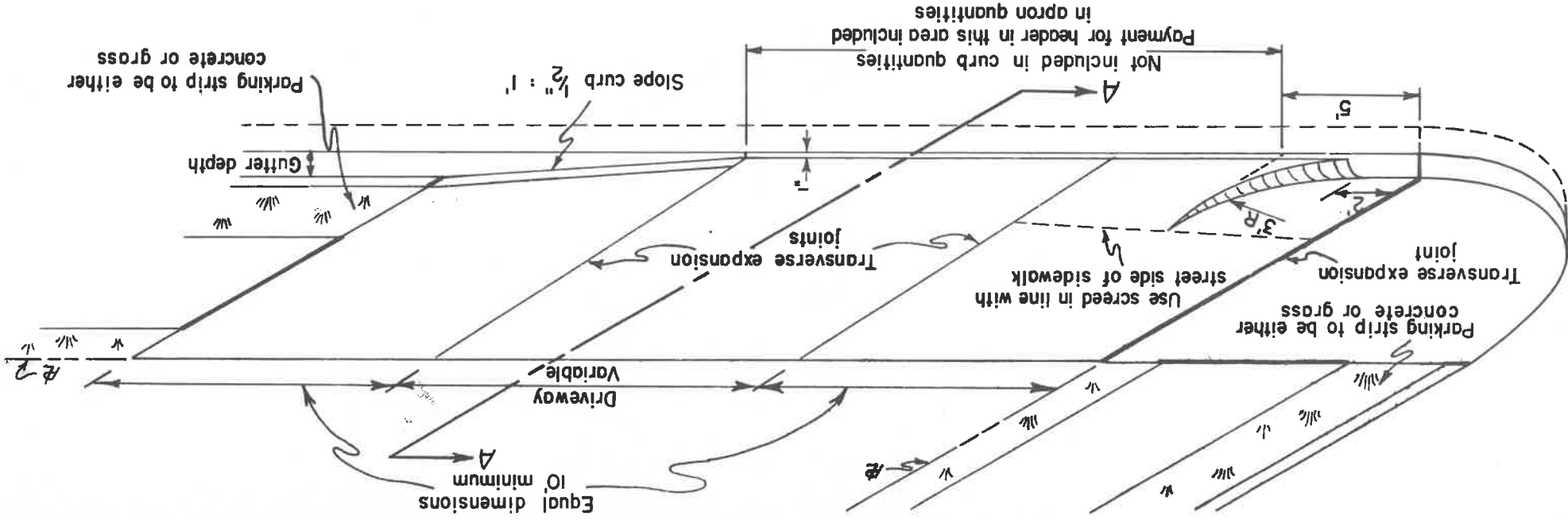
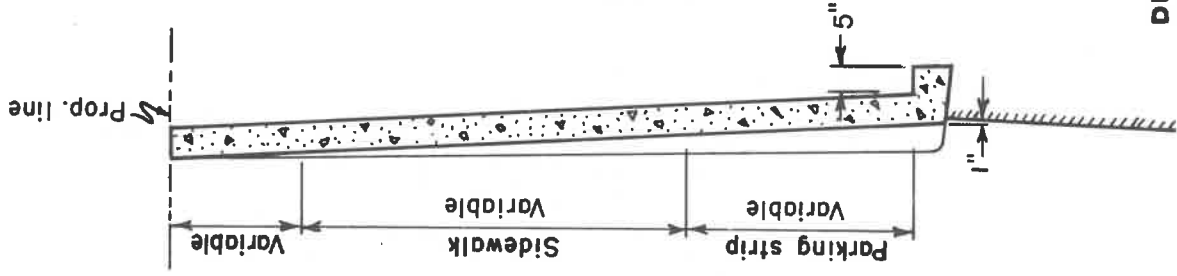
COMMERCIAL 3ft. WING-TYPE
 CONCRETE DRIVEWAY

APPROVED: *[Signature]* DATE *[Signature]*
 CITY ENGINEER

BUREAU OF DESIGN
 STANDARD PLAN NO 108
 OCT., 1962
 Rev. 8-17-65

Note:
 Driveway to be constructed of 3000 lb., 2" to 4" slump concrete, 6" thick.
 Driveways exceeding 30' in width shall have additional expansion joints.

SECTION A-A



CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES
 COMMISSIONER

COMMERCIAL RAMP-RADIUS-TYPE
 CONCRETE DRIVEWAY

APPROVED

CITY ENGINEER DATE

BUREAU OF DESIGN
 STANDARD PLAN NO 109
 OCT., 1962
 Rev. 8-17-65

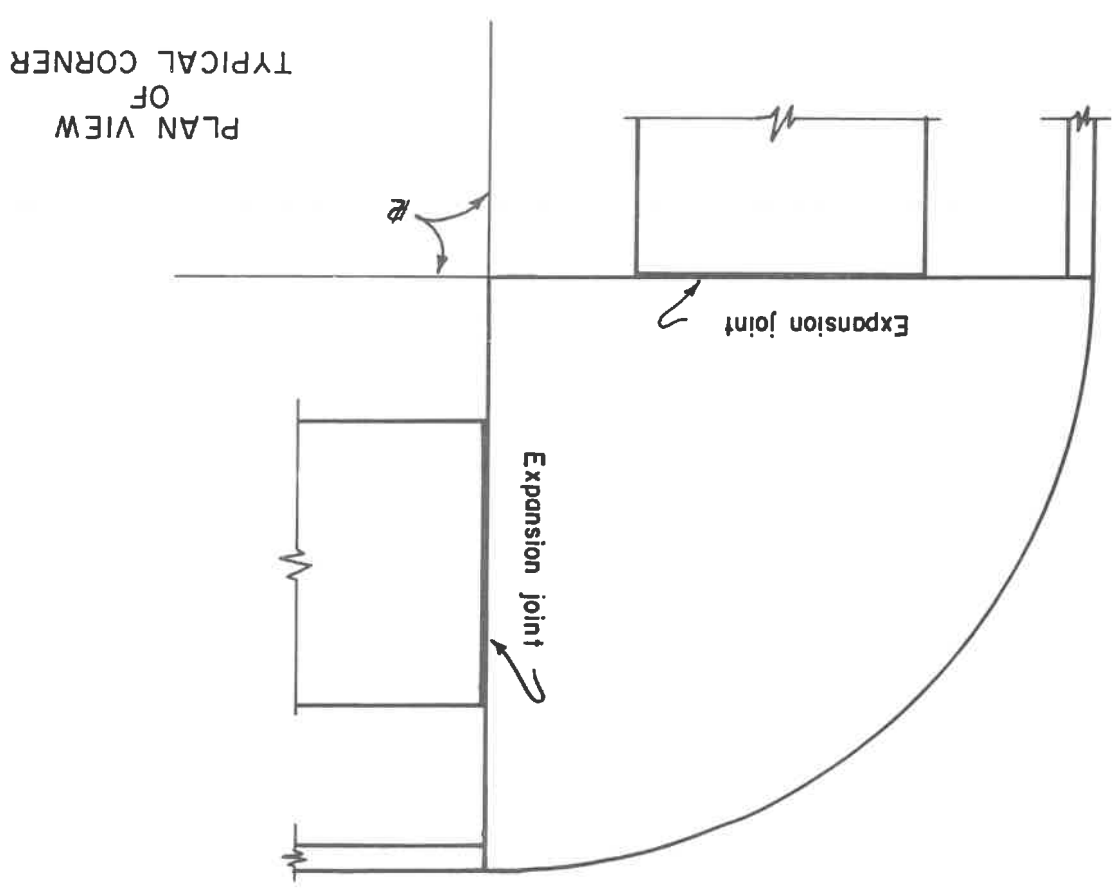
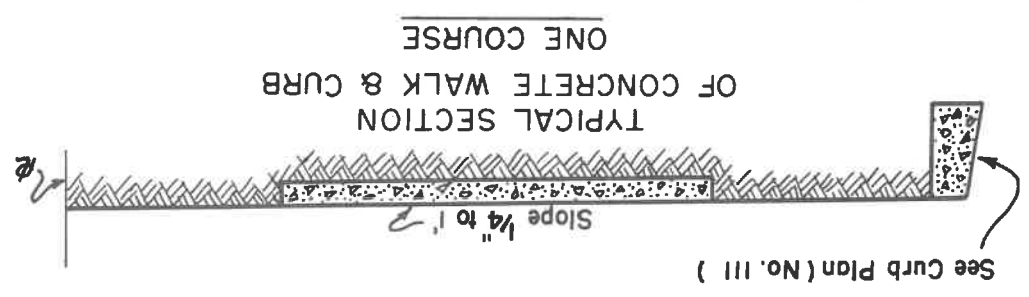
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES
 COMMISSIONER

APPROVED: *[Signature]*
 DATE: 11/2/66
 CITY ENGINEER

BUREAU OF DESIGN
 STANDARD PLAN NO. 110
 OCT., 1962
 Rev. Nov. 1966

**CONCRETE SIDEWALK
 AND
 SIDEWALK CORNERS**

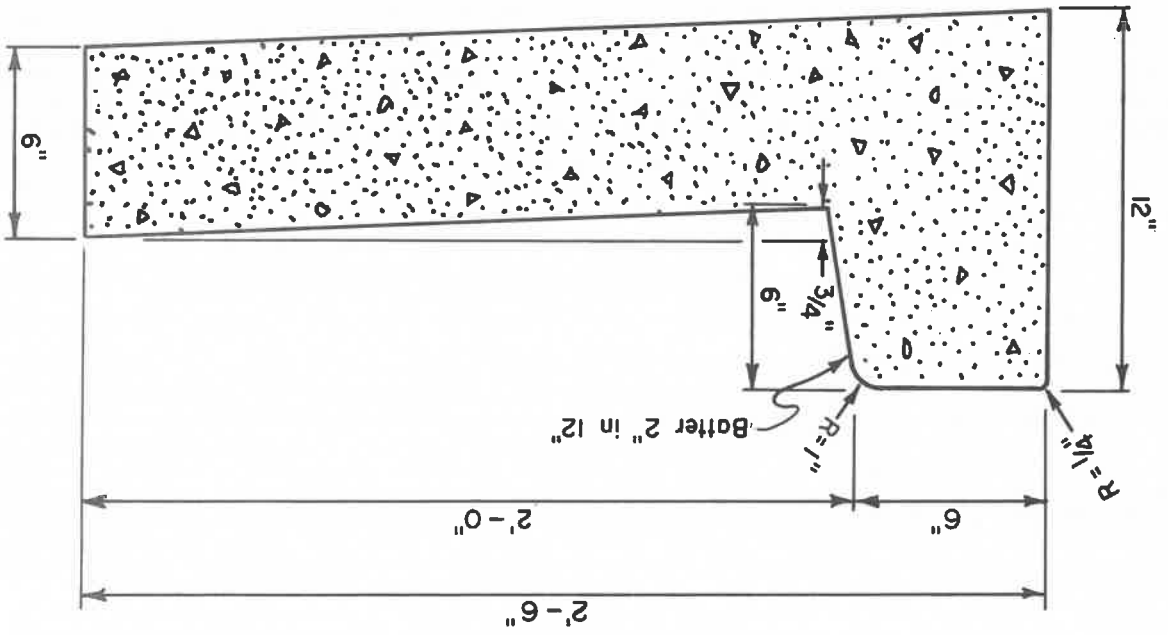
Concrete for sidewalk and sidewalk corners shall be 3000 lb. 2" to 4" slump, 4" thick.



CROSS SECTION
 OF COMBINATION
 CURB & GUTTER

APPROVED: *[Signature]*
 CITY ENGINEER
 DATE: *9/2/65*

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES
 COMMISSIONER



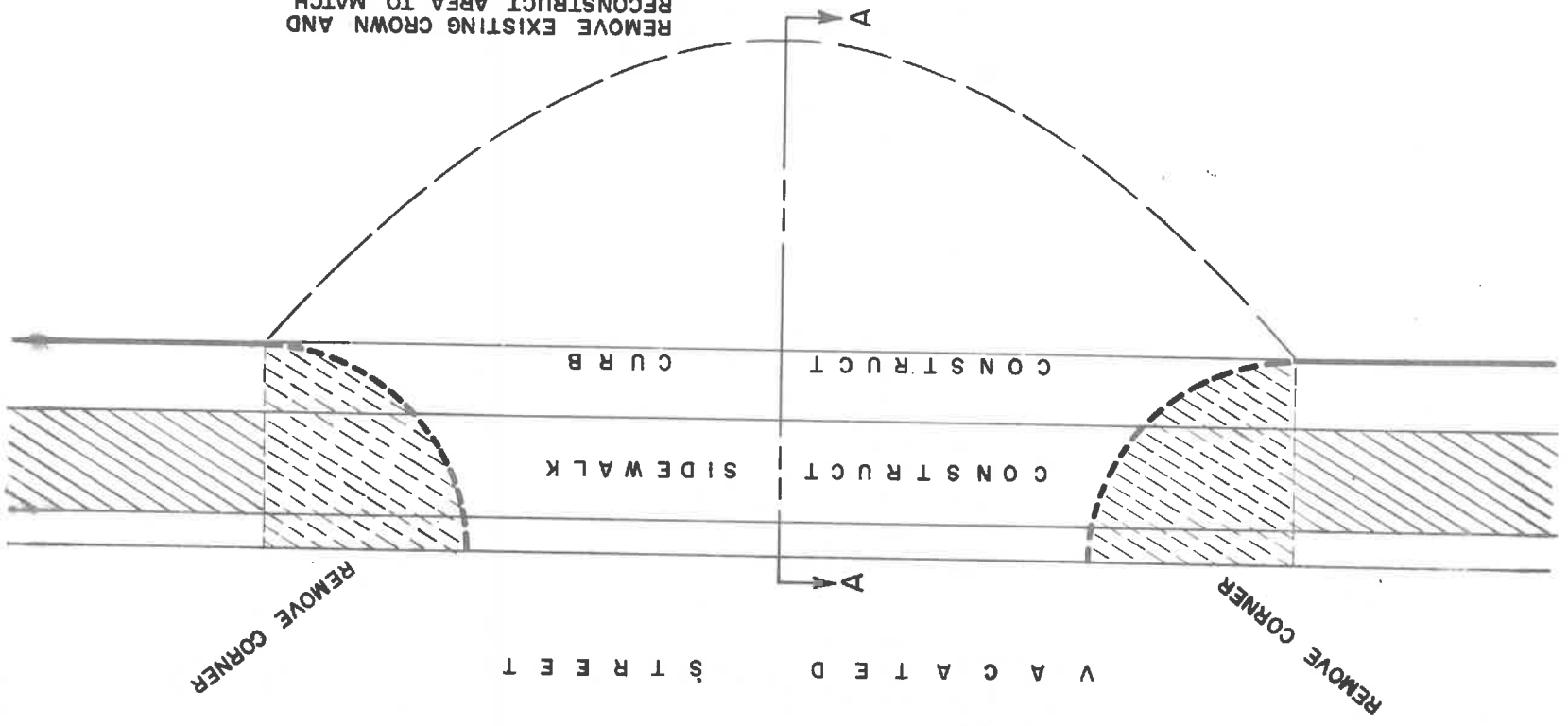
NOTE:
 Transverse expansion joints to be constructed
 at intervals not to exceed 18'
 Concrete shall be 3000# 2"-4" slump

SECTION A-A



IF A DRAINAGE PROBLEM RESULTS
 AT A LOCATION ACCEPTABLE
 TO THE CITY ENGINEER

REMOVE EXISTING CROWN AND
 RECONSTRUCT AREA TO MATCH
 ADJACENT PAVEMENT. ELEV. OF
 NEW GUTTER AND CURB MUST BE
 APPROVED BY THE CITY ENGINEER



CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES COMMISSIONER

CLOSURE OF
 VACATED STREET

APPROVED *[Signature]* DATE *[Date]*
 CITY ENGINEER

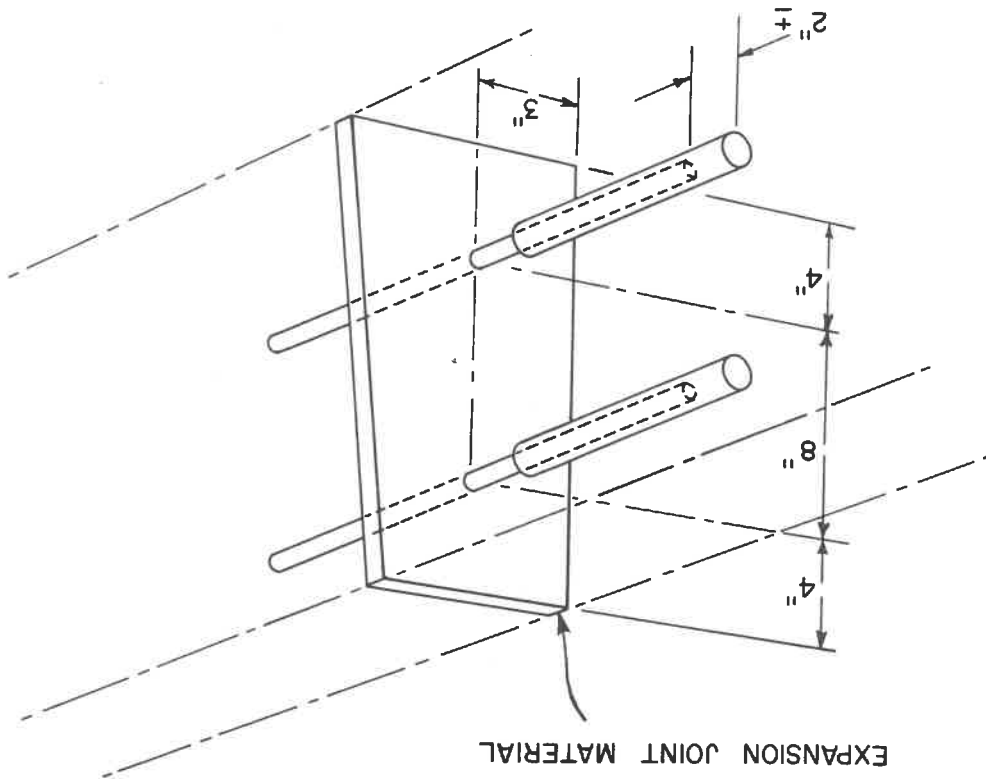
OCT., 1962 BUREAU OF DESIGN STANDARD PLAN NO 113

APPROVED _____
CITY ENGINEER
DATE 4/2/00

CURB JOINTS

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WM. A. BOWES
COMMISSIONER

3/4" X 18" COATED DOWEL BARS WITH CAPS SHALL
BE PLACED AT ALL THROUGH EXPANSION JOINTS UNLESS
OTHERWISE DESIGNATED BY THE CITY ENGINEER.



CITY ENGINEER

DATE

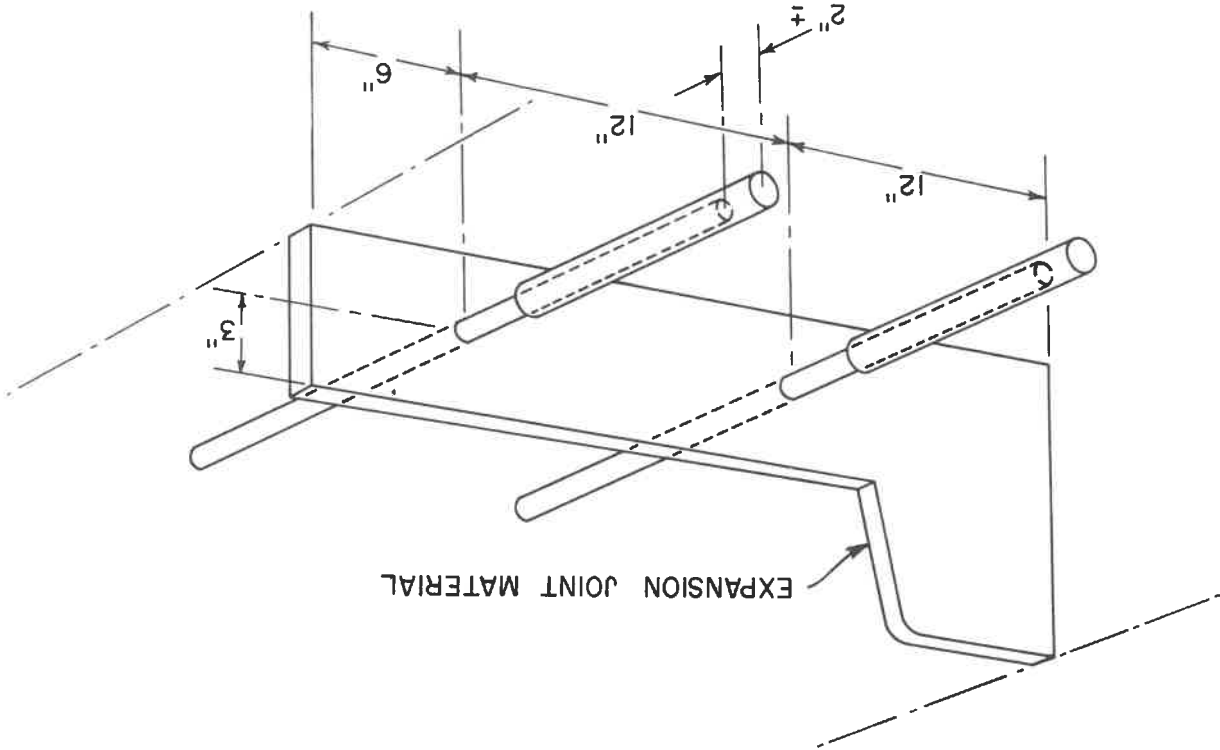
4/2/69

W. A. Bowes
APPROVED

COMBINATION GUTTER AND CURB JOINTS

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WM. A. BOWES
COMMISSIONER

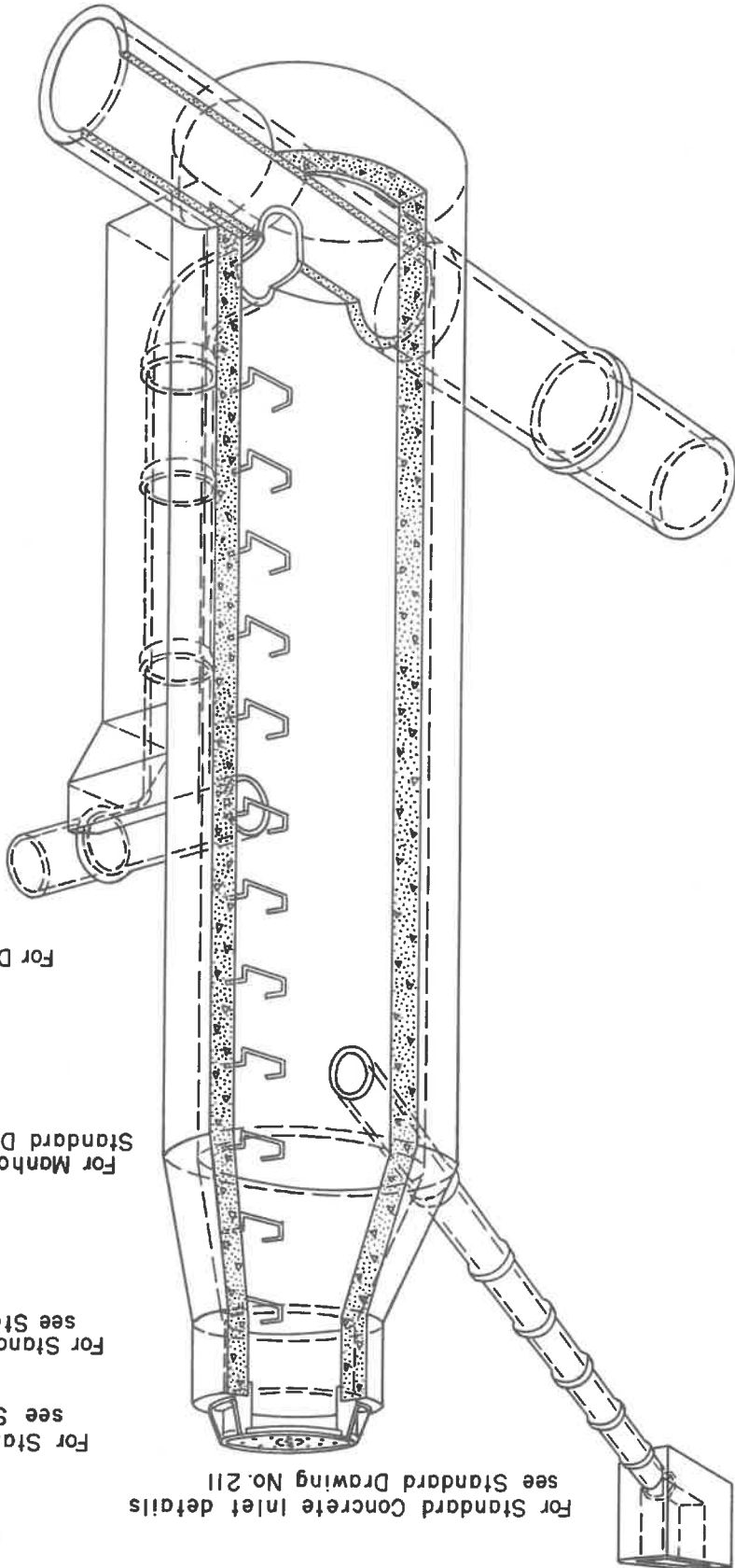
3/4" X 18" COATED DOWEL BARS WITH CAPS SHALL
BE PLACED AT ALL THROUGH EXPANSION JOINTS.



APPROVED *[Signature]* DATE *[Signature]* CITY ENGINEER

STANDARD MANHOLE ASSEMBLY DRAWING

CITY OF PORTLAND, OREGON DEPARTMENT OF PUBLIC WORKS WM. A. BOWES COMMISSIONER



For Drop Connection details for Manholes see Standard Drawing No. 209

For Manhole Step details see Standard Drawing Nos. 205 & 206

For Standard Manhole Cover details see Standard Drawing No. 208

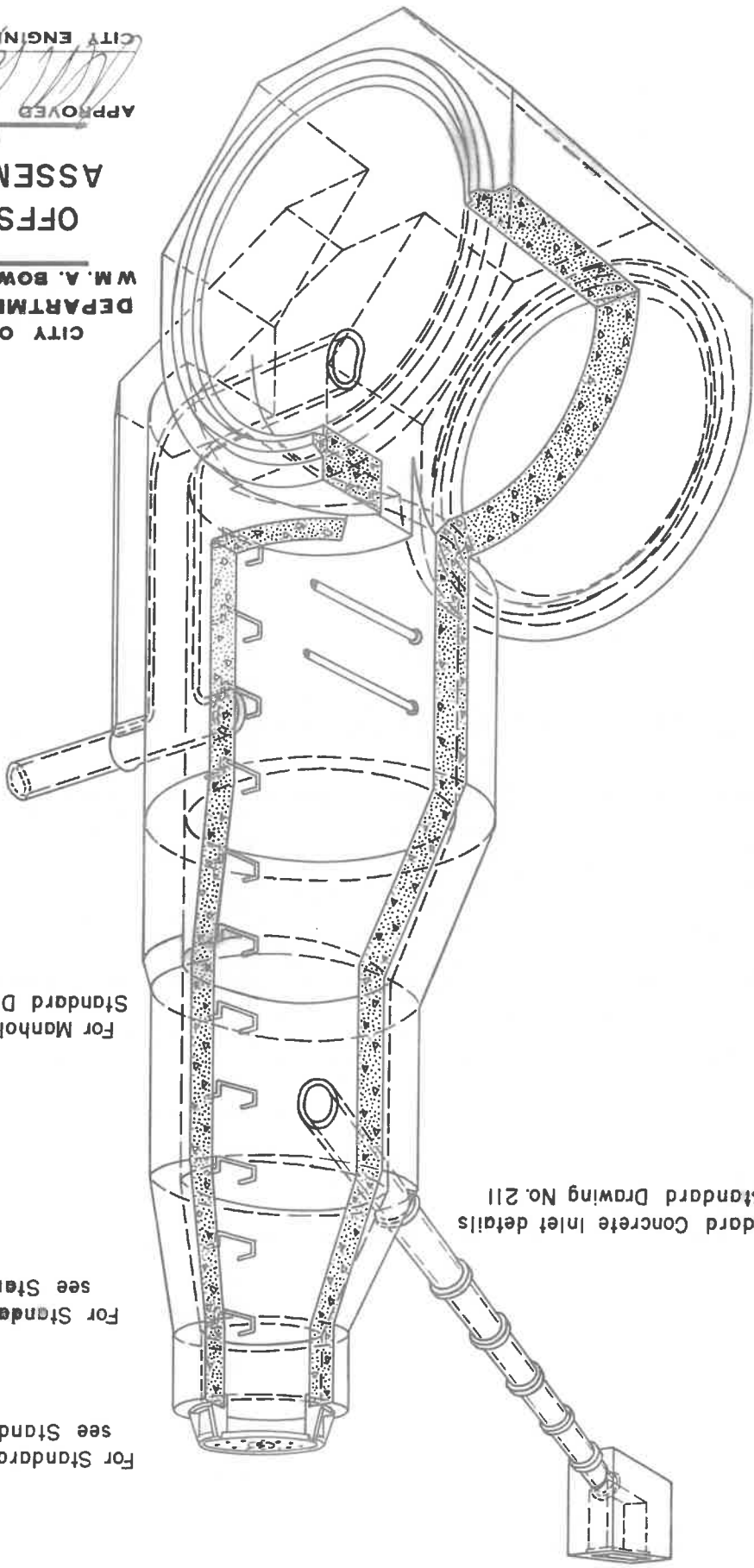
For Standard Manhole Frame details see Standard Drawing No. 207

For Standard Concrete Inlet details see Standard Drawing No. 211

APPROVED *[Signature]* DATE *[Signature]* CITY ENGINEER

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
W.M.A. BOWEN
COMMISSIONER

OFFSET MANHOLE
ASSEMBLY DRAWING



For Manhole Step details see
Standard Drawing Nos. 205 & 206

For Standard Concrete Inlet details
see Standard Drawing No. 211

For Standard Manhole Frame details
see Standard Drawing No. 207

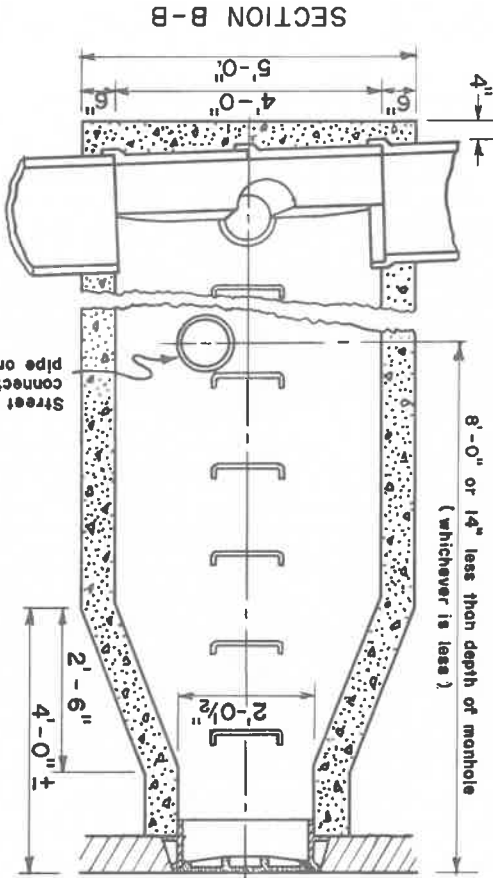
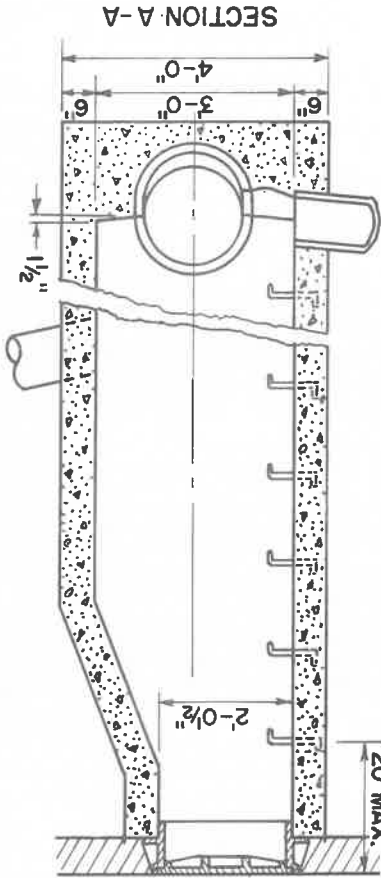
For Standard Manhole Cover details
see Standard Drawing No. 208

APPROVED *[Signature]* CITY ENGINEER
 DATE *[Signature]*

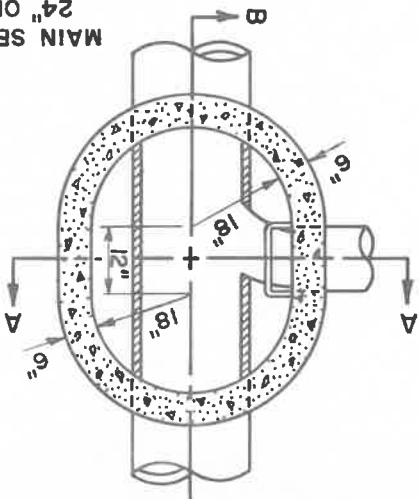
STANDARD MONOLITHIC CONCRETE MANHOLE

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W. M. A. BOWES
 COMMISSIONER

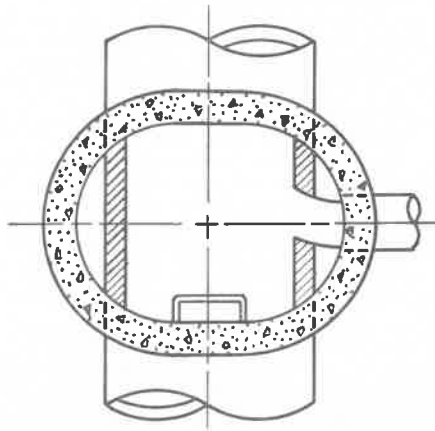
Note
 All concrete to have 28 day strength of 3000 p.s.i.
 See city standard drawing No. 205 for manhole step details.
 See city standard drawing No. 215 for details of direction change of main sewer within the manhole.



MAIN SEWER DIA. 24" OR LESS



MAIN SEWER DIA. 27" TO AND INCLUDING 36"



APPROVED *[Signature]* DATE *[Signature]* CITY ENGINEER

**STANDARD PRECAST
CONCRETE MANHOLE**

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
W.M.A. BOWES
COMMISSIONER

NOTES:

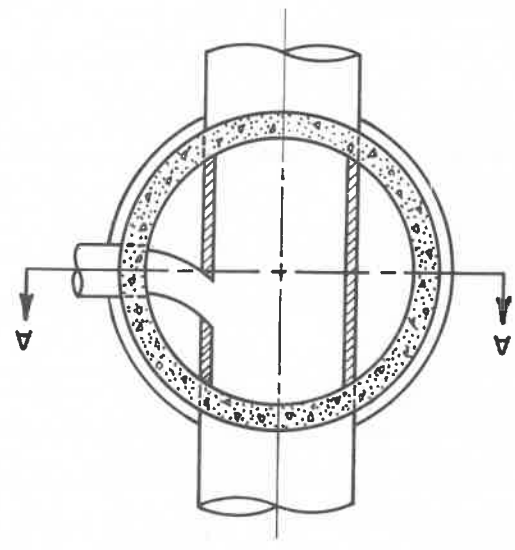
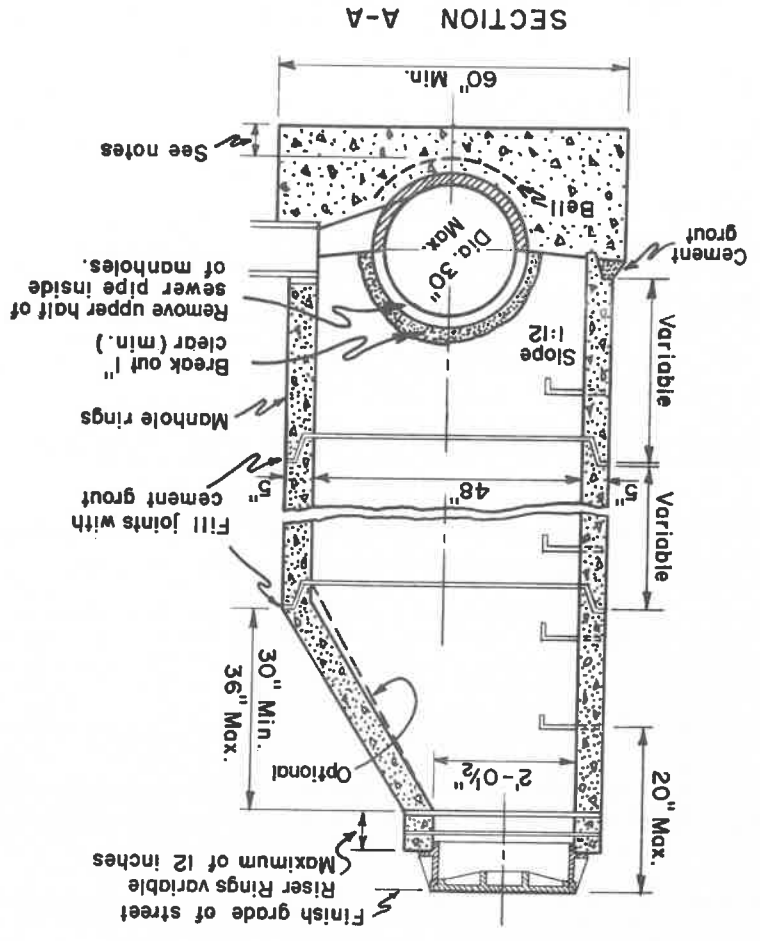
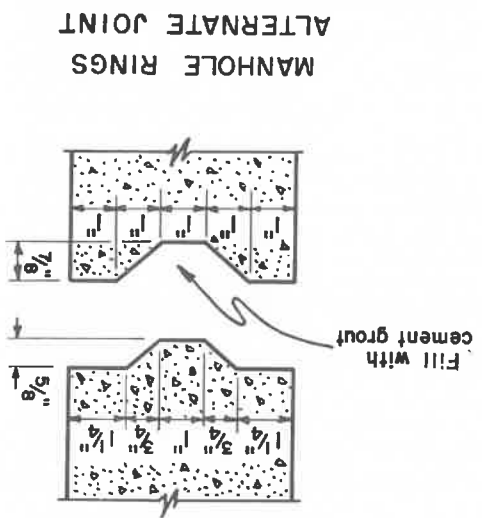
All precast concrete to have a 28 day strength of 3500 p.s.i. and all poured in place concrete to have a 28 day strength of 2500 p.s.i. and 2" to 4" slump.

Steel cage reinforcement shall be welded wire fabric conforming to A.S.T.M. A-82 & A-185. Minimum circumferential steel shall be 0.18 in² per lineal ft.; longitudinal steel and pipe joint shall conform to A.S.T.M. C-76

Manhole base shall provide at least 6" of concrete between the bottom of the base and the lowest projection of the sewer pipe.

Manhole may be poured monolithic to 8" above barrel of main sewer.

See City of Portland Standard Drawing No. 206 for manhole step details.

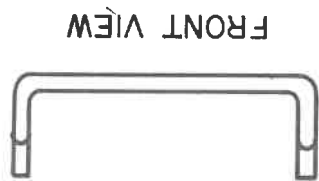


APPROVED *[Signature]* DATE *10/15/62*
CITY ENGINEER

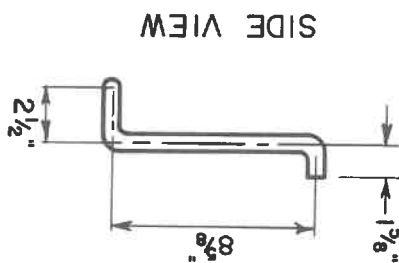
WROUGHT IRON STEP FOR MONOLITHIC MANHOLE

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
W. M. A. BOWES
COMMISSIONER

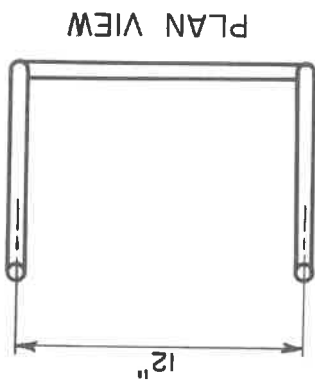
Material: $\frac{3}{4}$ " dia. Genuine W.I. A.S.T.M. A-207. No coating or plating allowed.



FRONT VIEW

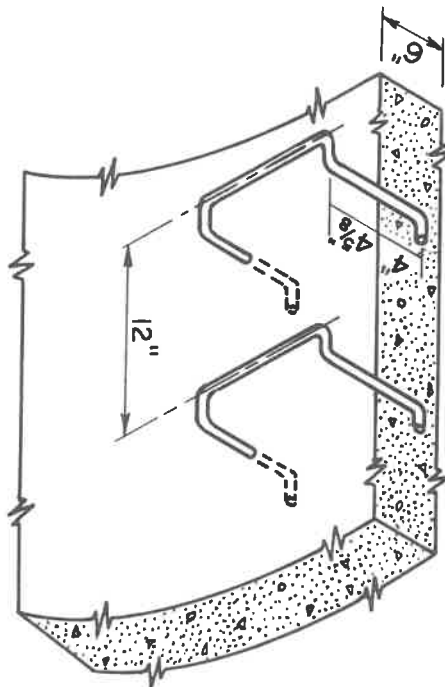


SIDE VIEW



PLAN VIEW

CUTAWAY VIEW
(Standard Manhole)



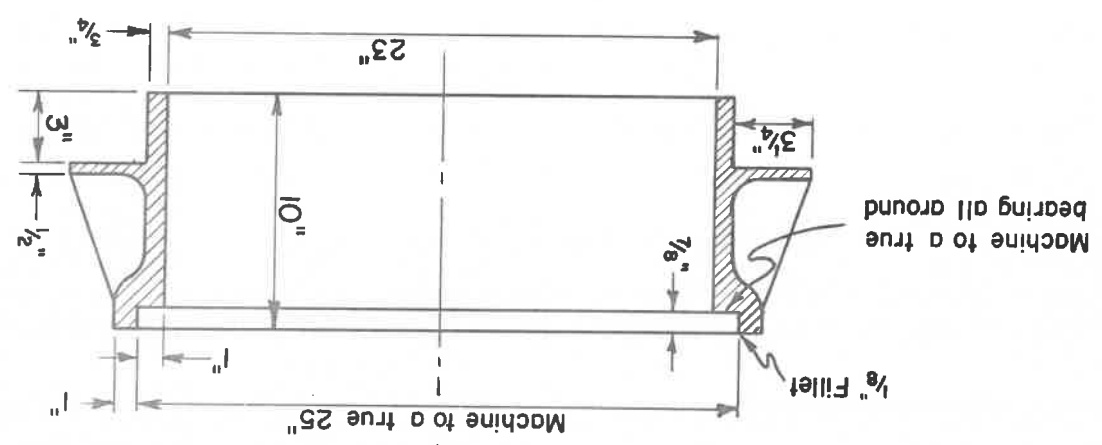
APPROVED *[Signature]* DATE *[Signature]*
 CITY ENGINEER
 BUREAU OF DESIGN
 STANDARD PLAN NO. 207
 OCT., 1962
 Rev. 3-8-65

STANDARD MANHOLE FRAME
 WEIGHT - APPROX. 237 LBS.

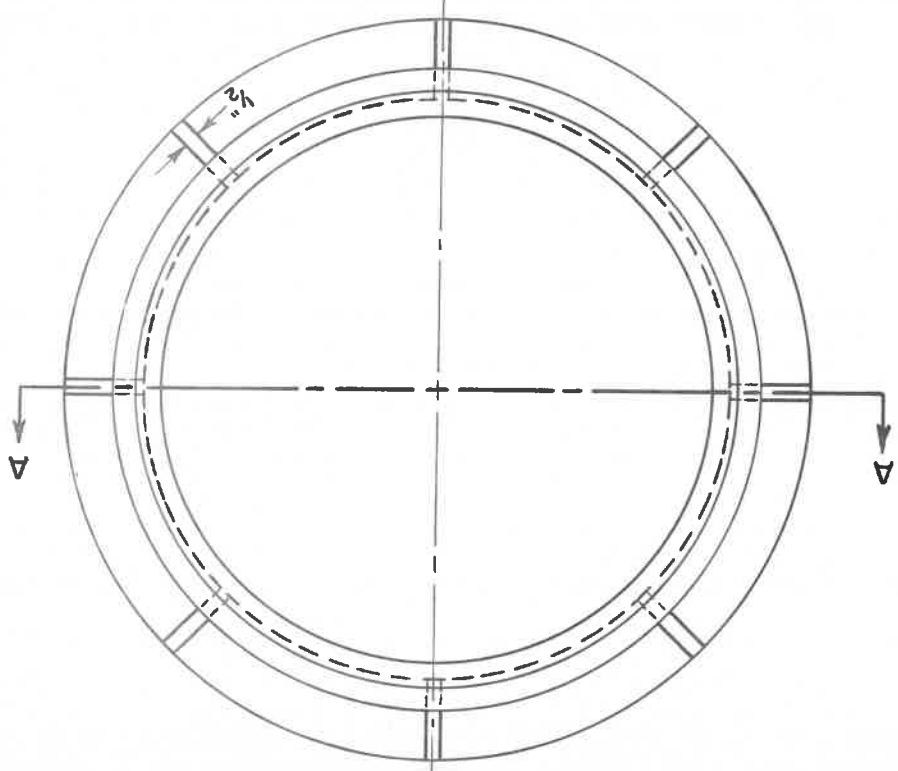
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W. M. A. BOWES
 COMMISSIONER

MATERIAL TO BE GRAY CAST IRON
 ASTM A-48, CLASS 30

SECTION A-A



TOP VIEW



APPROVED _____
DATE 10/65
CITY ENGINEER _____

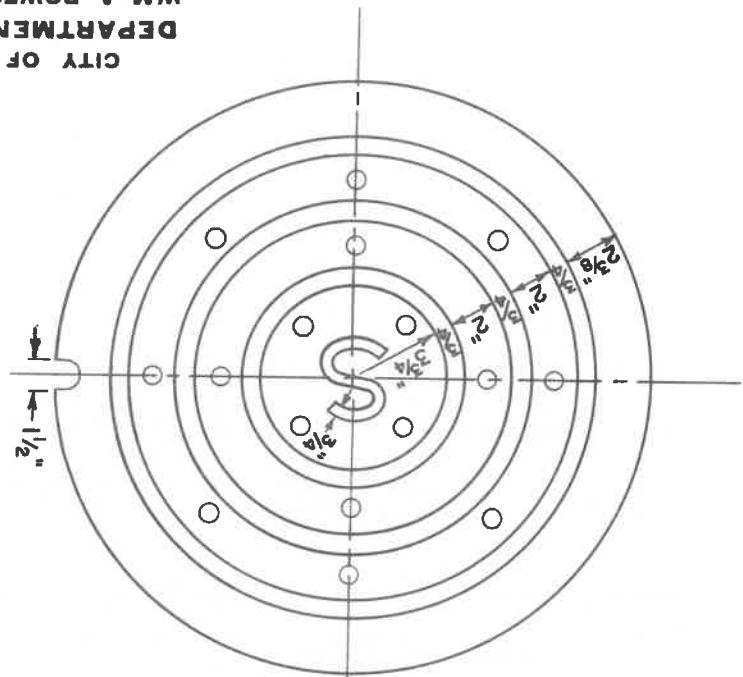
STANDARD MANHOLE COVER

WEIGHT - APPROX. 139 LBS.

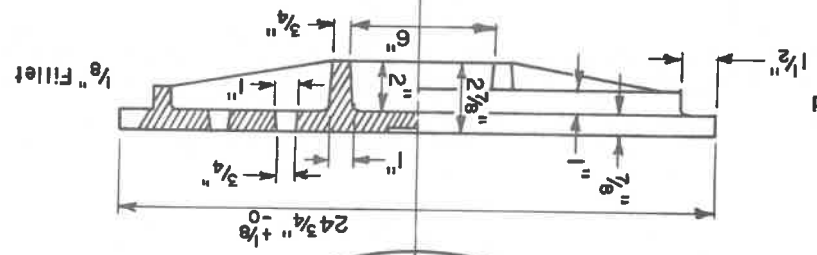
CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WM. A. BOWES
COMMISSIONER

MATERIAL TO BE GRAY CAST
IRON A.S.T.M. A-48, CLASS 30

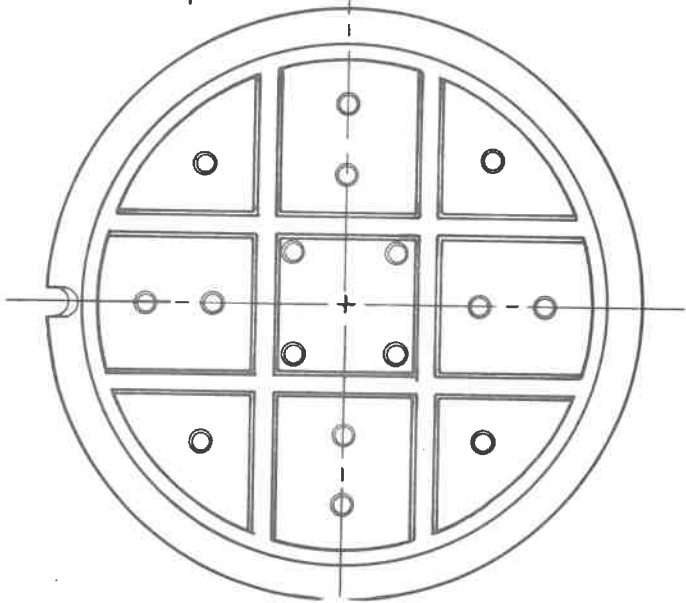
TOP VIEW



SIDE VIEW
HALF SECTION



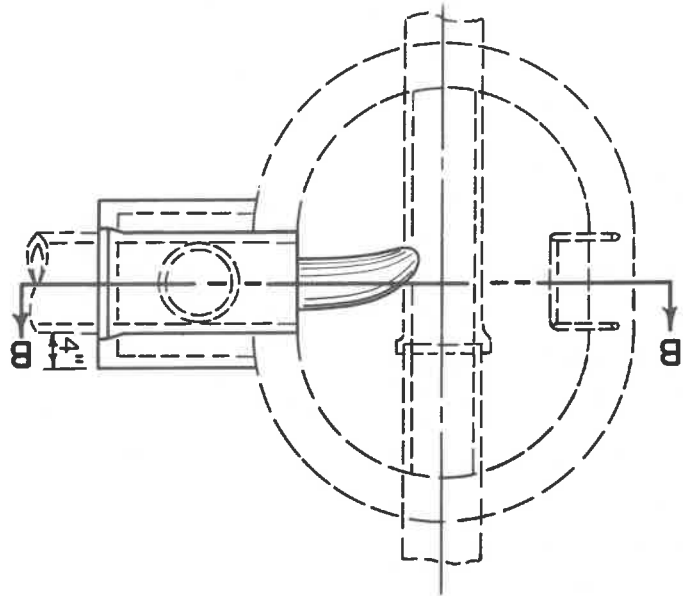
BOTTOM VIEW



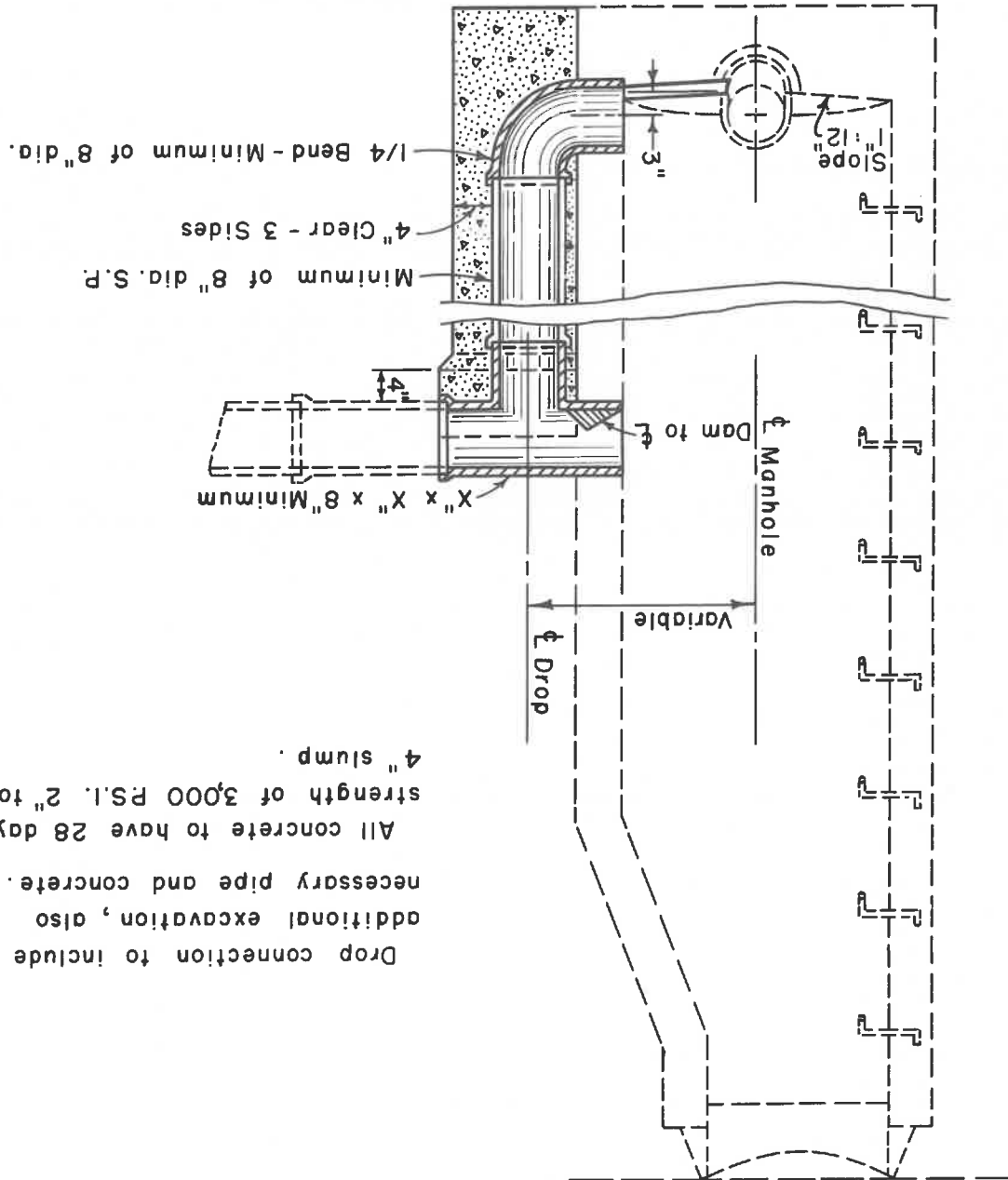
APPROVED *[Signature]* DATE *10/15/62*
 CITY ENGINEER

**DROP CONNECTION
 DETAILS FOR MANHOLES**

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES
 COMMISSIONER



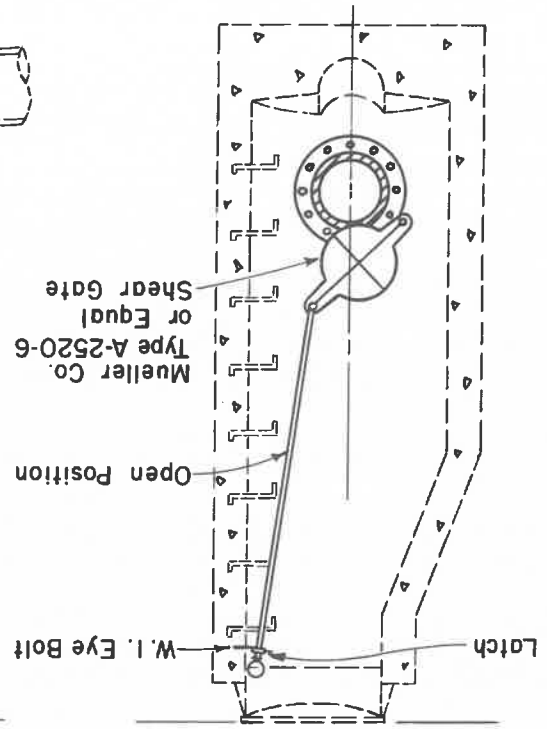
SEC. B-B



Drop connection to include additional excavation, also necessary pipe and concrete. All concrete to have 28 day strength of 3,000 P.S.I. 2" to 4" slump.

Gate Size	Dimension X
12"	4 1/2"
10"	3 3/4"
8"	3 1/4"
6"	2 3/4"

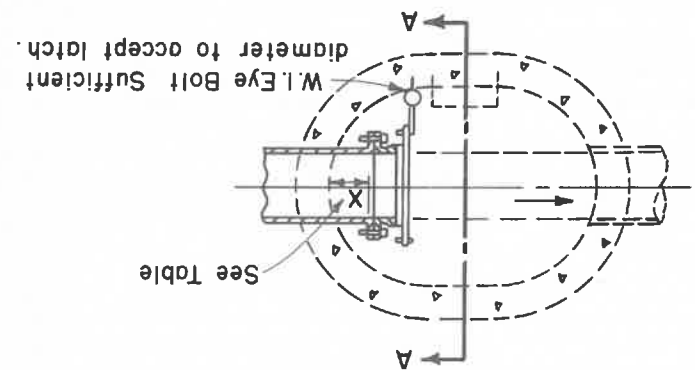
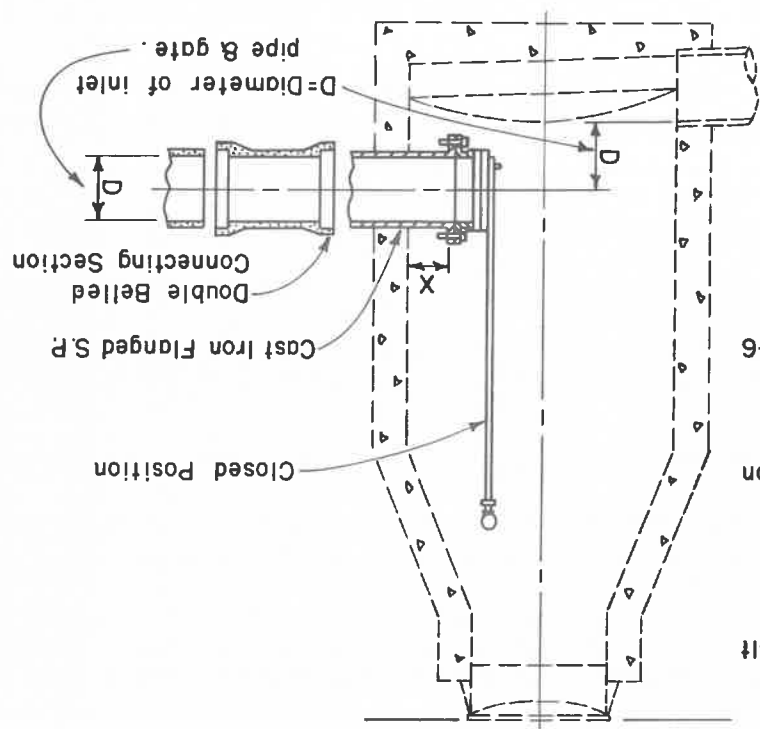
TABLE



See City of Portland Standard Drawing No. 205 or No. 206 for manhole step details.
 Manhole may be constructed at angle point in sewer by discharging either right or left and shaping channel accordingly.
 Manhole details shall conform to City of Portland Standard drawings No. 203 & No. 204.

SAMPLING MANHOLE

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES
 COMMISSIONER

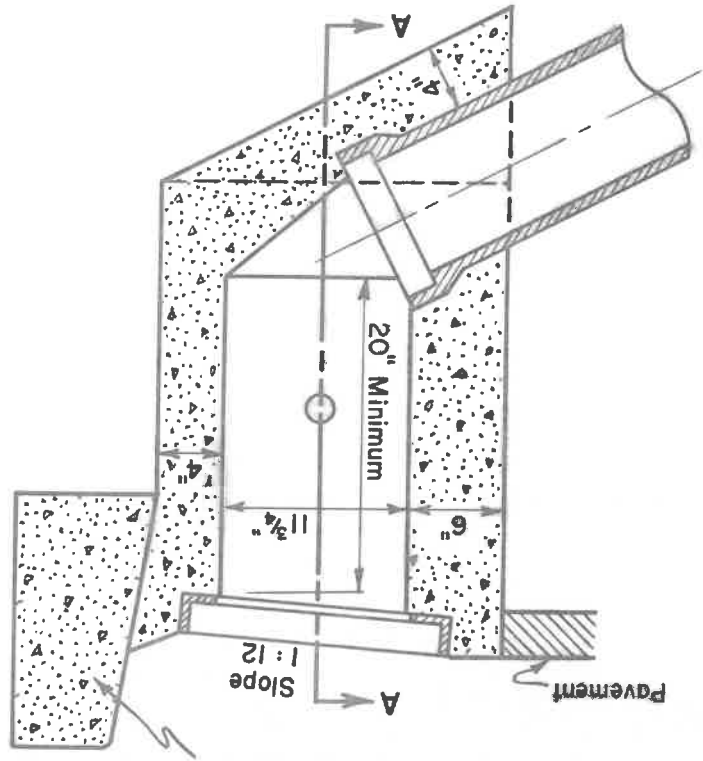


APPROVED *[Signature]*
 CITY ENGINEER
 DATE *10/65*

APPROVED
CITY ENGINEER
DATE *10/1/62*

STANDARD CONCRETE INLET

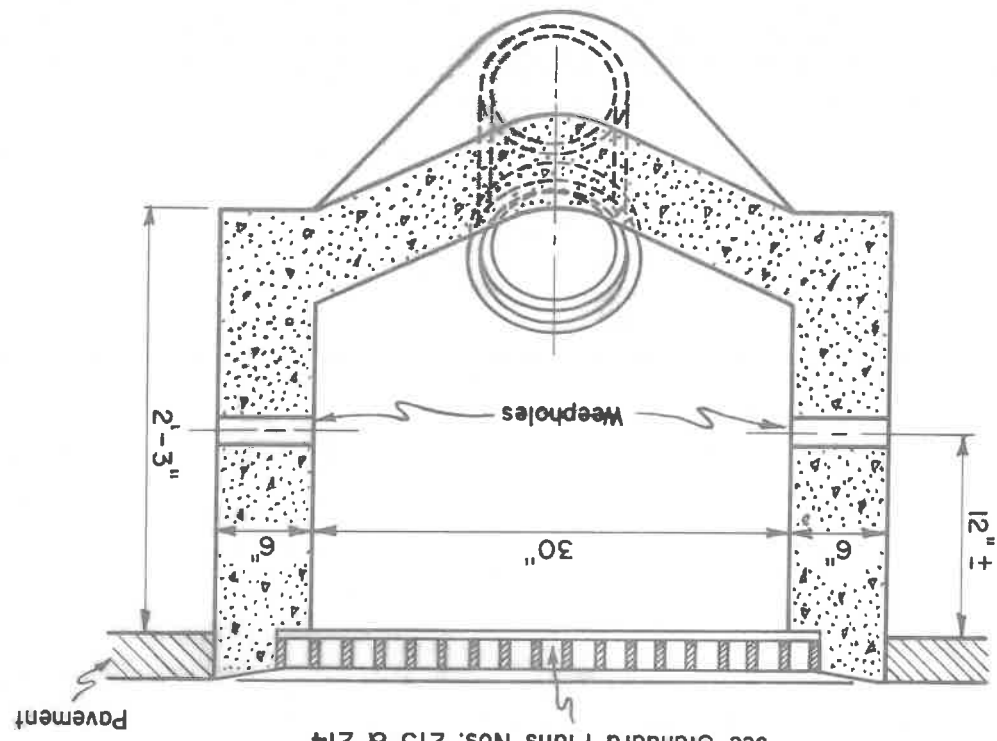
CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
W.M.A. BOWES
COMMISSIONER



For concrete curbs see Standard Plan No. III

Concrete to be 3000 lb., 3" to 5" slump, approx. 0.4 cu. yd.

SECTION A-A



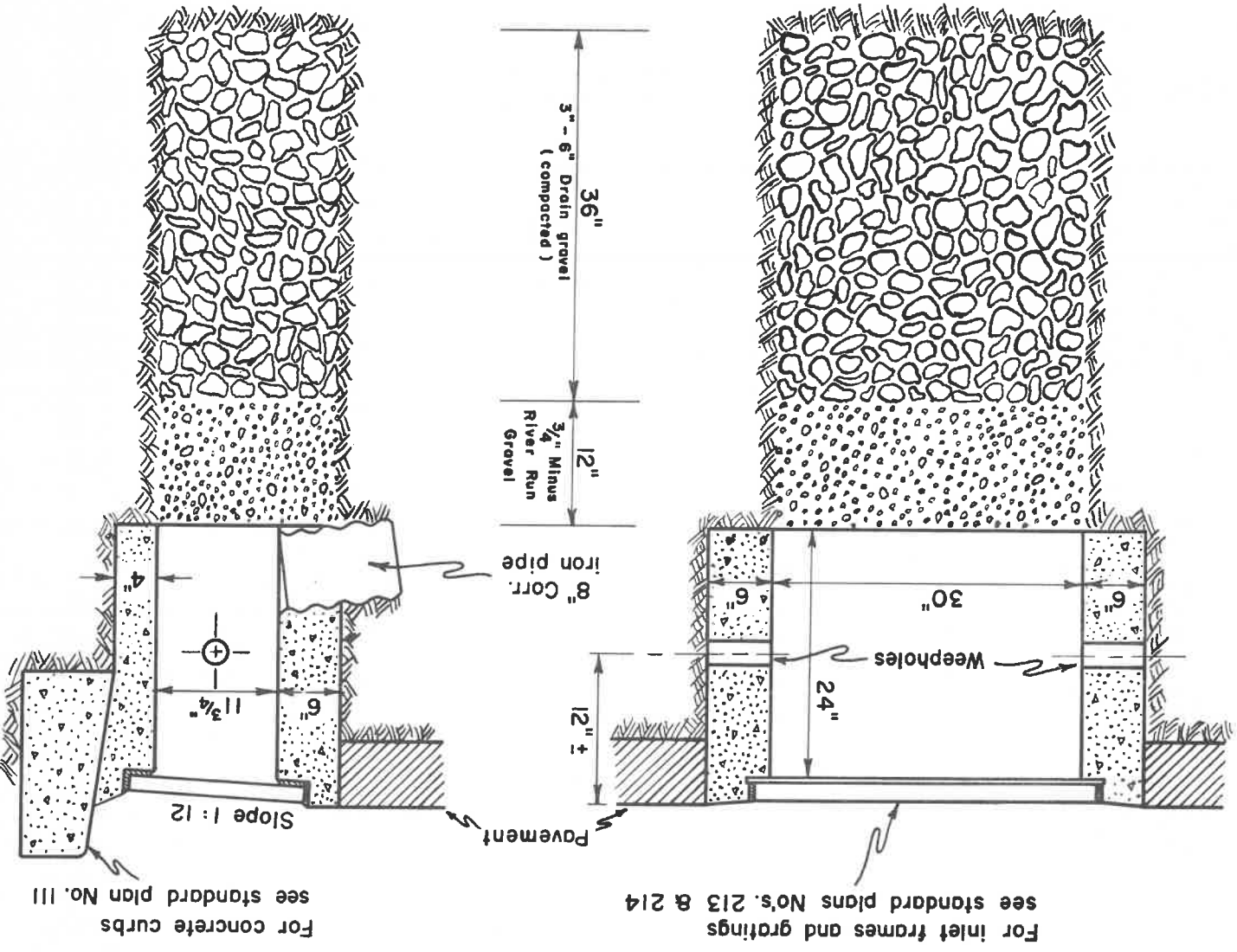
For inlet frames and gratings see Standard Plans Nos. 213 & 214

APPROVED _____
 CITY ENGINEER
 DATE _____
[Signature]

**BOTTOMLESS
 CATCH BASIN**

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES
 COMMISSIONER

APPROXIMATE QUANTITIES
 3000 P.S.I. 2" TO 4" SLUMP
 CONC. - 0.3 CU. YD.
 GRAVEL - 0.6 CU. YD.



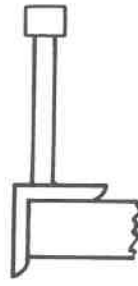
APPROVED: *[Signature]*
 CITY ENGINEER
 DATE: 11/3/65

STANDARD INLET FRAME
 WEIGHT - APPROX. 55 LBS.

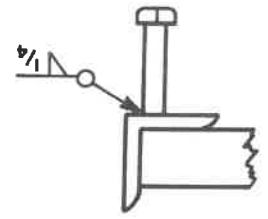
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 WM. A. BOWES
 COMMISSIONER

NOTE: MATERIAL TO BE NEW STRUCTURAL
 STEEL, ASTM A-7, A-36 OR A-373

1/2" x 5" Nelson
 Head Stud

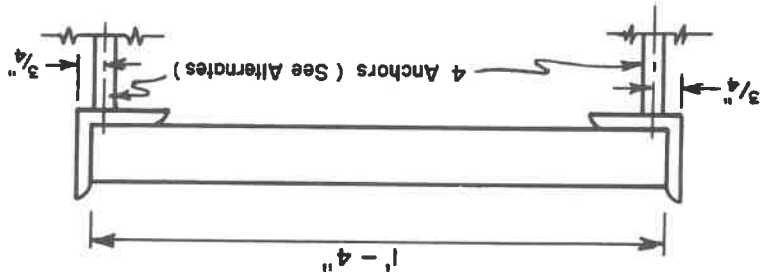


5/8" x 3" Bolt

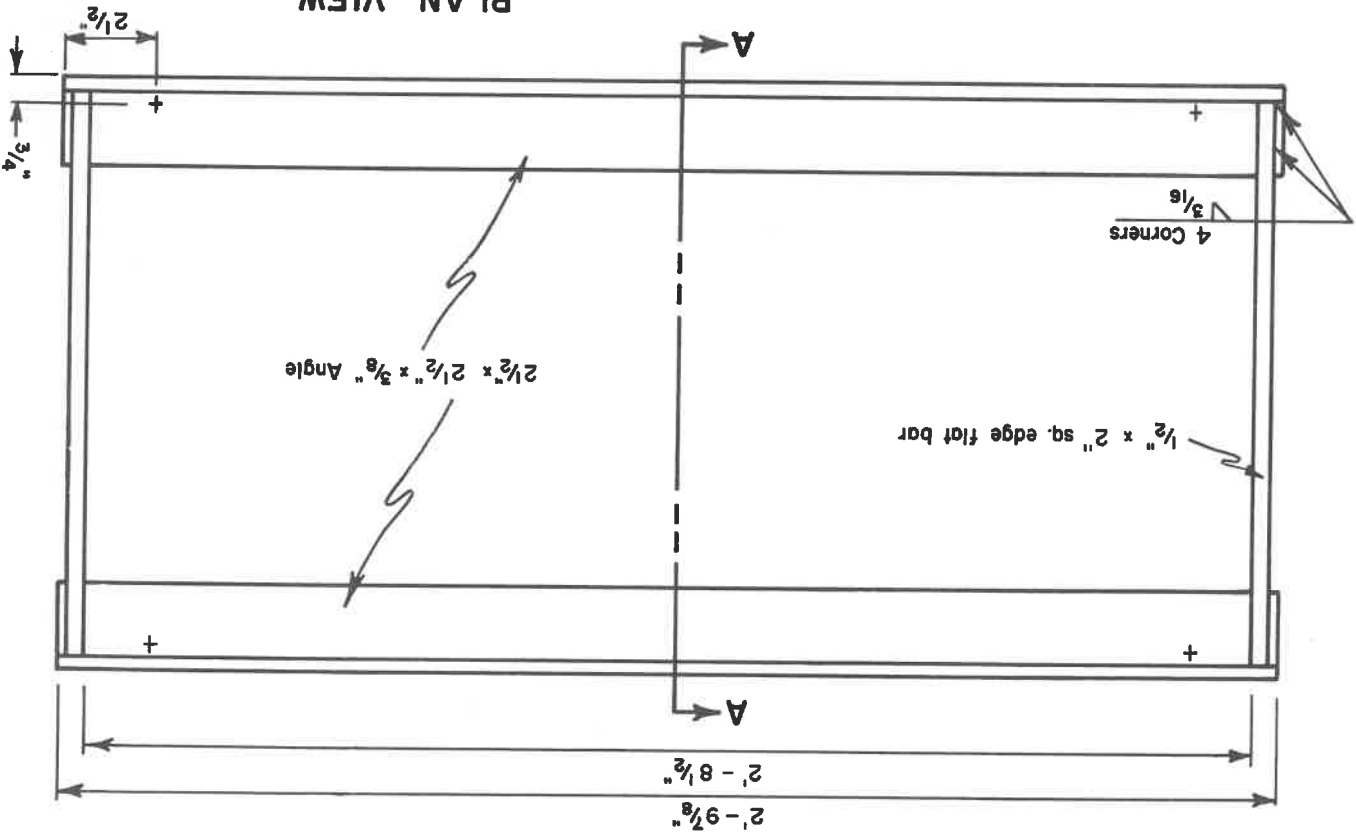


ALTERNATE ANCHORS

SECTION A-A



PLAN VIEW



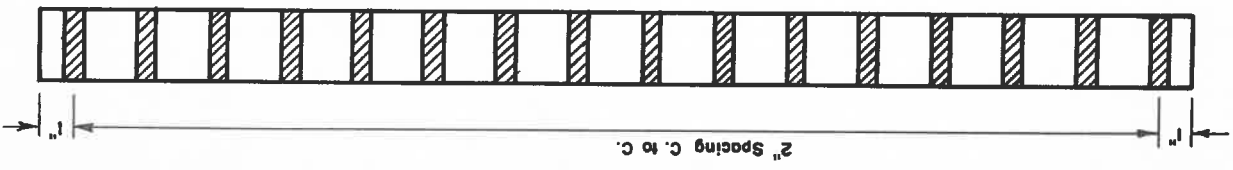
APPROVED _____
 CITY ENGINEER _____
 DATE _____
 BUREAU OF DESIGN
 STANDARD PLAN NO. 214
 OCT. 1962
 Rev. 3-30-65

STANDARD INLET GRATING
 WEIGHT - APPROX. 84 LBS.

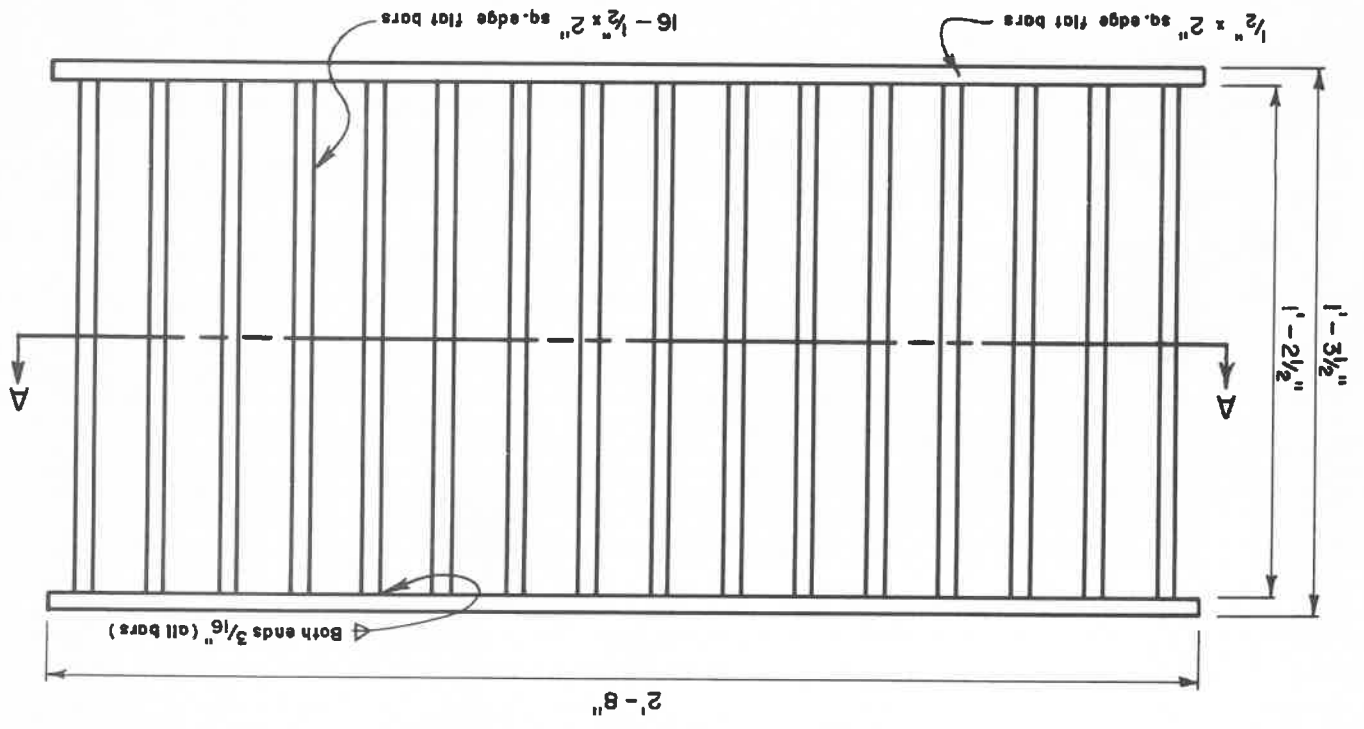
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES
 COMMISSIONER

MATERIAL TO BE NEW STRUCTURAL
 STEEL, A.S.T.M. A-7 OR A-373

SECTION A-A



PLAN VIEW

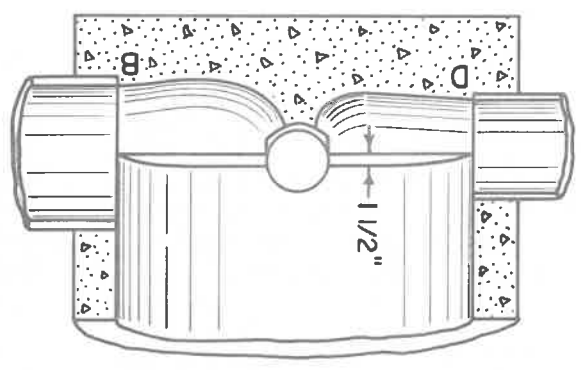


CITY ENGINEER
 APPROVED
 DATE 10/15/62

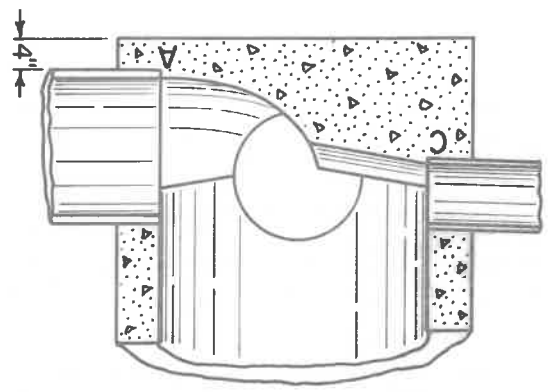
CHANGE IN DIRECTION
 OF MAIN SEWER

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 WM. A. BOWES
 COMMISSIONER

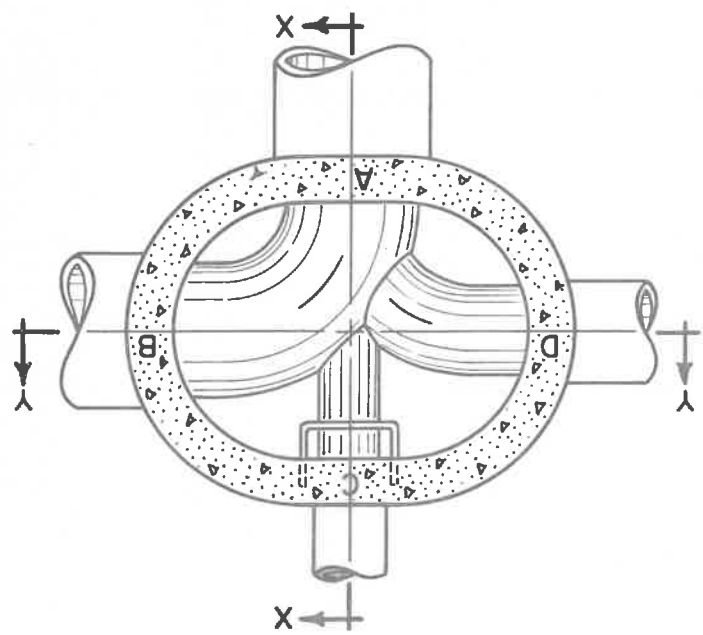
SECTION Y-Y



SECTION X-X



PLAN

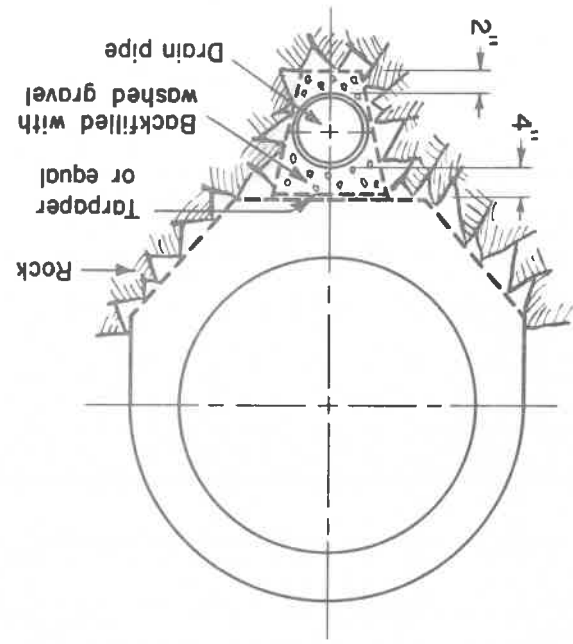


Note:
 Flow line at B, C, and D shall not be less than 4 inches higher than flow line at A.
 Top of pipe at B, C, and D shall not be lower than top of pipe at A.
 For change in direction of main sewers larger than 36 inches see plans for particular project.

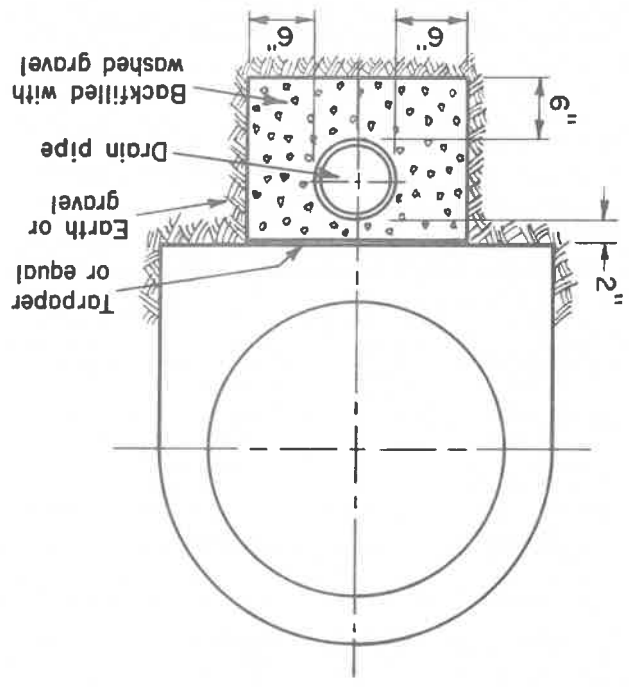
APPROVED *[Signature]* DATE *[Signature]* CITY ENGINEER

DRAIN PIPE FOR MONOLITHIC SEWERS

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES
 COMMISSIONER



WHEN SEWER IS IN ROCK FORMATION



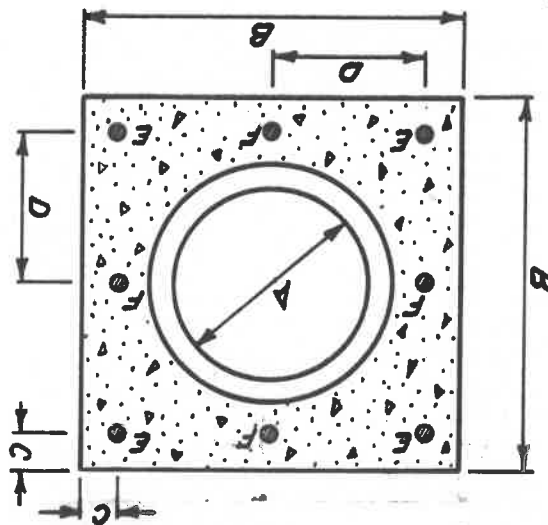
WHEN SEWER IS IN EARTH OR GRAVEL FORMATION

APPROVED: *[Signature]*
 CITY ENGINEER
 DATE: *[Signature]*

SEWER PIPE ENCASED IN CONCRETE

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W. M. A. BOWES
 COMMISSIONER

DIMENSIONS (INCHES)		BARS REQ'D.	C.Y. CONC. PER LIN. FT.	LBS. STEEL PER LIN. FT.	BELL & SPIGOT AND TONGUE & GROOVE			BELL & SPIGOT			TONGUE & GROOVE				
A	B				C	D	E	F	ST'D. STRENGTH	A	B	C	D	E	F	ST'D. STRENGTH
6	16	3 1/2	-	4.17	0.055	E		27	21	38	3 1/2	15 1/2	E, F	0.25	8.34
8	18	3 1/2	-	4.17	0.07	E		24	24	42	3 1/2	17 1/2	E, F	0.26	8.34
10	20	3 1/2	-	4.17	0.08	E		27	27	50	3 1/2	21 1/2	E, F	0.40	8.34
12	22 1/2	3 1/2	-	4.17	0.09	E		21	21	36	3 1/2	14 1/2	E, F	0.19	8.34
15	26	3 1/2	-	4.17	0.10	E		24	24	42	3 1/2	17 1/2	E, F	0.25	8.34
18	30	3 1/2	-	4.17	0.14	E		27	27	50	3 1/2	21 1/2	E, F	0.40	8.34
24	41	3 1/2	-	8.34	0.25	E, F		24	24	41	3 1/2	17 1/2	E, F	0.25	8.34
27	46	3 1/2	-	8.34	0.32	E, F		27	27	46	3 1/2	19 1/2	E, F	0.32	8.34



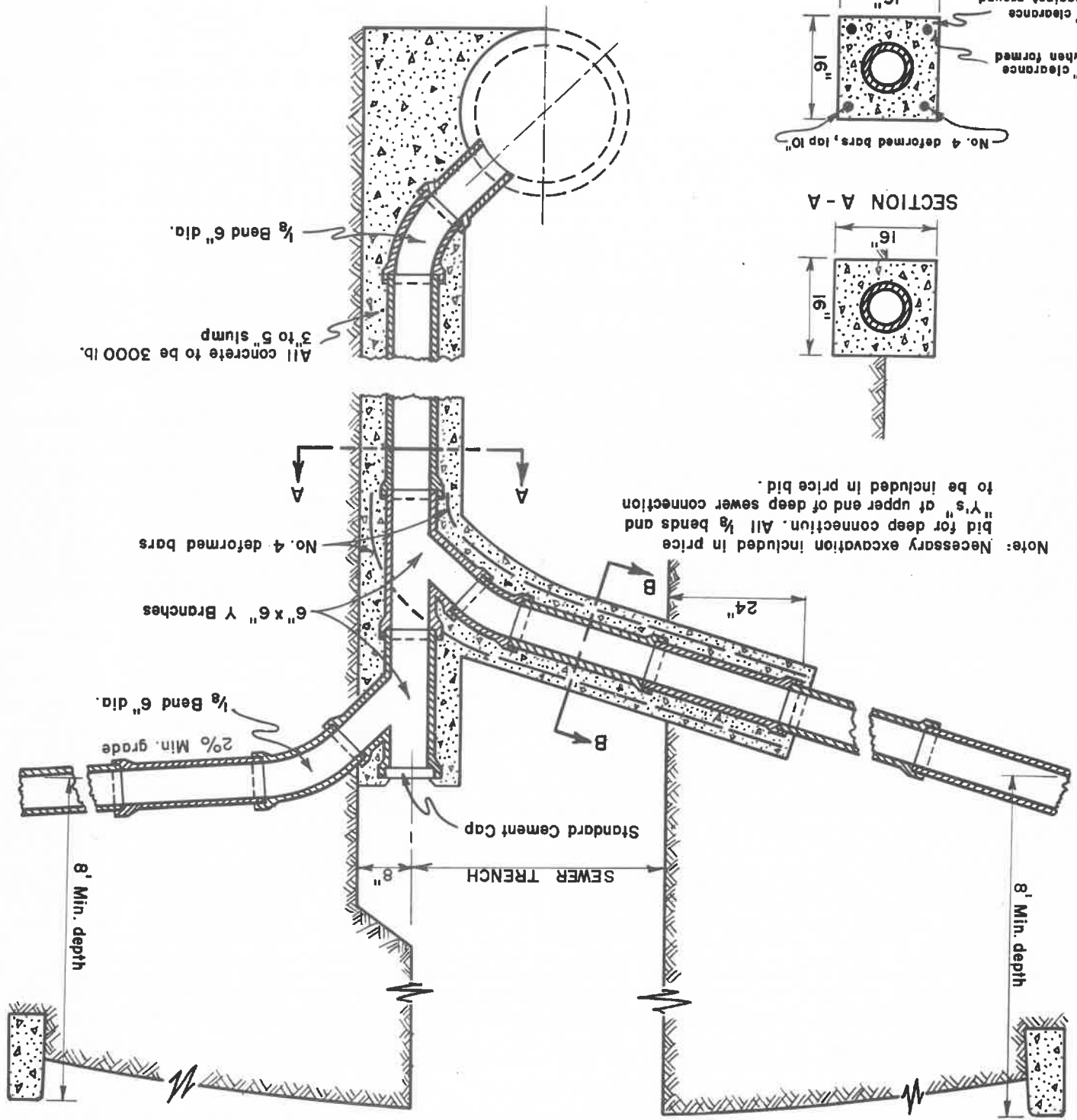
Note:
 Concrete shall be 3000# 3 to 5"
 slump.
 All reinforcing steel shall be
 No. 5 Deformed Bars with 18" lap
 splices and 2" clear cover.

9/29/65

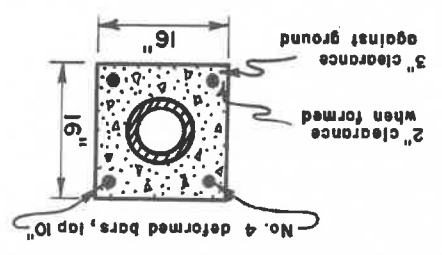
APPROVED

HOUSE BRANCHES TO DEEP SEWERS

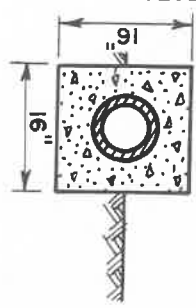
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 WM. A. BOWES
 COMMISSIONER



SECTION B-B



SECTION A-A



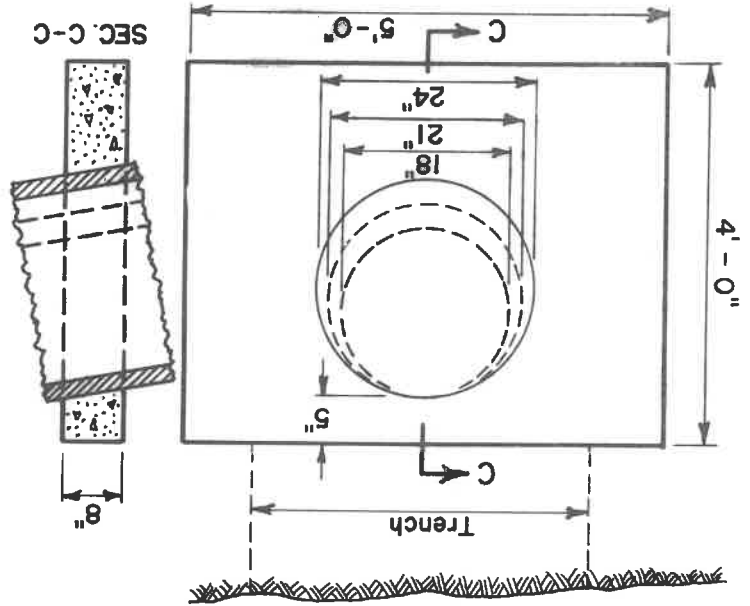
Note: Necessary excavation included in price bid for deep connection. All 1/8 bends and 'Y's' at upper end of deep sewer connection to be included in price bid.

All concrete to be 3000 lb. 3" to 5" slump
 1/8 Bend 6" dia.

STANDARD PLAN
FOR
ANCHOR WALLS

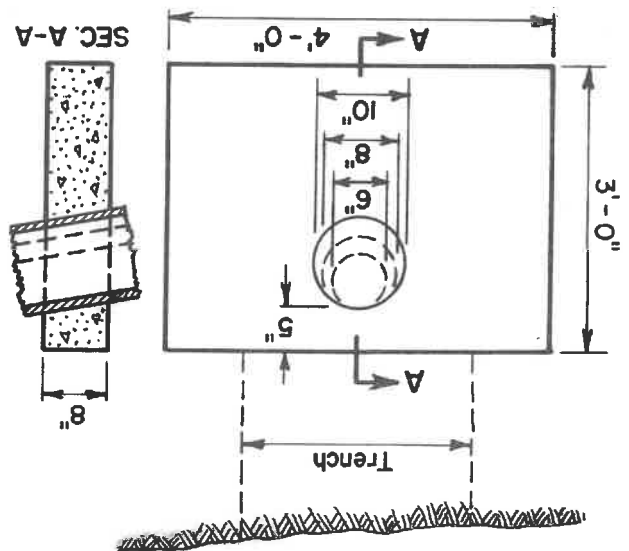
CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
W.M. A. BOWES
COMMISSIONER

FOR 18", 21" & 24" SEWER PIPE
0.42 Cu. Yd. Concrete Each

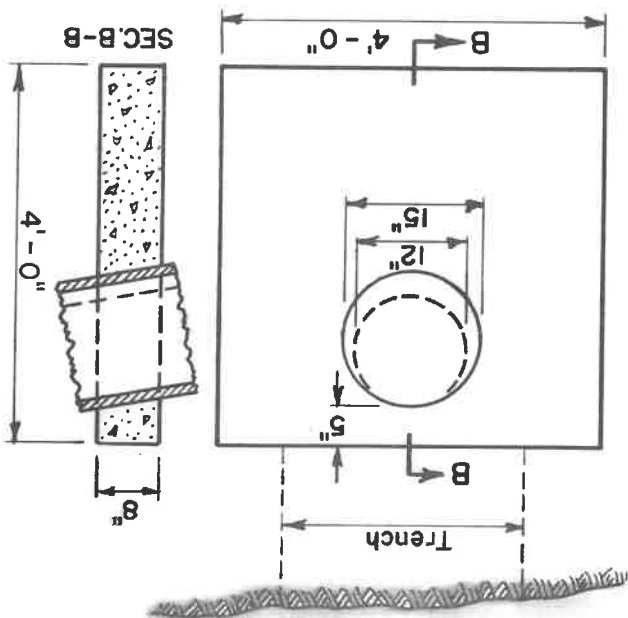


Note
All concrete to be 3000 lbs., 2" to 4" slump.
Walls to be placed where grade is 18% or over.
Space between walls to be 2' on slope measurement.
Place wall immediately below bell of pipe where possible.

FOR 6", 8" & 10" SEWER PIPE
0.29 Cu. Yd. Concrete Each



FOR 12" & 15" SEWER PIPE
0.37 Cu. Yd. Concrete Each

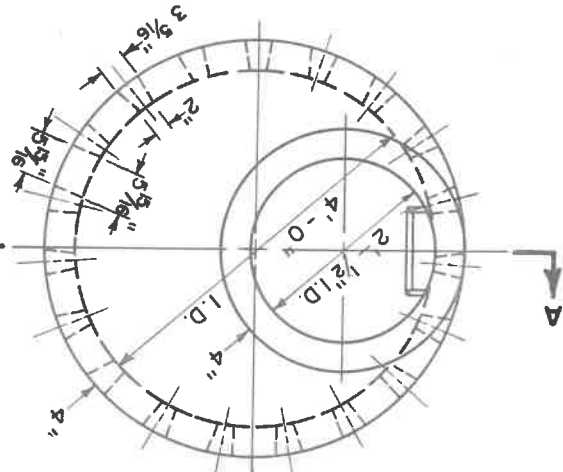
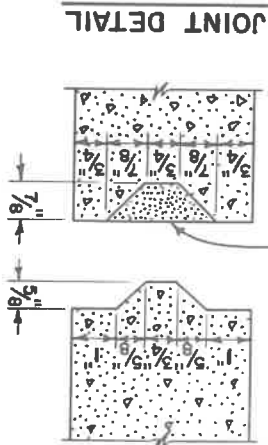
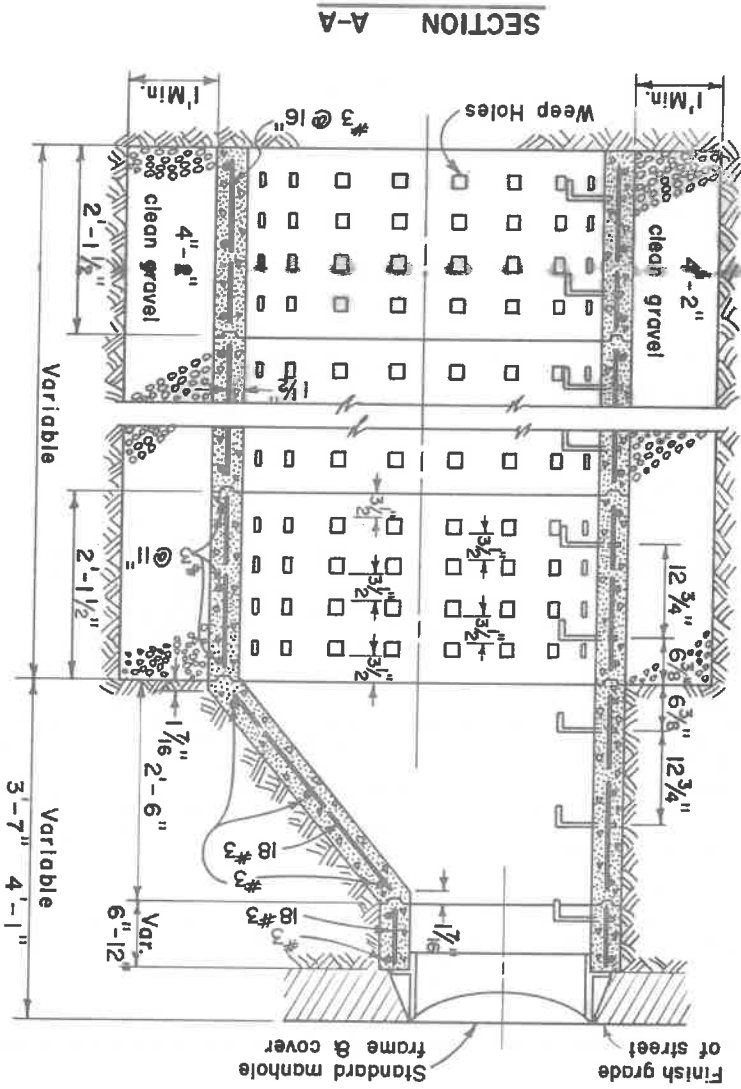


APPROVED _____
 CITY ENGINEER _____
 DATE 10/9/62

STANDARD PRECAST
 SUMP

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 WM. A. BOWES
 COMMISSIONER

Notes:
 76 weep holes per ring; 304
 sq. in. weep inside, 506 sq. in.
 weep outside.
 Use 2000 lb. compressive
 strength concrete.
 See City of Portland Standard
 No. 206 for manhole step details.

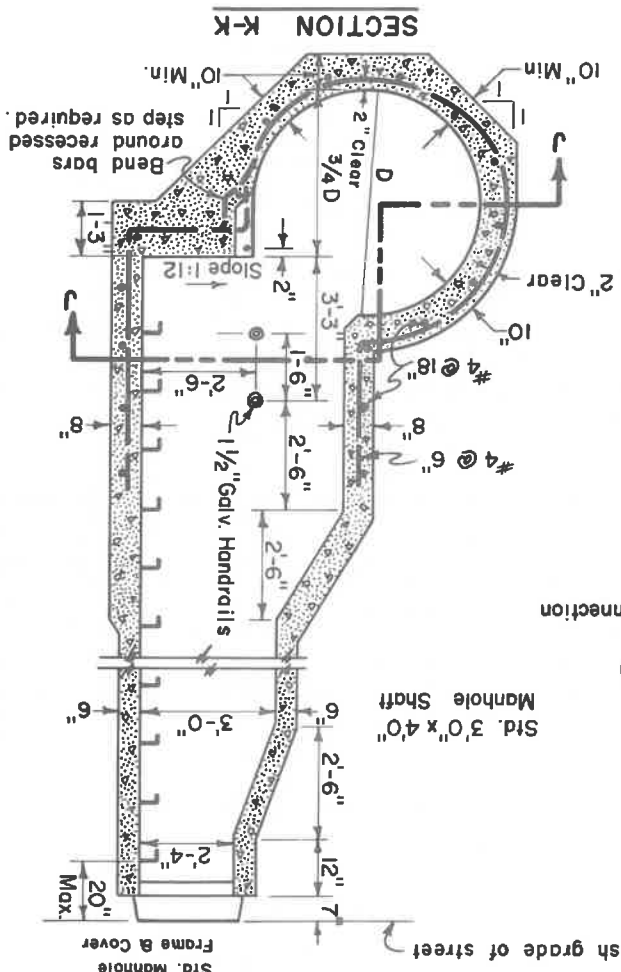


CITY ENGINEER DATE

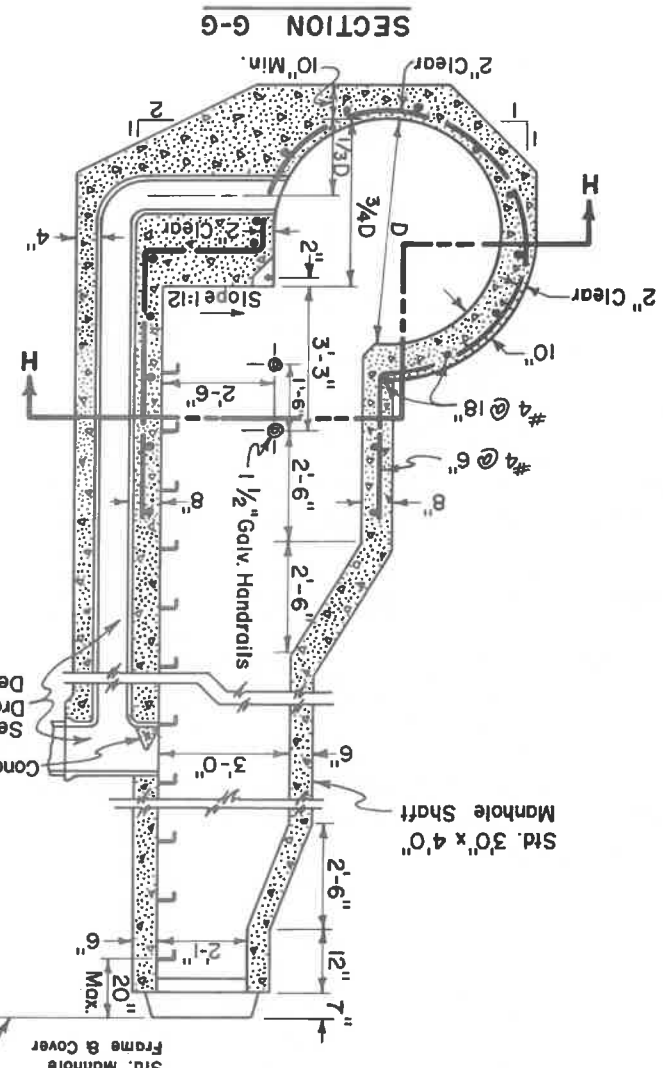
APPROVED

OFFSET MANHOLE DETAILS

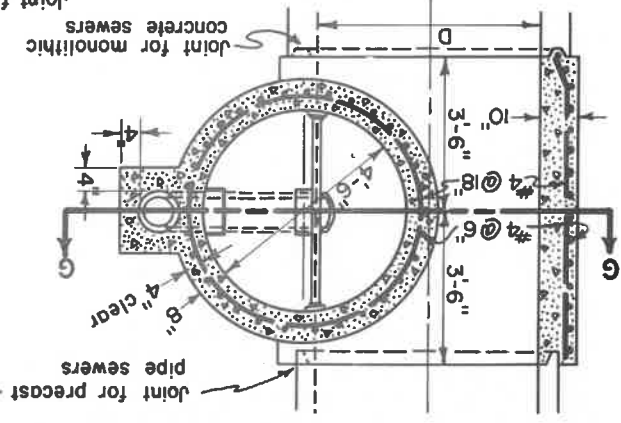
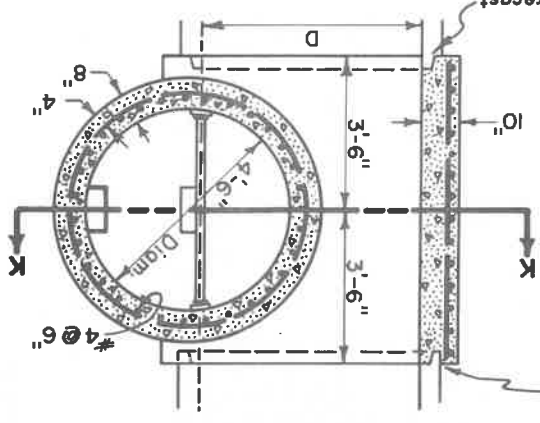
CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W. M. A. BOWES
 COMMISSIONER



SECTION K-K
 PLAN



SECTION G-G
 PLAN



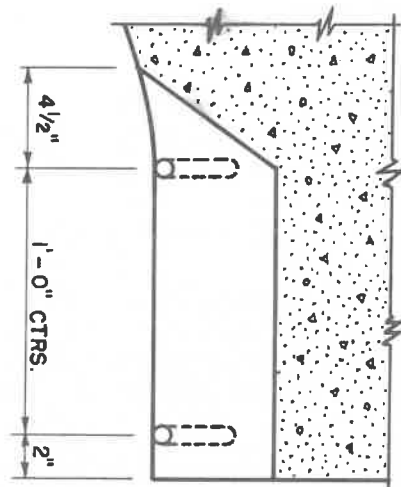
Note:
 See City of Portland Standard No. 205 & No. 222 for manhole step details.
 D = diameter of main sewer outlet
 Concrete shall be 3000 #,
 2" to 4" slump.

APPROVED *[Signature]* DATE *[Signature]*
 CITY ENGINEER

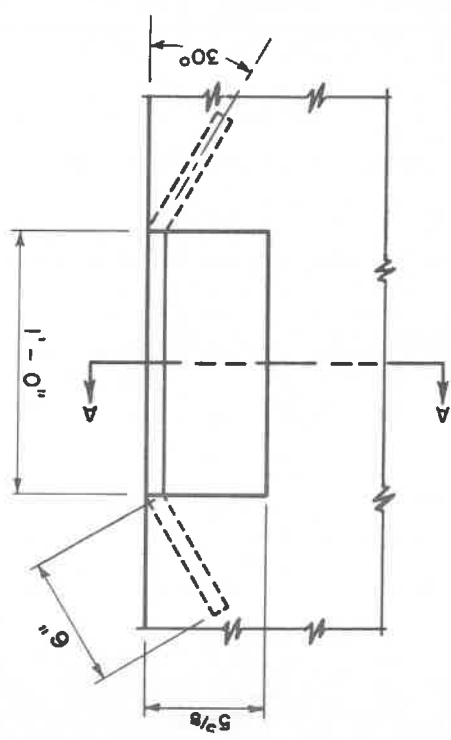
**RECESSED STEP
 FOR
 OFFSET MANHOLES**

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES
 COMMISSIONER

SECTION A-A



PLAN



NOTE: For sewers larger than 60" and less than 90" a third step will be required. For sewers 90" or larger a fourth step will be required.

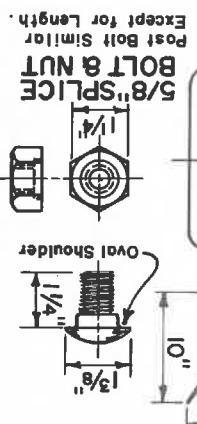
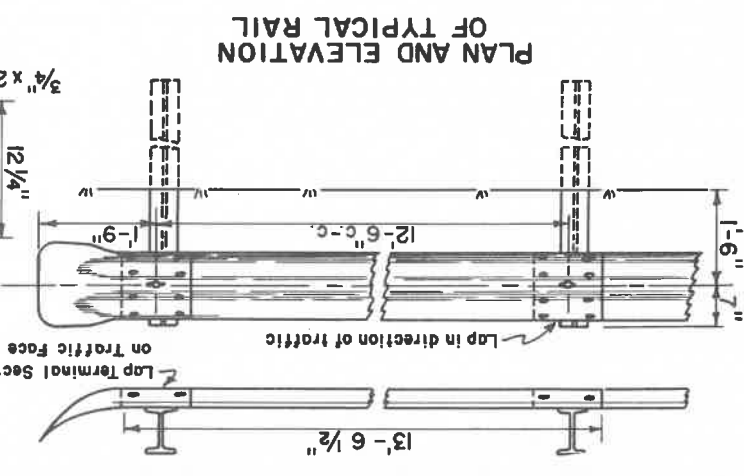
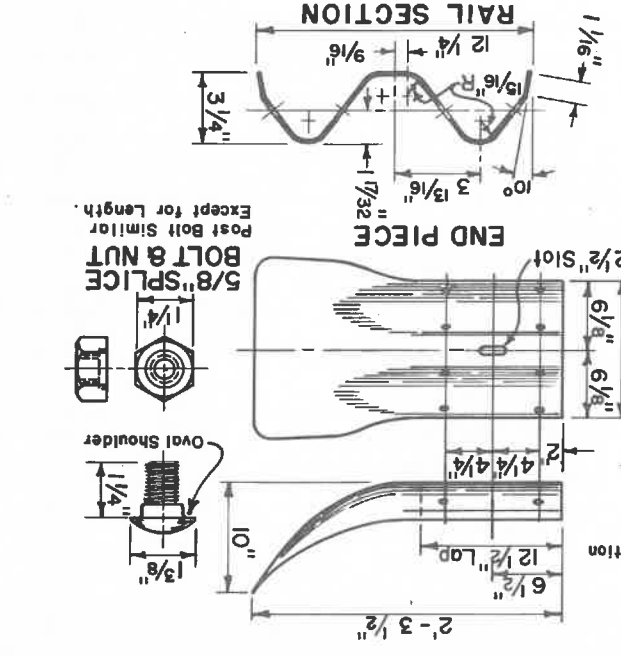
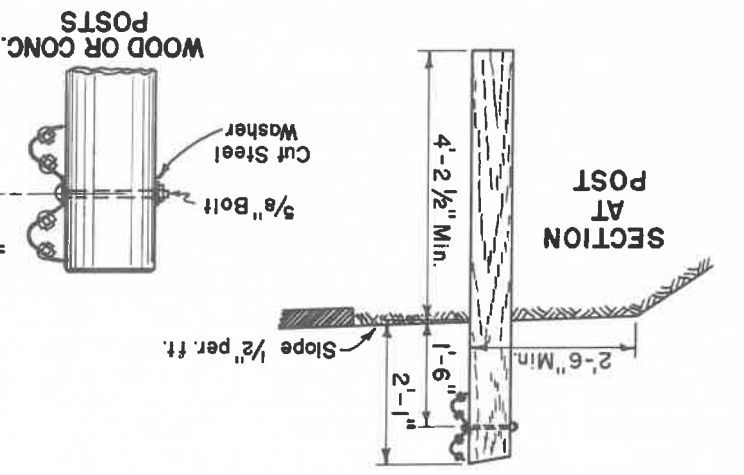
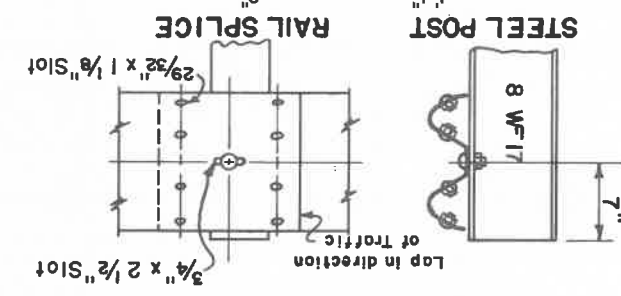
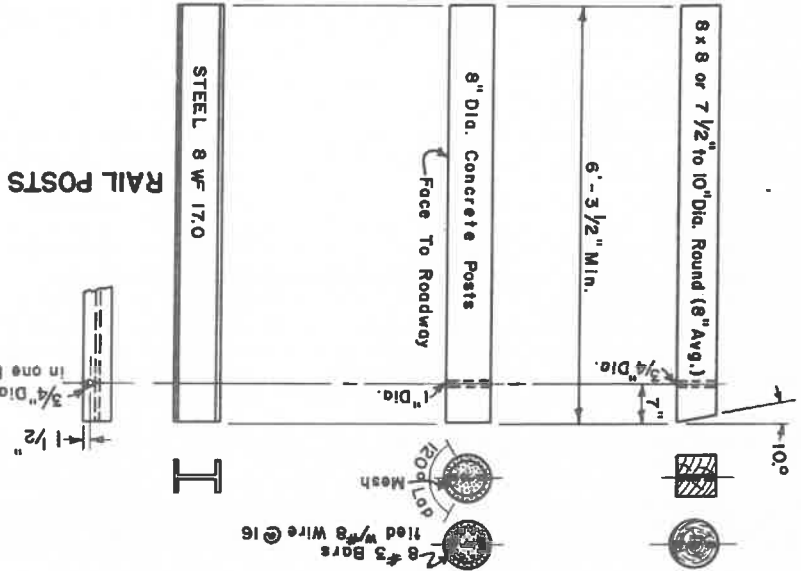
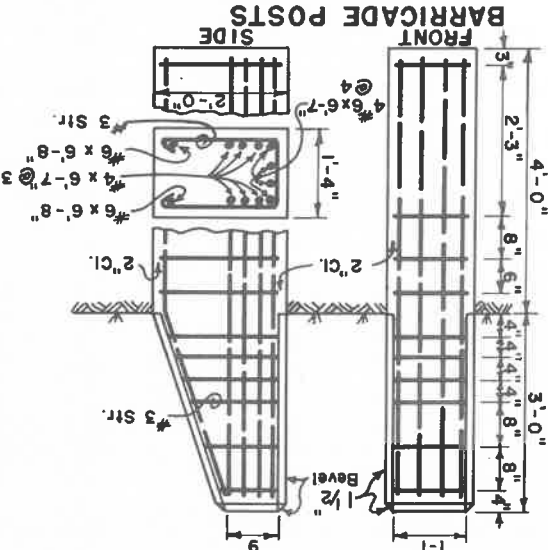
MATERIAL: 3/4" Genuine W.I. A.S.T.M. A-207
 No coating or plating allowed.

APPROVED *[Signature]* CITY ENGINEER
 DATE *[Signature]*

STANDARD GUARDRAIL POSTS AND RAILING

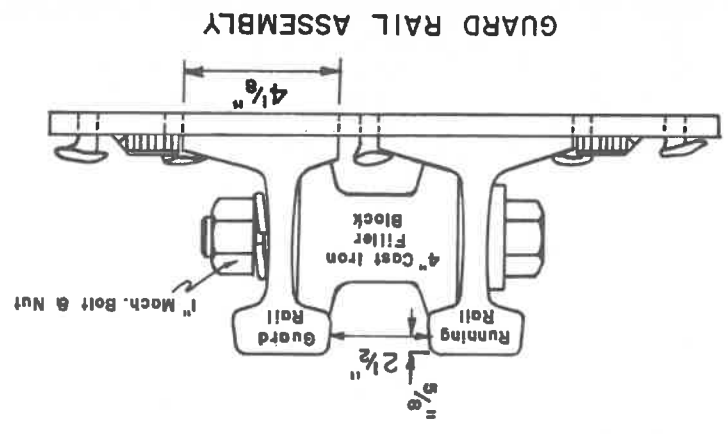
W.M.A. BOWES
 COMMISSIONER
 DEPARTMENT OF PUBLIC WORKS
 CITY OF PORTLAND, OREGON

Wood Posts to be pressure-treated with Creosote or 50% Creosote-oil Solution to retention of 8 to 10 lbs. per cu. ft. in accordance with A.W.P.A. Specification C-14. Concrete posts with wire mesh fabric shall have a minimum of 13 longitudinal wires on 2" centers. Minimum total sectional area of steel 0.75 sq. in. Posts with reinforcing bars shall have 8 No. 3 bars equally spaced & tied with No. 8 wire at 16" centers. All materials and methods shall conform to "General Construction Details" section of the City of Portland, Dept. of Public Works Specifications as presently applicable.



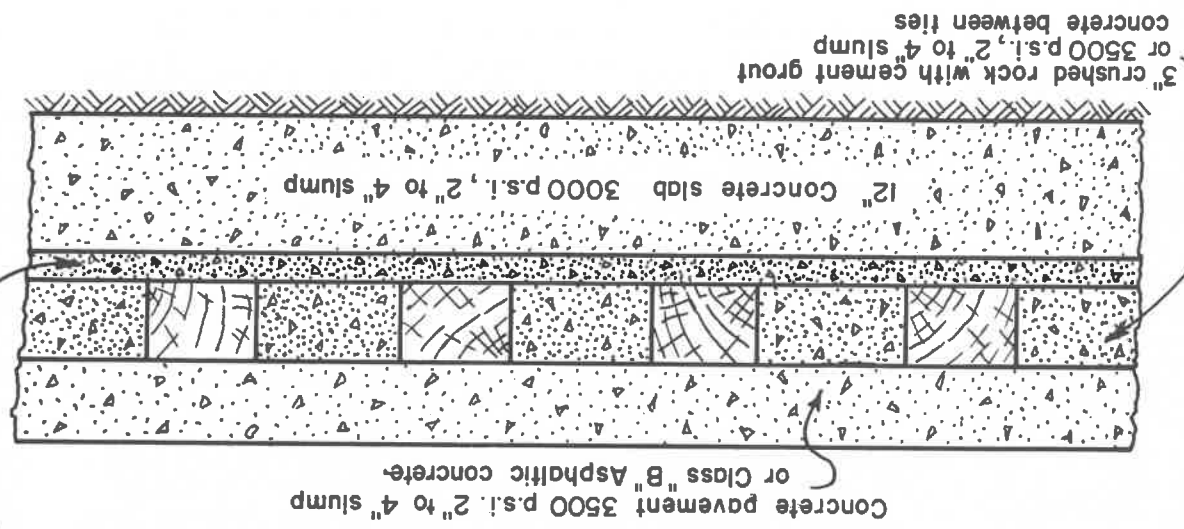
APPROVED *[Signature]* CITY ENGINEER
 DATE *[Signature]*

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M. A. BOWES
 COMMISSIONER
R. R. TRACK CROSSING
 (ALTERNATE NO. 1)

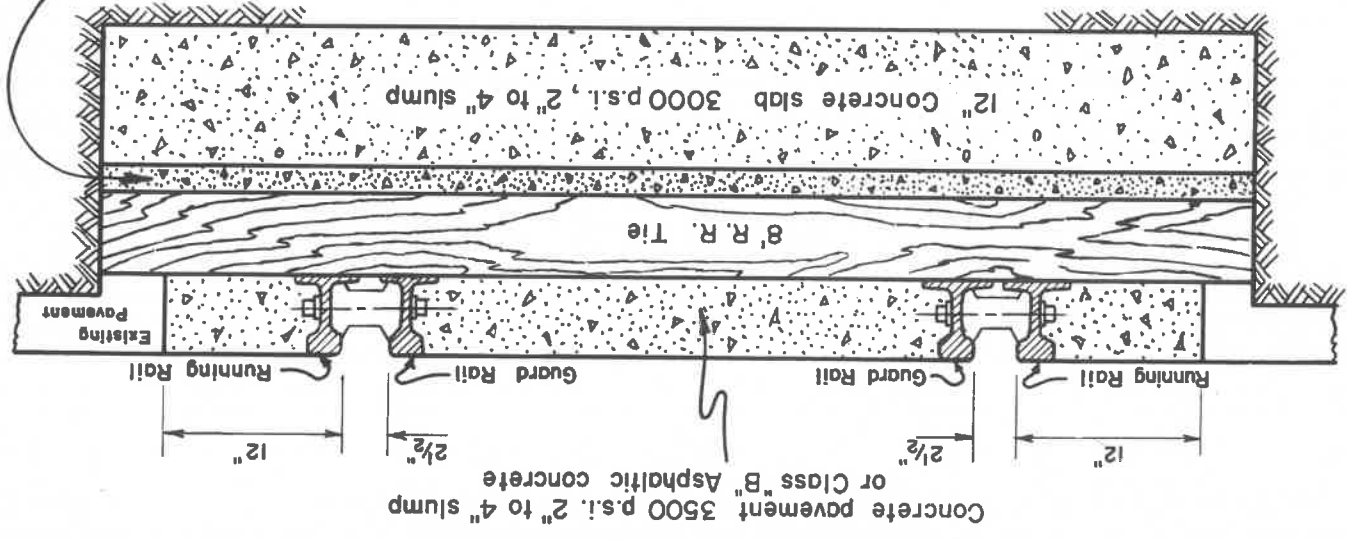


No wood shall be used for guard rails, and Hi-Early cement shall be used if directed by the City Engineer. Groat subgrade when unstable.

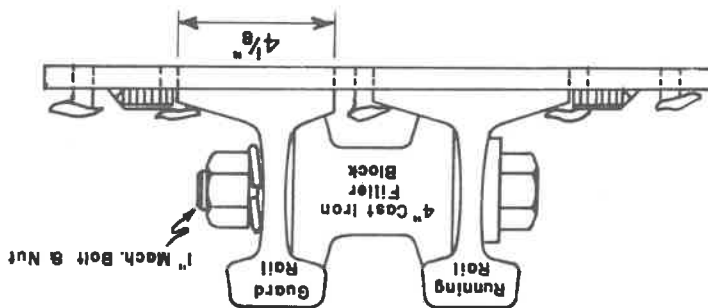
LONGITUDINAL SECTION



CROSS SECTION



GUARD RAIL ASSEMBLY



REV. 2-28-69
OCT., 1962
STANDARD PLAN NO
303

BUREAU OF DESIGN
CITY ENGINEER
DATE
APPROVED

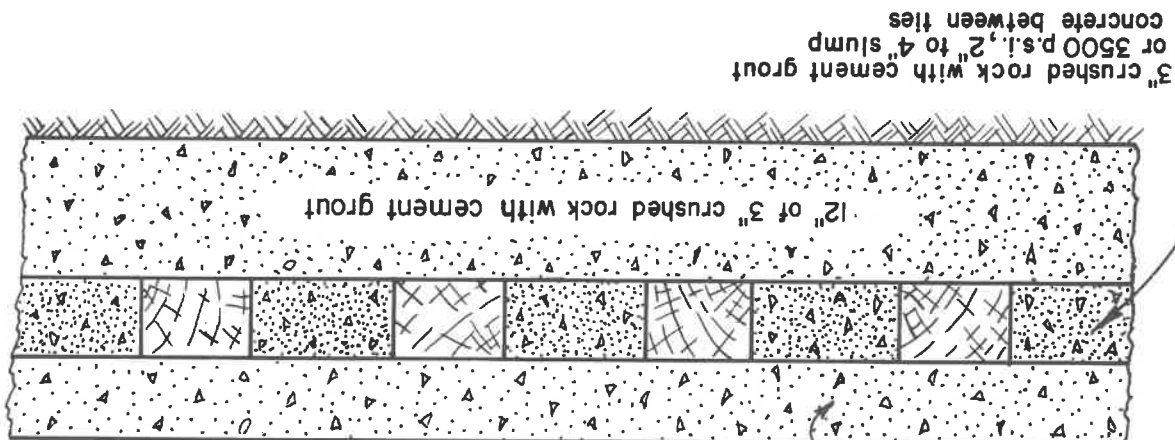
SUGGESTED
R.R. TRACK CROSSING
(ALTERNATE NO. 2)

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WM. A. BOWES
COMMISSIONER

* Unless approved by the City Engineer

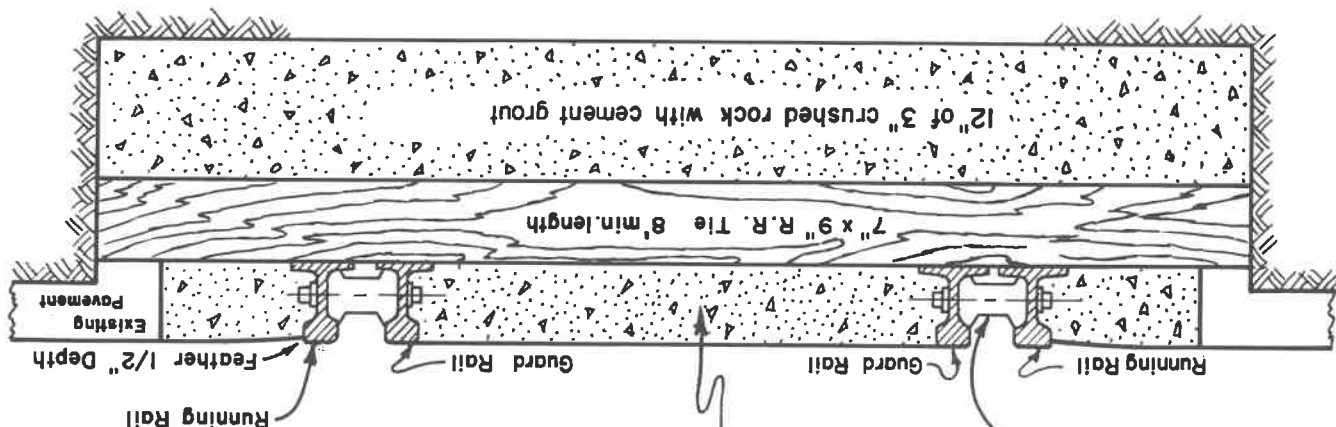
No wood shall be used for guard rails, and Hi-Early cement shall be used if directed by the City Engineer. Groat subgrade when unstable.

LONGITUDINAL SECTION



Concrete pavement 3500 p.s.i., 2" to 4" slump or Class "B" Asphaltic concrete

CROSS SECTION



Concrete pavement 3500 p.s.i., 2" to 4" slump or Class "B" Asphaltic concrete
Guard Rail fastening as approved by the City Engineer

CITY ENGINEER APPROVED DATE 5/1/64

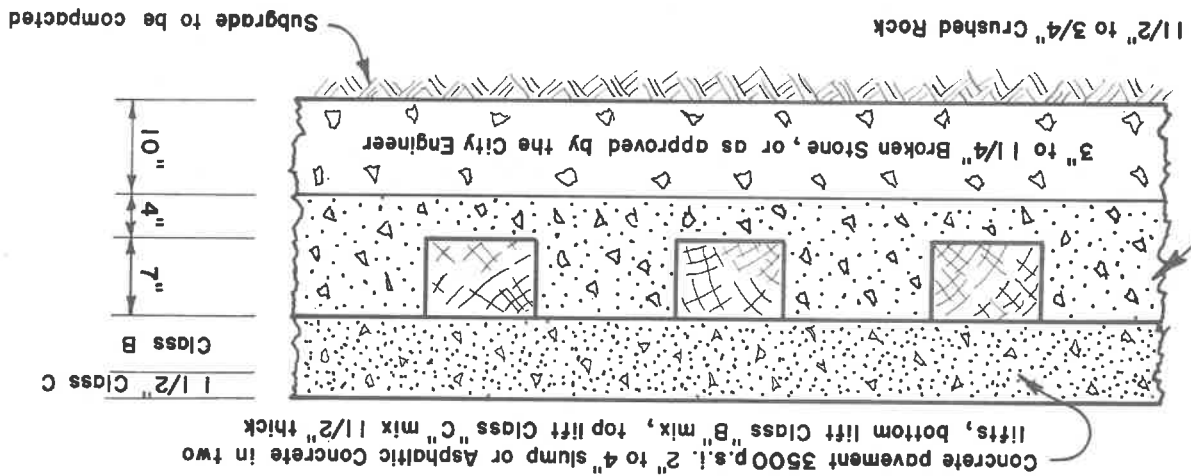
**SUGGESTED
R.R. TRACK CROSSING
(ALTERNATE NO. 3)**

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WM. A. BOWES
COMMISSIONER

* or other approved alternates
trackage when approved by the City Engineer.
required on crossings but may be eliminated on other
plate, asphaltic pad may be used. Guard rails are
Engineer. Rails and guard rails to be set on steel tie
for pavement and guard rails when approved by the City
top of tie. Gumwood plank panels may be substituted
concrete pavement for full depth of running rail or to
Class "B" to top of tie, or 3500 p.s.i., 2" to 4" slump
Class "C" asphaltic concrete wearing course, balance of
a manner as approved by the City Engineer. 1 1/2" of
Guard rails will be required and shall be fastened in
shall be either planked or cold mix.

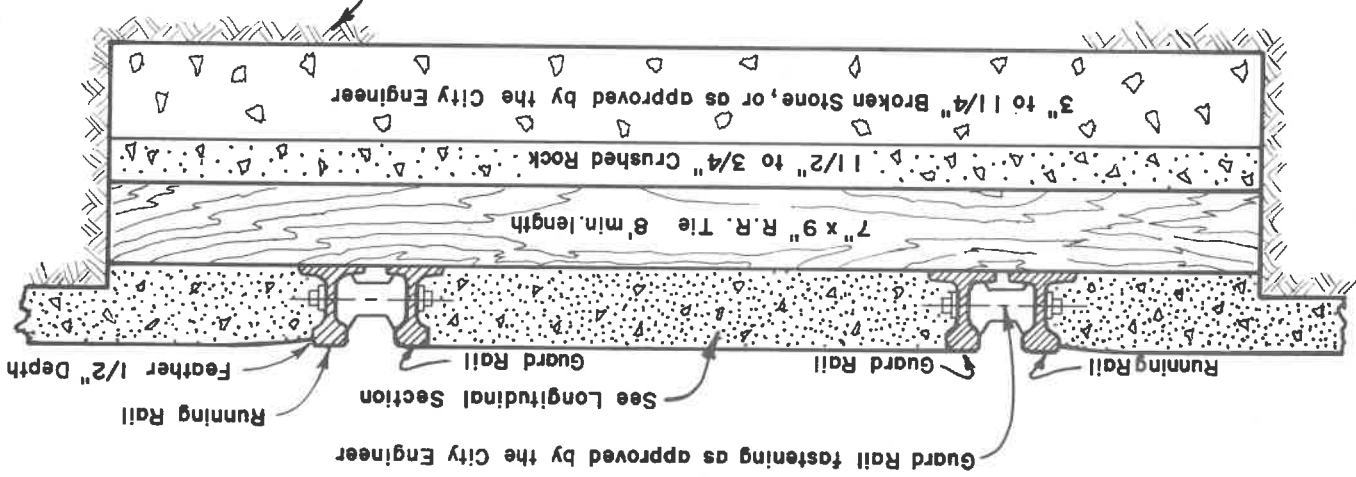
final mechanical tamping, then pave. Temporary crossing
shall be allowed to cross area at least two days before
welded joints or one piece rail, across the roadway. Traffic
Rock ballast. All ballast to be tamped, by mechanical means, a minimum of two times. 7" of
1 1/2" to 3/4" Crushed Rock ballast to be placed between ties, with continuous rails, either
Subgrade to be compacted by rolling, tamping or vibrating, and with the addition of water if
needed, 10" of 3" to 1 1/4" Broken Stone ballast, on subgrade. Topped by 4" of 1 1/2" to 3/4" Crushed

LONGITUDINAL SECTION



Concrete pavement 3500 p.s.i., 2" to 4" slump or Asphaltic Concrete in two lifts, bottom lift Class "B" mix, top lift Class "C" mix 1 1/2" thick

CROSS SECTION



BUREAU OF DESIGN

CITY ENGINEER

DATE

APPROVED

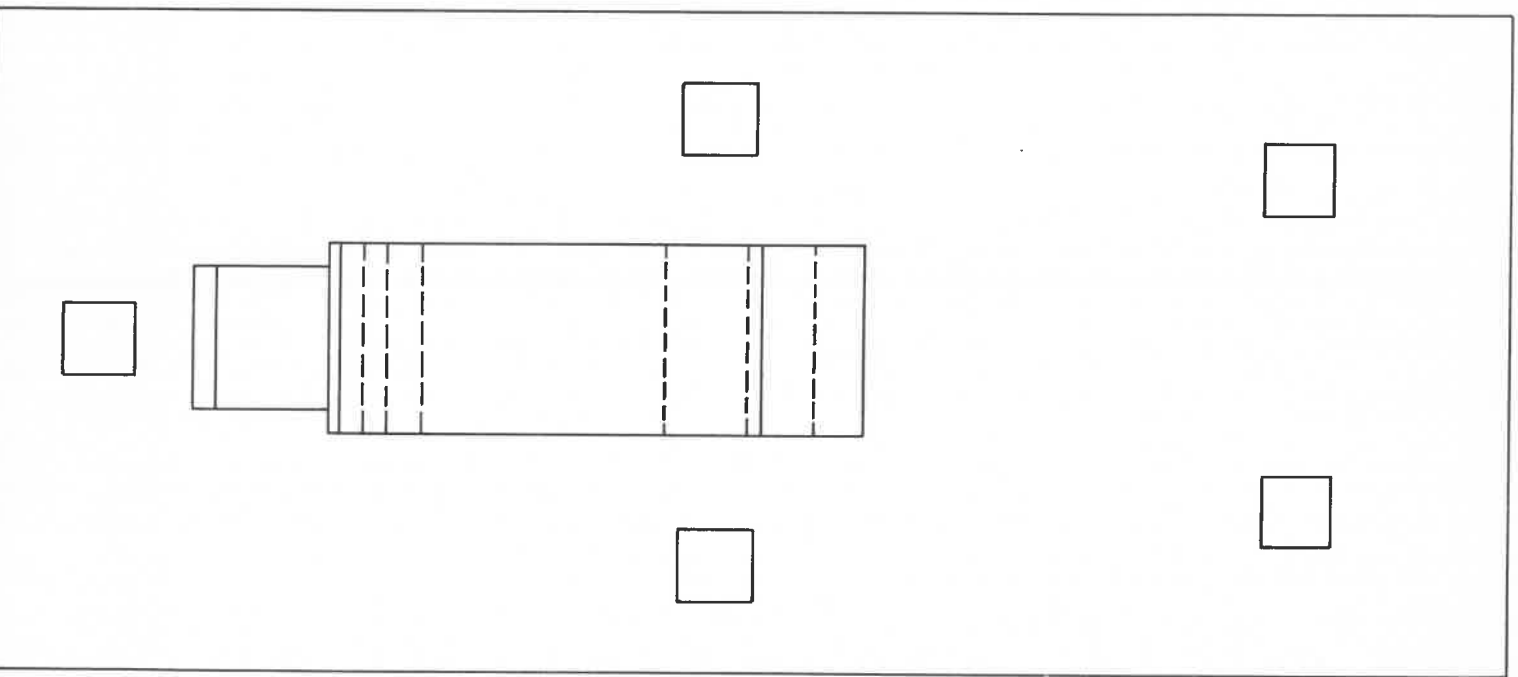
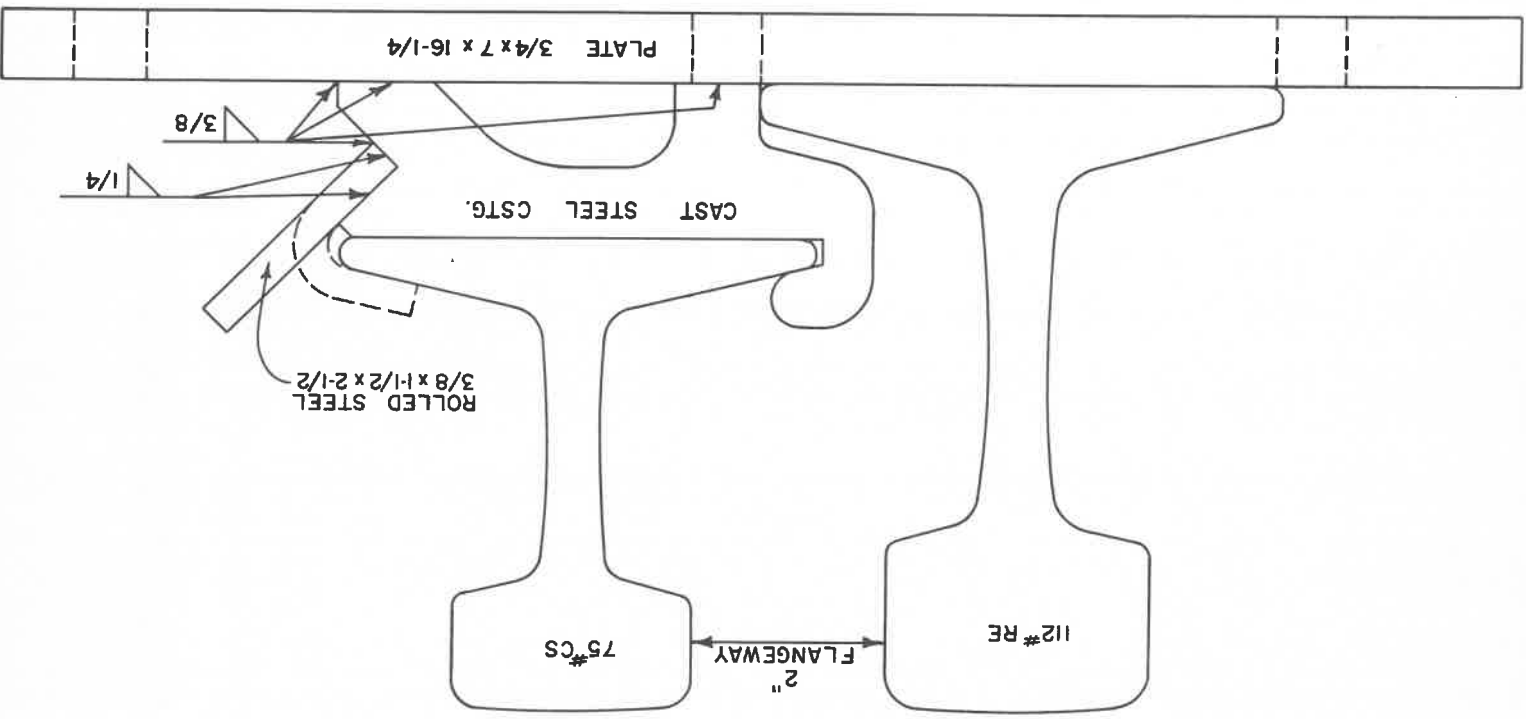
[Handwritten signatures and dates]

ASSEMBLY

OPTIONAL GUARD RAIL

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
W.M.A. BOWES
COMMISSIONER

NOTE:
MAY BE USED WITH
STANDARD PLAN NO. 302 or 303

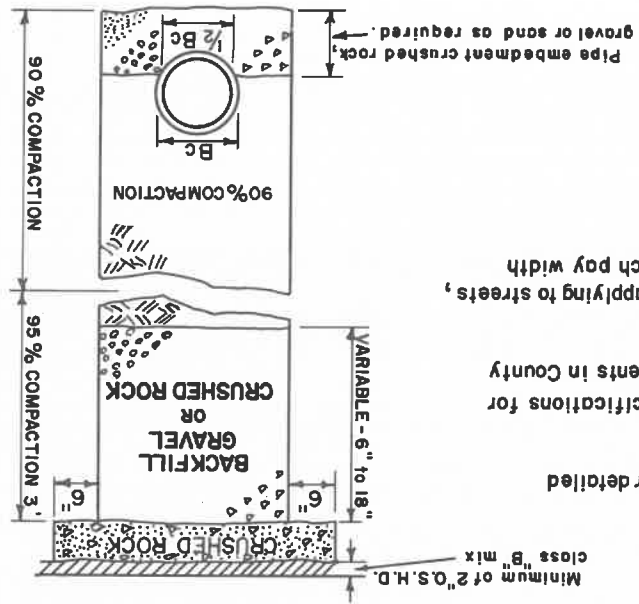


CITY ENGINEER
DATE *10/1/65*
APPROVED *[Signature]*

TYPICAL TRENCH SECTIONS
& SURFACING
BACKFILL, BEDDING

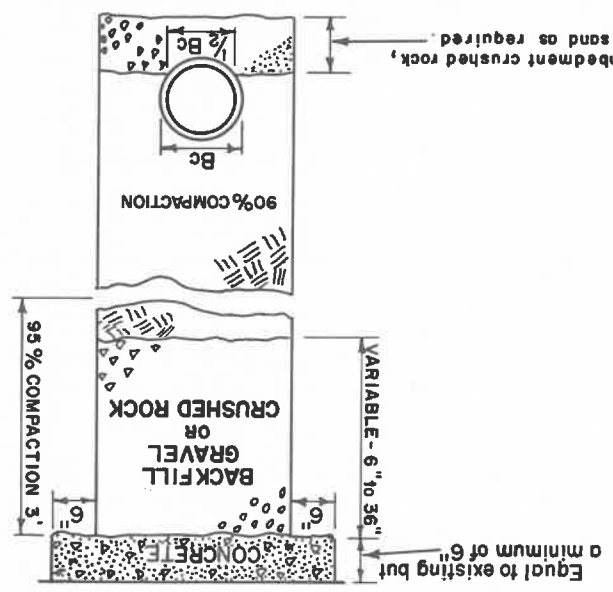
CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WM. A. BOWES
COMMISSIONER

OIL GRAVEL OR ASPHALTIC
CONCRETE SURFACE

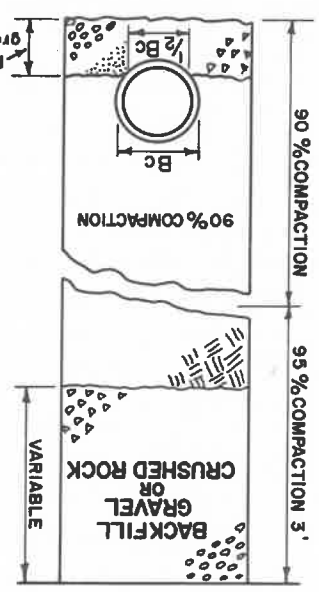


- NOTES
- 1 - Refer to preliminary estimate sheet for detailed allowances of quantities.
 - 2 - See Multnomah County Special specifications for trench backfill and surfacing requirements in County Roads.
 - 3 - See City of Portland specifications applying to streets, sewers, bridges and structures for trench pay width and surfacing pay width.

HARD SURFACE (CONCRETE)



TRAVELED UNIMPROVED STREET



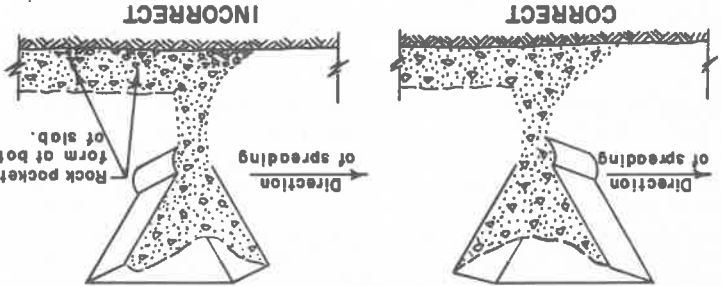
APPROVED *[Signature]* DATE *[Signature]* CITY ENGINEER

METHODS OF CONCRETE PLACEMENT

CITY OF PORTLAND, OREGON
 DEPARTMENT OF PUBLIC WORKS
 W.M.A. BOWES
 COMMISSIONER

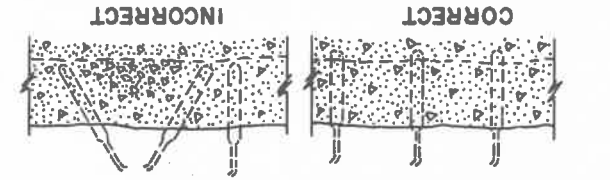
IF SEPARATION HAS NOT BEEN ELIMINATED IN FILLING PLACING BUCKETS (A temporary expedient until correction has been made)

Bucket should be turned so that separated rock falls on concrete where it may be readily worked into mass.
 Dumping so that free rock falls out on forms or subgrade results in rock pockets.



SYSTEMATIC VIBRATION OF EACH NEW LIFT

Vertical penetration of vibrator a few inches into previous lift (which should not yet be rigid) spacings without sufficient depth will not assure intimate combination of the two layers. Hazardous random penetration of vibrator at all angles and



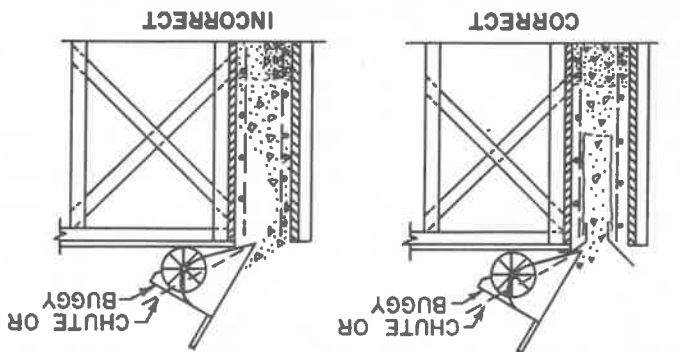
WHEN CONCRETE MUST BE PLACED IN A SLOPING LIFT

Start placing at bottom of slope so that compaction is increased by weight of newly added concrete. Vibration consolidates the concrete. When placing is begun at top of slope the upper concrete tends to pull apart especially when vibrated below as this starts flow and removes support from concrete above.



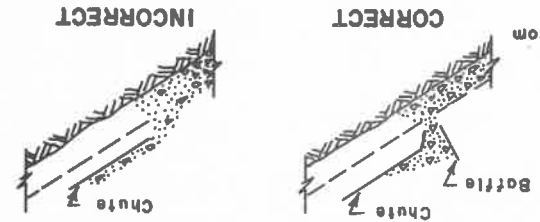
PLACING IN TOP OF NARROW FORM

Separation is avoided by discharging concrete into hopper feeding or buggy to strike against form and ratchet on bars and form also keeps forms and steel clean until concrete covers them. Permitted concrete from chute into drop chute. This arrangement and ratchet on bars and form faces causes separation and honeycomb at the bottom.



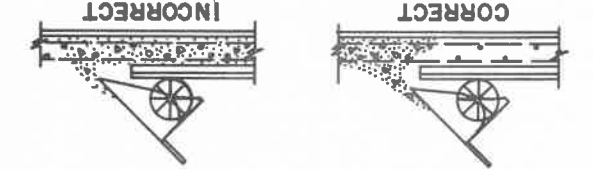
PLACING ON SLOPE

A baffle and drop at end of chute will avoid free and chute onto a slope Discharging concrete from free and chute onto a slope causes separation of rock which goes to bottom of slope Velocity tends to carry concrete down the slope.



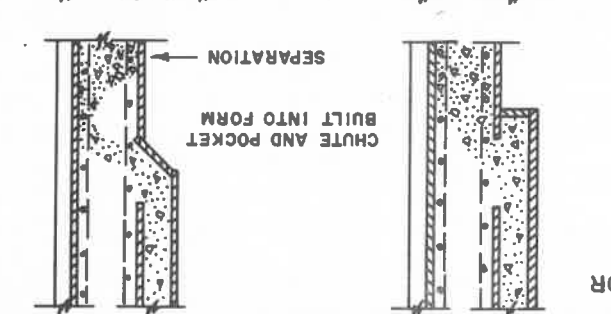
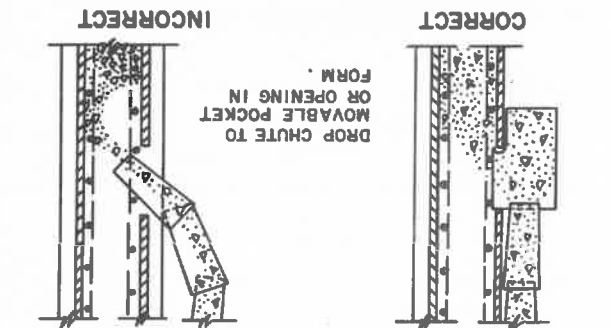
PLACING SLAB CONCRETE FROM BUGGIES

Concrete should be dumped into face of previously placed concrete. Dumping concrete away from previously placed concrete causes separation.



PLACING IN DEEP NARROW WALL THROUGH PORT IN FORM

Drop concrete vertically into outside pocket under each form opening so as to let concrete stop and flow easily over into form without separation. Permitting rapidly flowing concrete to enter forms on an angle invariably results in separation.



CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS
WILLIAM A. BOWES, COMMISSIONER
L. H. ROSENTHAL, CITY ENGINEER



STREETS - SEWERS -
BRIDGES &
STRUCTURES

applying to

SPECIFICATIONS

FOREWORD

The specifications contained herein have been developed around the following outline:

SEC. A NOTICE TO CONTRACTORS

A short notice with a brief resume of the major quantities involved.

SEC. B INSTRUCTIONS TO BIDDERS

Items that would only be of interest prior to the contract execution.

SEC. C PROPOSAL

Itemized bid proposal to be signed prior to submittal.

SEC. D SPECIAL SPECIFICATIONS

Special clauses supplemental to the Plans, General Conditions and General Construction Details, setting forth requirements peculiar to the specific work included in any particular contract or project.

SEC. E GENERAL CONDITIONS

General contract clauses governing the City-Contractor relations.

SEC. F GENERAL CONSTRUCTION DETAILS

Standard quality requirements for materials and workmanship used on this type of project. (Type - sewers, streets, structures, etc.)

SEC. G PLANS

Standard and special graphic details.

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SECTION 1

- 1. The first part of the report is devoted to a general description of the project and its objectives.
- 2. The second part contains a detailed description of the methodology used in the study.
- 3. The third part presents the results of the study and discusses their implications.
- 4. The fourth part concludes the report and provides recommendations for further research.
- 5. The fifth part contains a list of references used in the study.
- 6. The sixth part contains a list of appendices.
- 7. The seventh part contains a list of figures and tables.
- 8. The eighth part contains a list of abbreviations.
- 9. The ninth part contains a list of symbols.
- 10. The tenth part contains a list of acronyms.

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 Mortar and Grout
 Grout
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 Wrought Iron
 Lumber and Timber
 Timber Piling
 General
 Soundness
 Knots
 Splits and Shakes
 Treated Piles and Sapwood
 Heartwood and Density
 Peeling
 Cutting and Trimming
 Straightness
 Taper
 Twist of Grain
 Dimensions
 Driving Defects
 Bearing Capacity
 Pile Cut Off

(d) Sand
 Gravel
 Washed Gravel
 Bank-Run Gravel
 Water
 Mortar and Grout
 Grout
 Drain Tile
 Reinforcing Steel
 Steel Wire Fabric
 Wrought Iron
 Lumber and Timber
 Timber Piling
 General
 Soundness
 Knots
 Splits and Shakes
 Treated Piles and Sapwood
 Heartwood and Density
 Peeling
 Cutting and Trimming
 Straightness
 Taper
 Twist of Grain
 Dimensions
 Driving Defects
 Bearing Capacity
 Pile Cut Off

NOTICE TO CONTRACTORS

SECTION A

No proposal will be considered unless accompanied by a certified check, cashier's check or bid bond payable to the City of Portland, Oregon, for an amount at least equal to ten per cent (10%) of the aggregate amount of the proposal to be forfeited as fixed and liquidated damages should the bidder neglect or refuse to enter into a contract and provide a suitable bond for the faithful performance of the work in the event the contract is awarded to him.

Each proposal must be upon the regular blank forms furnished with the specifications.

Plans, specifications and other documents required for bidding may be inspected at the office of the Purchasing Agent and copies may be obtained by prospective bidders upon deposit of \$25.00 per copy, which amount will be refunded when the documents are returned in good condition before the bids are opened. Subcontractors and suppliers of materials will not be considered bona fide bidders, nor entitled to obtain plans and specifications.

Major items of work included under this contract include: Laying approximately 8,000 lineal feet of sewer pipe varying from 30 inches to 32 inches in diameter; 15,000 cubic yards of classified excavation; and 32 concrete manholes.

Sealed proposals for the construction of the Tryon Creek Interceptor Sewer Unit No. 2 will be received at the office of the Purchasing Agent, Room 209, City Hall, Portland 4, Oregon, until _____, 1962, on _____ and thereafter will be publicly opened and read.

NOTICE TO CONTRACTORS

-- 00 --

UNIT NO. 2

TRYON CREEK INTERCEPTOR SEWER

-- 00 --

RIVER POLLUTION CONTROL PROJECT

-- 00 --

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS

[Faint, illegible text, likely bleed-through from the reverse side of the page]

_____ 19____ Date of last publication

_____ 19____ Date of first publication

Purchasing Agent

By order of the City Council, _____, 19____.

The right is reserved by the City to reject any or all bids in whole or in part.

Attention is called to all provisions of Oregon Revised Statutes, Chapter 279, and the Public Works Code of the City, including prequalification requirements.

Sample

INSTRUCTIONS TO BIDDERS

SECTION B

Proposals received after the scheduled closing time for filing bids, as set forth in the Notice to Contractors, will be returned to the bidder, unopened, unless such closing time is extended by the City or unless, if such bid was sent through the mail, a legible postmark cancellation shows

2 c. LATE PROPOSALS

A proposal may be withdrawn on written or telegraphic request of the bidder received prior to the scheduled closing time for filing bids. Negligence on the part of the bidder in preparing his proposal confers no right to withdraw his proposal after the scheduled closing time for filing bids.

2 b. WITHDRAWAL OF PROPOSAL

Unless otherwise specified, bidders shall bid on all bid items included in the proposal and the low bidder shall be determined as noted in "Basis of Award" Section B, Subsection 10.

All proposals must be on the form furnished by the City, and in addition to the necessary unit price items and total prices in the column of totals to make a complete bid, all applicable blanks giving general information must be filled in and the bid signed by the Contractor or a duly authorized agent. Any statement accompanying and tending to qualify a bid may cause rejection of such bid, unless such statement is required in a proposal embracing alternative bids.

All proposals must be clearly and distinctly typed or written with ink or indelible pencil without any erasures or changes, and any erasure or change may invalidate the proposal.

Proposals and bid bond, certified check or cashier's check shall be enclosed in a sealed envelope and labeled and addressed as required in the Notice to Contractors and filed as required therein. The plans and specifications must be returned with the proposal.

2. a. FORM OF PROPOSAL

2. PROPOSAL

The deposit for the Plans and Specifications will be refunded only when the documents are returned in good condition before the bids are opened. Subcontractors and suppliers of materials will not be considered as bona fide bidders, nor entitled to obtain plans and specifications.

1. DEPOSIT

INSTRUCTIONS TO BIDDERS

SECTION B

Bidders must satisfy themselves regarding and determine for themselves

5. EXAMINATION OF SITE AND CONDITIONS

Bidder shall state whether he is doing business as an individual, a co-partnership or a corporation, and, if incorporated, in what state, and, if a co-partnership, shall give the names of all partners; the person signing on behalf of a corporation or a co-partnership shall state his position with the firm or corporation, and state whether the corporation is licensed to do business in the State of Oregon.

4. ORGANIZATION

Each proposal must be accompanied by a corporate surety bond, certified check or cashier's check payable to the City Treasurer for an amount not less than ten per cent (10%) of the total amount of the bid. If a bid bond is submitted in lieu of a certified check, such bid bond shall be on the form provided with these Specifications. Such check or bid bond shall be forfeited to the City as liquidated damages in case the bidder fails or refuses to enter into a contract and furnish a satisfactory bond within ten (10) calendar days after tender of form of contract by the City. All such checks or bid bonds may be retained by the City of Portland for a period of at least thirty (30) days from and after the date when the City tenders a form of contract for execution to the successful bidder.

3. BID GUARANTEE

Change in a proposal already delivered will be permitted only if a request for the privilege of making such modification is made in writing signed by the bidder and the specific modification itself is stated and received prior to the scheduled closing time for filing bids. However, a modification which is received from an otherwise successful bidder and which makes the terms of the bid more favorable or advantageous to the City will be considered at any time it is received and may thereafter be accepted. To be effective every modification must be made in writing over the signature of the bidder.

2 e. MODIFICATION OF PROPOSAL

Except as may be provided otherwise herein, proposals which are incomplete, or fail to cover all items of the Plans or Specifications, may be rejected.

2 d. ALTERATION OF DOCUMENTS

the time of mailing to be such that normal mail delivery time would have provided delivery to the City prior to the scheduled closing time for filing bids, and such proposal is received before the award has been made.

If it should appear to a Bidder that the work to be done or matters relative thereto are not sufficiently described or explained in the Specifications or that the Specifications are not definite and clear, the Bidder may make written inquiry regarding same to the Engineer at least five (5) days before the scheduled closing time for filing bids. Then if, in the opinion of the Engineer, additional information or interpretation is necessary, such information will be supplied in the form of an addendum which will be delivered to all individuals, firms and corporations who have taken out Specifications and such addendum shall have the same binding effect as though contained in the main body of the Specifications. Oral instructions or information concerning the Specifications or the project given out by city officers, employees or agents to prospective Bidders shall not bind the City.

8. ADDENDA TO PLANS OR SPECIFICATIONS

Bidders must include in their bid prices the entire cost of each item of the work set forth in the proposal, and it is understood and agreed that there is included in each lump sum or unit price bid the entire cost of materials and labor incidental or necessary to the completion of that portion of the work covered, unless such incidental work is expressly included in other lump sum or unit price bids in the proposal.

7. BID PRICES TO COVER ENTIRE WORK

The estimate of quantities of work to be done under the Specifications in unit price bids is approximate and is given only as a basis of calculation for comparison of bids and award of contract. The City does not be implication agree that the actual amount of work will correspond precisely to the amount as shown or estimated. Payment will be made at unit prices under a contract, only for work actually performed or materials actually furnished according to actual measurement.

The City reserves the right to increase or decrease the amount of any class or portion of the work. No such change in the work shall be considered as a waiver of any condition of the contract nor shall such change invalidate any of the provisions thereof.

6. AMOUNT OF WORK TO BE DONE

all the conditions and circumstances affecting the project or the cost of the proposed work by personal examination of the site, the Plans and Specifications and by such other means as they may choose. It is understood and agreed that information as to underground or other conditions or obstructions indicated in the Plans or Specifications has been obtained by the City from data at hand. There is no express or implied agreement that such conditions are fully or correctly shown and the Bidder must take into consideration the possibility that conditions affecting the cost or quantity of work may differ from those indicated.

While price extensions are required as a matter of convenience, in event of error in extensions, the unit prices bid shall govern. In the event of discrepancy between the written and numerical amounts, the written prices will govern.

The award will be made by the City Council to the lowest responsible bidder. In determining the lowest responsible bidder, the City will take into account, among other factors, the prices bid, discounts if any, the time of completion or delivery proposed, as between equal bids, the relative merits and performance of any item specifically proposed by Bidder, any variation in maintenance and guaranty period specifically proposed by Bidder in excess of any minimums specified, the realistic balance of prices in the proposals for various parts or units of the work and the experience and ability of the Bidder to perform the work.

10. BASIS OF AWARD

Time shall be considered the essence of the contract. If the Contractor fails to complete the project or to deliver the supplies or perform the services within the time specified in this contract or any extension thereof by the City Council, the actual damage to the City for the delay will be substantial but will be difficult or impractical to determine, and, therefore, in lieu thereof the Contractor shall be charged and will pay to the City as fixed, agreed and liquidated damages for each and every calendar day of delay, the sum of \$100 or such other amount as may be set forth as liquidated damages in the Special Specifications. Extensions of time will be allowed only under the circumstances set forth in Section E, subsection 2 of the Specifications (General Conditions).

9. LIQUIDATED DAMAGES

Any addendum or addenda issued by the Engineer, which may include changes, corrections, additions, interpretations or information, and issued forty-eight (48) hours or more before the scheduled closing time for filing bids, shall be binding upon the bidder and his bid is conclusively presumed to have taken such addendum or addenda into account. City will send copies of such addenda to all contractors who have obtained copies of the Plans and Specifications for the purpose of bidding thereon, but failure of Contractor to receive or obtain such addenda shall not excuse him from compliance therewith if he is awarded the contract.

Attention of bidders is called to the requirements of Oregon Revised Statutes, Chapter 279, relating to prequalification of bidders on public contracts, and to Article 4 of the Public Works Code (Ordinance No. 76971)

13. PREQUALIFICATION OF BIDDERS

This section shall not apply where such preference constitutes an interference or conflict with federal statutes or regulations.

When a project involves the use of non-metallic mineral construction material or materials except cement, sand, gravel, crushed rock and plaster, and if said materials are or can be produced in Oregon, the bidder shall submit alternate bids covering use of such Oregon materials and use of materials from outside the State, if bidder proposes to use such materials from outside the State, in accordance with ORS 279.040.

Contractor must use Oregon produced or manufactured materials with respect to common building materials such as cement, sand, crushed rock, gravel, plaster, etc., in all cases where bid prices of such materials are no greater than those of similar materials produced or manufactured outside the State, in accordance with ORS 279.038.

12. OREGON PRODUCTS

The Bidder's attention is called to the requirements of Oregon Revised Statutes Chapter 279 and to the provisions of Section 5-1801 of the Charter of the City of Portland, Ordinance No. 76971, and the Public Works Code of the City of Portland, with reference to public contracts, public purchasing in general, and to Contractor's proposals. The successful bidder shall not assign or transfer his contract without the written consent of the City of Portland, and the sureties on the successful bidder's performance bond.

11. LEGAL REQUIREMENTS

Any determination of the lowest responsible bidder and award are subject to review and determination by the City Attorney as to legal sufficiency of any bid submitted. When in the opinion of the Engineer the prices in any unit bid proposal are obviously unbalanced such proposal may be rejected. The City reserves the right to reject any or all bids, or waive irregularities not affecting substantial rights.

If the bidder proposes to furnish an item which he claims to be the equal of the brand named, product designated, or manufacturer set forth in the Specifications, he shall supply to the Engineer a full description thereof including pertinent physical, mechanical, electrical and chemical details and a statement explaining the differences between the item being offered and any one of the corresponding brand or specifically named items called for by the Specifications. Such information must be supplied to the Engineer by attachment to the proposal, and the decision of the Engineer concerning the equality asserted by the bidder shall be final and binding upon the bidder.

Whenever a manufacturer's name, brand or item designation is given it shall be understood that the words "or approved equal" follow such name or designation whether in fact they do so or not.

In order to establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified on the plans or herein, by designating a manufacturer by name and referring to his brand or product designation. It is not the intent of these Specifications to exclude other processes, equipment or materials of a type and quality equal to those designated.

14. "OR APPROVED EQUAL" CLAUSE

of the City of Portland relating to forms, statements and other prequalification matters. Bidders are warned to file any prequalification statement required at least ten (10) days prior to the scheduled closing time for filing bids. In the event a prequalification statement has been filed with the City within the current calendar year and a bidder has been accepted as a qualified bidder upon City projects, a review of the previous statement may be made to determine whether a prospective bidder is qualified to bid upon the work under consideration and additional statements may be required. The City reserves the right to reject the proposal of any bidder who has not been prequalified for the class of work involved in the project.

PROPOSAL

SECTION C

The following unit prices bid are submitted with the understanding that the quantities stated are approximate and are used only for comparing bids on a uniform basis and that the prices are independent of the quantities involved.

The undersigned hereby agrees that he will order all material and equipment included under this contract if awarded to him and will commence work within ten (10) calendar days after the date of the contract and that he will complete the work in all respects within one hundred ninety-five (195) calendar days after the contract execution.

In order that the least inconvenience be caused the property owners adjacent to this construction, the undersigned recognizes that time of construction will be of the essence, and that liquidated damages as provided in the contract have been considered in bidding this job. The City reserves the right to reject any and all bids or to waive irregularities if this be to the City's best interest.

The undersigned declares that he has carefully examined the Notice to Contractors, Instructions to Bidders, Specifications, and Plans; that he has made an examination of the site of the proposed work and has made the necessary investigations to determine the conditions to be encountered independently of the indications on the plans, has filed a prequalification statement, and that if this Proposal is accepted he will contract with the City of Portland in the form of contract prepared by the City Attorney to provide, to the extent of his bid, the necessary machinery, tools, apparatus, and other means of construction, and will furnish all materials, equipment and labor as specified, called for by the plans, or necessary to perform and complete the work in the manner specified according to the requirements of the City Engineer.

Portland, Oregon

TO THE CITY COUNCIL

_____, 1962

Portland, Oregon

PROPOSAL

UNIT NO. 2

TRAYON CREEK INTERCEPTOR SEWER

-- ogo --

CITY OF PORTLAND, OREGON
DEPARTMENT OF PUBLIC WORKS

Sample

ITEM

BID EXTENSION

(1) 13,300 cubic yards of trench common excavation and backfilling at the unit price of

dollars and

cents

(\$ _____) per cubic yard

(2) 1,420 cubic yards of trench solid rock excavation and backfilling at the unit price of

dollars and

cents

(\$ _____) per cubic yard

(3) 6,746 lineal feet of 30-inch B&S reinforced concrete sewer pipe class II in place at the unit price of

dollars and

cents

(\$ _____) per lineal foot

(4) 667 lineal feet of 30-inch B&S reinforced concrete sewer pipe class III in place at the unit price of

dollars and

cents

(\$ _____) per lineal foot

(5) 322 lineal feet of 30-inch B&S reinforced concrete sewer pipe class IV in place at the unit price of

dollars and

cents

(\$ _____) per lineal foot

\$ _____

BID EXTENSION

ITEM

(3-5) (Alternate) 7,735 lineal feet of 30-inch reinforced concrete pipe (steel cylinder type) 100 psi working pressure in place at the unit price of _____ dollars and _____ cents (\$ _____) per lineal foot

(6) 146 lineal feet of 27-inch B&S reinforced concrete sewer pipe class II in place at the unit price of _____ dollars and _____ cents (\$ _____) per lineal foot

(6) Alternate) 146 lineal feet of 27-inch reinforced concrete pipe (steel cylinder type) 100 p.s.i. working pressure in place at the unit price of _____ dollars and _____ cents (\$ _____) per lineal foot

(7) 480 lineal feet of 30-inch pipe encasement in place, less pipe, at the unit price of _____ dollars and _____ cents (\$ _____) per lineal foot

_____ dollars and _____ cents (\$ _____) per lineal foot

_____ \$

ITEM

BID EXTENSION

Sample

(8) 25 lineal feet of 27-inch pipe encasement in place, less pipe, at the unit price of

dollars and _____

cents _____

(\$ _____) per lineal foot

\$ _____

(9) 20 standard precast concrete manholes complete in place (base depth 7'-0") at the unit price of

dollars and _____

cents _____

(\$ _____) per each

\$ _____

(10) 12 standard monolithic concrete manholes complete in place (base depth 7'-0") at unit price of

dollars and _____

cents _____

(\$ _____) per each

\$ _____

(11) 104 lineal feet depth of standard precast concrete manholes in excess of base depth at the unit price of

dollars and _____

cents _____

(\$ _____) per lineal foot

\$ _____

(12) 49 lineal feet depth of standard monolithic concrete manholes in excess of base depth at the unit price of

dollars and _____

cents _____

(\$ _____) per lineal foot.

\$ _____

of

The name and business address of the surety company which will furnish the required bond is _____

Enclosed herewith is a (Certified Check) (Bidder's Bond) (Cashier's Check) for \$ _____, the same being at least ten (10) per cent of the amount of the proposal, payable to the order of the City of Portland, Oregon, as liquidated damages in case the undersigned should fail or neglect to furnish a performance bond and insurance and execute the contract within ten (10) days after tender of form of contract by City. All such checks or bid bonds may be retained by the City of Portland for a period of at least thirty (30) days from and after the date when the City tenders a form of contract for execution to the successful bidder.

Bidder understands, and agrees that said annual bid bond is intended as compliance with the terms and conditions of the paragraph next following:

The Bidder has heretofore filed with the City of Portland an annual bid bond for the calendar year _____ covering any and all bids not exceeding the sum of \$ _____, and naming the undersigned bidder as principal, and the _____ (Name of Company) As Surety.

Total Extensions (Alternate) \$ _____
Total Extensions \$ _____

_____ dollars and _____ cents
_____ (\$ _____) per cubic yard
\$ _____

(14) 150 cubic yards of bank-run gravel in place at the unit price of _____ dollars and _____ cents
_____ (\$ _____) per cubic yard
\$ _____

(13) 509 cubic yards of sand for pipe bedding in place at the unit price of _____ dollars and _____ cents

ITEM

BID EXTENSION

Sample

I, the undersigned, hereby certify that the above is a true and correct copy of the original as the same appears in the files of the Department of the Interior, Bureau of Land Management, at Washington, D. C.

Witness my hand and the seal of the Department of the Interior, at Washington, D. C., this _____ day of _____, 19____.

 Director, Bureau of Land Management

NAME OF BIDDER _____
 FORM OF ORGANIZATION _____
 STATE OF INCORPORATION _____
 LICENSED TO DO BUSINESS IN OREGON _____
 ALL PARTNERS _____
 BY _____
 TITLE _____
 ADDRESS _____
 DATE _____ 19____

SPECIAL SPECIFICATIONS

SECTION D

Sample

SECTION D

SPECIAL SPECIFICATIONS

1. SCOPE OF WORK

This contract unit is part of what is designated on the plans as the Tryon Creek Interceptor Sewer Unit No. 2, consisting of a sanitary interceptor sewer adjacent to Tryon Creek from the end of Unit No. 1, a point approximately 3500 feet north of the Clackamas County line, to a point approximately 1000 feet northwest of the Pacific Highway. It includes only the interceptor sewers between these termini and the manholes and appurtenances that are incorporated therein.

2. LIST OF DRAWINGS

The drawings are designated by names, numbers, and subtitles as shown below. Where reference is made to the drawings, the "Sheet Number" of the drawings will be used. Each drawing bears the general title:

CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS

-- 00 --

RIVER POLLUTION CONTROL PROJECT

-- 00 --

TRYON CREEK INTERCEPTOR SEWER

UNIT NO. 2

SHEET NO.

SUB-TITLE

1.

Vicinity Map & Drawing Index

2.

Plan & Profile, Manhole C-16 to C-22

3.

" " " C-22 to M-7

4.

" " " M-7 to M-20

5.

Structural Details - Standard

Sample

3. INDEX OF ASTM STANDARDS

When an A.S.T.M. Specification is referred to in the Specifications, it shall be understood to refer to the revised Specifications as noted in the following:

SPECIFICATIONS TITLE CURRENT REVISED EDITION

A-7	Specifications for steel for bridges and buildings	A-7-58T
A-15	Specifications for billet steel bars for concrete reinforcement	A-15-58T
A-16	Specifications for rail steel bars for concrete reinforcement	A-16-59T
A-27	Specifications for mild to medium strength carbon-steel castings for general application	A-27-60
A-42	Specifications for wrought iron plates	A-42-60T
A-48	Specifications for grey iron castings	A-48-60T
A-82	Specifications for cold drawn wire for concrete reinforcement	A-82-58T
A-123	Specifications for zinc (Hot Galvanized) coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip	A-123-59
A-141	Specifications for structural rivet steel	A-141-58
A-160	Specifications for axle steel bars for concrete reinforcement	A-160-57T
A-162	Specifications for uncoated wrought iron sheets	A-162-60T
A-184	Specifications for fabricated steel bar or rod mats for concrete reinforcement	A-184-37
A-185	Specifications for welded steel wire fabric for concrete reinforcement	A-185-58T

Sample	
A-207	Specifications for rolled wrought iron shapes and bars
A-235	Specifications for carbon steel forgings for general industrial use
A-252	Specifications for welded and seamless pipe piles
A-305	Specifications for minimum requirements for the deformation of formed steel bars for concrete reinforcement
A-339	Specifications for nodular iron castings
G-4	Specifications for clay drain tile
G-7	Specifications for paving brick
G-12	Recommended practice for installing vitrified clay sewer pipe
G-13	Specifications for standard strength clay sewer pipe
G-14	Specifications for concrete sewer pipe
G-25	Methods of chemical analysis of limestone, quick lime, and hydrated lime
G-32	Specifications for sewer brick (made from clay or shale)
G-33	Specifications for concrete aggregates
G-40	Method of test for organic impurities in sands for concrete
G-50	Methods of sampling, inspection, packing and marking of quick lime and lime products
G-62	Specifications for building brick (solid masonry units made from clay or shale)
G-76	Specifications for reinforced concrete culvert, storm drain and sewer pipe

Sample

C-87	Method of test for measuring mortar making properties of fine aggregate	C-87-58T
C-94	Specifications for ready mixed concrete	C-94-58
C-110	Methods of physical testing of quick lime and hydrated lime	C-110-58
C-117	Method of test for amount of material finer than No. 200 sieve in aggregate	C-117-49
C-136	Method of test for sieve analysis of fine and coarse aggregate	C-136-46
C-143	Method of test for slump of Portland cement concrete	C-143-58
C-150	Specifications for Portland cement	C-150-60
C-175	Specifications for air entraining Portland cement	C-175-60
C-200	Specifications for extra strength clay sewer pipe	C-200-59T
C-425	Specifications for vitrified clay pipe joints using materials having resilient properties	C-425-60T
C-443	Specifications for joints for circular concrete sewer and culvert pipe, using flexible, water-tight, rubber-type gaskets	C-443-60T
D-12	Specifications for raw tung oil turpentine	D-12-59T
D-13	Specifications for spirits of turpentine	D-13-51
D-25	Specifications for round timber piles	D-25-58
D-79	Specifications for zinc oxide	D-79-44
D-80	Specifications for leaded zinc oxide	D-80-41
D-81	Specifications for basic carbonate white lead	D-81-43

D-82	Specifications for basic sulphate white lead
D-98	Specifications for calcium chloride
D-209	Specifications for lampblack
D-212	Specifications for pure chrome green
D-234	Specifications for raw linseed oil
D-235	Specifications for petroleum spirits (Mineral Spirits)
D-242	Specifications for mineral filler for bituminous paving mixtures
D-261	Specifications for iron blue
D-263	Specifications for chrome oxide green
D-476	Specifications for titanium dioxide pigments
D-545	Methods of testing preformed expansion joint fillers for concrete (Nonextruding and re-silent types)
D-561	Specifications for carbon black
D-597	Specifications for cut back asphalt (rapid curing type)
D-598	Specifications for cut-back asphalt (medium curing type)
D-600	Specifications for liquid paint driers
D-605	Specifications for magnesium silicate pigment
D-607	Specifications for mica pigment
D-946	Specifications for asphalt cement for use in pavement construction

Sample

When an A.A.S.H.O. Specification is referred to in the Specifications, it shall be understood to refer to the revised Specifications as noted in the following:

INDEX OF AASHO STANDARDS

D-977	Specifications for emulsified asphalt	D-977-57
D-1751	Specifications for preformed expansion joint fillers for concrete paving and structural construction (Nonextruding and resilient bituminous types)	D-1751-60T
D-1752	Specifications for preformed expansion joint fillers for concrete paving and structural construction (nonextruding and resilient nonbituminous types)	D-1752-60T
E-10	Method of test for brinell hardness of metallic materials	E-10-60T

M-36	Specifications for corrugated metal culvert pipe	M-36-57
M-67	Specifications for foliage green bridge paint	M-67-54
M-68	Specifications for black bridge paint	M-68-52
M-69	Specifications for aluminum paint	M-69-54
M-70	Specifications for white and tinted ready-mixed paint	M-70-52
M-71	Specifications for red lead and paint made therefrom	M-71-42
M-72	Specifications for red lead ready-mixed paint	M-72-57
M-129	Specifications for mineral iron oxide	M-129-42

The following information was obtained from the records of the
 Department of the Interior, Bureau of Land Management, regarding
 the acquisition of the land described in the foregoing
 paragraphs of this report.

The land described in the foregoing paragraphs of this report
 was acquired by the Department of the Interior, Bureau of Land
 Management, on or about the date indicated in the following
 table:

Date of Acquisition	Description of Land	Acquired by
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
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1920
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1923
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1926
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1928
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1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950

Sample

The City will obtain permanent easements on the total length of the main interceptor sewer adjacent to Tryon Creek. The width of the permanent easement will be generally twenty (20) feet. Wherever possible a thirty (30) foot working easement will be provided in addition to the permanent easement. The working easement will in most cases be positioned equally about the permanent easement.

Adequacy of working room provided by easements shall be the responsibility of the Contractor and all costs and expense involved in the Contractor's securing of working room in addition to that provided by easements shall be wholly borne by the Contractor.

The City has prepared a map which shows the actual widths and status of permanent and working easements, as stated above. As the width and location of these easements may vary from property to property, the Contractor shall keep himself informed of the status of easements and shall schedule his work and confine his operations to such easements.

The easement map will also be available for inspection by prospective bidders at the time of preparing their bids.

It is the intent of these Specifications that the permanent and working easements shall provide access and working room to the Contractor for the construction of the project; however, at various locations along the route of the project, access roads to the site of the work may be required. The use of public or private property outside of the designated rights of way for storage of materials or spoil, construction of access roads or other usage, must be arranged for by the Contractor and the costs

4. RIGHTS OF WAY

Testing of pipe sewers as set forth in Section F (General Construction Details) shall not be required for more than twenty (20) per cent of the total lineal footage of sewer in this contract, unless the portion of the line under test fails to meet test requirements, in which case a test of additional length shall be required equaling that of the original section tested in which the rejection occurred and said additional length of sewer tested shall be tested at the Contractor's expense and shall not be included in the twenty (20) per cent specified above. After repairs have been completed on a rejected section of the sewer, the Contractor shall retest this section and shall continue to test and repair same until test requirements have been met, all at the Contractor's expense.

7. TESTS

No part of this sewer shall be covered in the absence of an inspector, and any work so performed shall be deemed in violation of these specifications, and the Engineer may order the same to be uncovered by the Contractor and recovered all at the sole expense of the Contractor.

6. ABSENCE OF INSPECTOR

After consideration of certain test pits, test borings and an intensive study of the Tryon Creek banks and bottom, the City has made an approximate determination of the existing materials which may be encountered during construction. The accuracy of the determination by the City of existing materials is not guaranteed. The approximate determination, exclusive of actual boring and pit logs, is available in the office of the City Engineer for the inspection of the prospective bidder, but bidders are to make their own interpretations of conditions or make any supplemental investigations they may desire.

5. SUBSURFACE CONDITIONS

Involved shall be borne by the Contractor, and all such costs, including rentals, royalties, permits, construction of access roads and other construction which may be involved including restoration to conditions specified; removal of spoil, debris, material, and other such items; legal proceedings and damages, and all other related costs shall, as prescribed above, be borne by the Contractor and shall be considered as included in the unit prices bid for the various items of work in the contract and no additional allowance will be made therefore.

All work shall be done under a program meeting the approval of the Engineer, which creates a minimum of interruption or inconvenience to vehicular or foot traffic. The degree of interruption to vehicular traffic will be subject to the approval of the Traffic Engineer's Office of the City of Portland or of the Permit Supervisor, Permit Department, Multnomah County, and the bidders should contact said offices prior to submitting bids. Open trenches and excavations shall be provided with barricades of a type approved by the Engineer and which can be seen for a reasonable distance, and at night all work shall be protected by lights. Safety instructions received from the Engineer or

10. TRAFFIC MAINTENANCE AND PROTECTION

Rubber-type gasket joints shall be used for all pipe joints in this contract. Said joints shall conform to the requirements of Section F Subsection 4 of the General Construction Details.

9. PIPE JOINTS

Where both common trench excavation and solid rock trench excavation occur at the same location in the trench, each shall be paid for separately at the respective unit price bid per cubic yard and the sum of the quantities of all classification shall consist of the total quantity of excavation required in said location.

Common trench excavation shall be paid for as set forth in Subsection 1 of the General Construction Details, except that the depth where rock is encountered, will be the vertical distance from the undisturbed ground surface to the top of the rock.

Measurement for solid rock in trench will be computed from the length of solid rock actually cut, the depth from the undercut grade to the top of the rock and the allowable pay width for open trench excavation.

The bid quantities provide for a special classification for solid rock. Solid rock shall be defined as meaning rock occurring in ledges which cannot reasonably be removed by other means than blasting, or solid boulders having a volume in excess of one-half (½) cubic yard each. All other materials, including loose rock, decomposed rock, and gravel, whether cemented or uncemented, shall be classified as common excavation.

8. CLASSIFIED TRENCH EXCAVATION

Sample

During the performance of the contract, the Contractor shall maintain a suitable office at the site of the work which shall be the headquarters of a representative authorized to receive drawings, instructions, or other communications or articles from the Engineer; and any such communications given to the said representative or delivered at the Contractor's office at the site of the work in his absence shall be considered to have been given to the Contractor.

12. CONTRACTOR'S OFFICE AT THE WORK

Monolithic	C16
Precast	C17
Precast	C18
Monolithic	C19
Monolithic	C20
Precast	C21
Monolithic	C22
Monolithic	C23
Precast	C24 to C26 inclusive
Monolithic	C27 and C28
Precast	M1 to M3 inclusive
Monolithic	M4 and M5
Precast	M6 and M7
Precast	M8 and M9
Monolithic	M10
Precast	M11
Monolithic	M12 and M13
Monolithic	M14 to M19 inclusive

Manhole Numbers Type of Standard Manhole

The following tabulation indicates the type of manholes to be used in the various locations except that the city reserves the right to change the type of manhole to fit conditions encountered in the field:

Excavation and backfill will be paid for as set forth in Section F of these Specifications.

Payment for standard manholes, complete with rings and covers, shall be a basic lump sum price for a depth 7'-0" or less, measured from the top of the cover to the invert, plus a lineal foot allowance for additional depths of shaft in excess of the base depth.

Standard manholes shall be constructed in conformity with the Plans and Specifications.

11. STANDARD MANHOLES

other authorities shall be observed, but following of such instructions shall not relieve the Contractor from his responsibility or liability for accidents to workment or to the public.

Sample

Sample

13. REINFORCED CONCRETE PIPE, PRETENSIONED REINFORCEMENT
(steel cylinder type)

14. ACCESS TO THE WORK (Federal and/or State Aid Projects)
Product specifications for an alternate means of construction.

The contractor shall provide access to the work for representatives of the State of Oregon as well as the Federal Government for inspection of the progress of the work, the methods of construction and for any inspection required by the officials of the State of Oregon or the Federal Government.

15. ANTI-KICKBACK PROVISIONS

(Federal regulations for Federal Aid Projects)

16. OREGON PRODUCTS EXCLUSION (For Federal Aid Projects)

The Oregon Products requirements (see also Sec. B Subsection 12) of the Oregon Revised Statutes will not apply to this federal aid project.

17. LABOR STANDARDS (Federal Water Pollution Control Act)

(For Federal Aid Projects)

Notwithstanding any provision contained in these Specifications, the Contractor shall comply with all provisions of the Building Code of the City of Portland with relation to structural sufficiency.

19. BUILDING CODE COMPLIANCE

In any street or sewer improvement within the provisions of the preceding paragraph, a twenty (20%) percent retainage shall be substituted for the fifteen (15%) percent retainage mentioned in the payment provisions of the General Conditions. (Section # Subsec. 7)

If all or any portion of the project has been designated by City prior to award of contract as a local improvement to be paid for, in whole or in part, by local improvement assessment and the City has created a local improvement assessment district therefor, then it is expressly agreed and the contract is made upon the condition that all provisions of the city charter, charter ordinances and general ordinances shall be applicable notwithstanding any conflicting or inconsistent provisions in these specifications and shall automatically be substituted therefor, and shall be applicable in all matters on which these specifications may be silent.

18. LOCAL IMPROVEMENTS

Sample

GENERAL CONDITIONS

SECTION E

SECTION E

GENERAL CONDITIONS

1. DEFINITION OF TERMS

As used throughout this Contract, the following terms or expressions shall be understood to have the meanings given below:

- A.A.S.H.O. - American Association of State Highway Officials
- A.C.I. - American Concrete Institute
- A.P.W.A. - American Public Works Association
- A.S.A. - American Standards Association
- A.S.T.M. - American Society for Testing Materials
- A.W.P.A. - American Wood Preservers Association
- A.W.S. - American Welding Society
- A.W.W.A. - American Water Works Association
- N.E.M.A. - National Electrical Manufacturer's Association
- O.R.S. - Oregon Revised Statutes
- O.S.H.D. - Oregon State Highway Department
- W.C.L.A. - West Coast Lumberman's Association
- W.P.C.F. - Water Pollution Control Federation

APPROVED EQUAL: A component or process whose use in or on this particular project is approved by the Engineer. (See also Section E Subsection 3b).

BIDDER: Any individual, firm, co-partnership or corporation submitting a proposal in response to the advertisement calling for bids on the work contemplated in the Specifications.

CITY: The City of Portland, Oregon, acting through its duly authorized officials.

CITY ATTORNEY: The City Attorney of the City of Portland, Oregon.

CITY ENGINEER: The City Engineer of the City of Portland, Oregon, acting directly or through properly authorized agents limited to the particular duties entrusted to them.

CONTRACT: The written agreement covering the performance of the project, including the advertisement calling for bids, the proposal, plans, specifications, instruction to bidders, contract bonds and all supplemental agreements affecting the project, and change orders in the course of the work.

CONTRACT COST. The aggregate amount or price promised to be paid by the City to the Contractor upon fulfillment of the contract.

CONTRACTOR. Any individual, firm, co-partnership, corporation or any combination thereof who has or have entered into the contract with the City for this particular project.

DATE OF ACCEPTANCE. The date of official acceptance of the work by the City.

DAY. Calendar day, any and every day shown on the calendar, Sundays and Holidays included.

DEPARTMENT OF PUBLIC WORKS. The Department of Public Works of the City of Portland, Oregon, acting directly or through properly authorized agents limited to the particular duties entrusted to them.

ENGINEER. The City Engineer, Traffic Engineer, or Water Engineer of the City, under whose direction the work will be performed, acting directly or through properly authorized agents limited to the particular duties entrusted to them.

ESTABLISHED GRADE. Official centerline elevations of the pavement surface to which future improvements will be related. Such elevations are established by the authority having legal jurisdiction over such matters.

INSPECTOR. The authorized representative of the Engineer whose instructions and decisions shall be limited to the particular duties and responsibilities entrusted to him in making detailed inspections of any or all portions of the work or materials therefore.

MATERIAL. Any item which is installed in, or incorporated into the project but not including tools, machinery, appliances, bracing or other equipment used to facilitate or accomplish the work.

NOTICE. A written communication delivered by hand or by mail to the authorized individual, member of the firm or officer of the corporation for which it is intended. If delivered or sent by mail it shall be addressed to the last known business address of the individual, firm or corporation. In the case of a contract with two (2) or more persons, firms or corporations, notice to one shall be deemed notice to all.

MUNICIPALITY. Shall include the City of Portland or any other municipal or quasi-municipal corporation affecting the project or the work thereon.

PLANS. The maps, drawings or reproductions thereof, approved by the Engineer, pertaining to the work and provided for and made a part of the contract.

Time shall be considered the essence of the contract, and in the event that the project is not completed within the time limit fixed in the contract or extensions thereof by the City Council, the Contractor shall be charged the liquidated damages fixed in the contract, as provided in Instruction to Bidders, Section B, subsection 9, as the agreed reasonable compensation to the City for the delay and for damages and additional expenses to the City occasioned thereby. The City, however, may grant extensions of time to the extent it finds reasonable and justified when the delay is due solely to causes beyond the control of the Contractor and without any fault or negligence or participation by the Contractor, and such causes shall include court orders enjoining the prosecution of the project, strikes, enemy action, acts of God which shall include unusual action of the elements not reasonably foreseeable by Contractor, or act of the City not authorized by the contract or permitted by law. Such extension shall be granted only if the Contractor has

2. COMPLETION DATE AND EXTENSION OF TIME.

WATER ENGINEER. The Water Engineer of the City acting directly or through properly authorized agents limited to the particular duties entrusted to them.

USE OF PRONOUNS AND GRAMMATICAL CHANGES. As used herein, the singular shall include the plural, and the plural the singular, any masculine pronoun shall include the feminine or neuter gender; and the term "person" includes natural person or persons, firm, copartnership, corporation or association, or combination thereof.

TRAFFIC ENGINEER. The Traffic Engineer of the City acting directly or through properly authorized agents limited to the particular duties entrusted to them.

SUBCONTRACTOR. An individual, firm or corporation acting for or in behalf of the contractor under separate contract with the contractor in the execution of all or any part of the contract with the City. Nothing contained in the contract shall create any contractual relation between any subcontractor and the City.

SPECIFICATIONS. The information, directions, provisions and requirements pertaining to the particular project under the contract and contained in the Special Specifications, General Conditions, General Construction Details and all supplements thereto.

SPECIAL SPECIFICATIONS. Special clauses supplemental to the Plans, General Conditions and General Construction Details, setting forth requirements peculiar to the specific work included in any particular contract or project.

given written notice to the City of the cause of delay within ten (10) days after the beginning thereof and notice to the City of the termination thereof of within five (5) days after such termination, and makes claim for such extension prior to the contract completion date. The decision by the City Council of the reasonable term of any extension or denial thereof shall be final.

3. INTERPRETATION OF SPECIFICATIONS.

3 a. DUTIES OF ENGINEER.

It shall be the duty of the Engineer to interpret the plans and specifications, and decide the true meaning thereof. Such interpretation shall be in writing if asked for by either party hereto. The decision of the Engineer relating to the plans and specifications, the acceptability of material or equipment, the proper execution of the work, the measurement of quantities, or the quantity, character and classification of material shall be final and binding upon both parties to the contract. The Engineer may amend or correct any errors or omissions in the plans and specifications when such amendments or corrections are necessary to make definite the intent indicated by a reasonable interpretation of the contract requirements.

3 b. "OR APPROVED EQUAL" CLAUSE

In order to establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified on the plans or herein, by designating a manufacturer by name and referring to his brand or product designation. It is not the intent of these specifications to exclude other processes, equipment or materials of a type and quality equal to those designated.

Whenever a manufacturer's name, brand or item designation is given, it shall be understood that the words "or approved equal" follow such name or designation whether in fact they do so or not.

If the Contractor desires to furnish items of equipment by manufacturers other than those specified, he shall secure the approval of the Engineer prior to placing a purchase order or furnishing the same.

If the proposal includes a list of equipment, materials, or articles for which the Contractor must name the manufacturer at the time of submission of the bid, no substitutions therefor will be permitted after a proposal has been accepted without the express consent of the City.

3 c. CONFLICTS, ERRORS AND OMISSIONS.

The Contractor shall check and compare all drawings prior to construction, and shall notify the Engineer of any discrepancies or omissions in order to permit their correction. Co-ordination of drawings and specifications is intended. Labor and materials required for the work if indicated on one and not the other shall be furnished as fully as it mentioned or indicated on both; and should any work or materials be reasonably required or intended for carrying the project to completion which are inadvertently omitted on the plans or specifications, the Contractor shall furnish the same as fully as it particularly delineated or described. It is understood to be the intent of the plans and specifications to show and describe a complete project within the limits stated. In case of conflict

between the requirements set forth in the Special Specifications, the Plans, the General Conditions, or the General Construction Details or apply and the requirements of the document having greater precedence shall prevail: (1) Special Specifications, (2) Plans, (3) General Conditions, (4) General Construction Details. However, nothing contained in any of such documents nor in this order of precedence shall limit or revoke the authority of the Engineer as set forth above. Dimensions shown on drawings shall be followed, rather than scale measurements. Whenever it may appear that the contract drawings are not sufficiently detailed or explicit, the Engineer may furnish additional detail drawings or written instructions and the Contractor shall conform his work to such additional details or instructions.

Neither the contract nor any interest therein shall be transferred to any other party or parties without the prior written consent of the City and in case of such attempted transfer without permission, the City may refuse to carry out the contract either with the transferor or the transferee, but all rights of action for any breach of the contract by said Contractor are reserved to the City. No officer of said City, nor any person employed in its service is or shall be permitted any share or part of the contract or is or shall be entitled to any benefit which may arise therefrom. The Contractor shall not assign any of the moneys payable under this contract or his claim thereto without the prior written approval of the City.

4 c. TRANSFER OF CONTRACT AND INTERESTS THEREIN.

The Contractor shall keep himself fully informed of the Charter, Ordinances and regulations, including the Public Works Code of the City and of all Federal and State laws in any manner affecting the project or the performance thereof, and of all orders and decrees of governmental bodies or officials having any authority or jurisdiction over the same. He shall himself observe and comply with all his agents, employees and sub-contractors to observe and comply with said Charter and all such ordinances, laws, orders, and decrees. The Contractor shall save harmless and indemnify the City and all its officers and employees against any claim or liability arising from or based on the violation of said Charter or any such ordinances, regulations, law, order or decree whether by himself, his agents, employees or his sub-contractors.

4 b. LAWS AND REGULATIONS

At the time of execution of the contract the successful bidder must furnish performance bond or bonds approved by the Mayor and City Attorney of the City in an amount equal to the amount of the contract based upon the estimate of quantities or lump sum as set forth in the Proposal, conditioned upon a compliance with and fulfillment of all the terms and provisions of the contract, plans and specifications, including maintenance, repair and replacement, and all applicable laws, and the prompt payment, as due, to all persons supplying labor and/or material for the prosecution of the work provided for in the specifications.

4 a. PERFORMANCE BOND.

4. LEGAL RELATIONS AND RESPONSIBILITIES.

The Contractor shall take and assume all responsibility for the work. As between him and the City the Contractor shall bear all losses and damages directly or indirectly resulting to him, to the City or to others on account of the character or performance of the work, unforeseen difficulties, accidents or any other cause whatsoever. The Contractor shall assume the defense of, indemnify and save harmless the City, its officers and employees from all claims, liability, loss, damage and injury of every kind, nature and description, directly or indirectly resulting from the nature of the work, the performance of the contract, the ownership, maintenance or use of motor vehicles in connection therewith, or the acts, omissions, operations or conduct of the Contractor or any sub-contractor under the contract, or in any way arising out of the contract, irrespective of whether fault is the basis of the liability or claim, and irrespective of whether any act, omission or conduct of the City connected with the contract is a condition or contributory cause of the claimed liability, loss, damage or injury and irrespective of whether the act, omission or conduct of the Contractor or sub-contractor is merely a condition rather than a cause of the claim, liability, loss, damage or injury.

4 e. RESPONSIBILITY OF CONTRACTOR

The City shall not be precluded or estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work or payment therefor, from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate, or certificate is untrue or incorrectly made, or that the work or materials do not conform in fact to the contract. The City shall not be precluded or estopped, notwithstanding any such measurement, estimate or certificate, or payment in accordance therewith, from recovering from the Contractor and his sureties such damages as it may sustain by reason of his failure to comply with the terms of the contract, or from enforcing compliance with the contract. Neither the acceptance by the City, or by any representative or agent of the City, of the whole or any part of the work, nor any extension of time, nor any possession taken by the City, nor any payment for all or any part of the project, shall operate as a waiver of any portion of the contract or of any power herein reserved, or any right to damages herein provided. A waiver of any breach of the contract shall not be held to be a waiver of any other subsequent breach.

4 d. NO WAIVER OF LEGAL RIGHTS.

The Contractor shall maintain such public liability and property damage insurance as will protect the Contractor and the City from any and

PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

The Contractor shall not commence work until he has first obtained all insurance required in the contract nor until such insurance has been approved by the City Attorney, nor shall he allow any sub-contractor to commence work until he also has first obtained insurance throughout the life of the contract which will hold the City harmless and shall indemnify the City for any and all losses to third persons or to the City arising out of the Contractor's operations, including any contingent liability arising therefrom.

4 h. INSURANCE.

The City shall have the right to let other contracts to be coordinated with this contract. This Contractor shall afford such other contractors reasonable opportunity for introduction and storage of materials and for execution of their work, and shall cooperate with them. Any matters of dispute shall be decided by the Engineer, and his decision shall be binding. If any part of this Contractor's work depends for its proper execution upon the work of any such other contractor, this Contractor shall inspect and promptly report to the Engineer any defects that affect the subsequent work. Failure to do so shall constitute an acceptance of such other contractor's work as fit and proper for the reception and attachment of his own work and equipment.

4 g. OTHER CONTRACTS.

The City shall have the right to take possession of and use any completed or partially completed portion of the project, notwithstanding that the time for completing the entire project or such portions thereof may not have expired; but such taking of possession and use shall not be deemed an acceptance of the project or of any part thereof not completed in accordance with the contract. If such prior use increases the cost of or delays the project completion, the Contractor shall be entitled to such extra compensation or extension of time or both, as the City may determine, and the decision of the City Council shall be final and conclusive.

4 f. USE OF COMPLETED PARTS OF THE PROJECT BEFORE ACCEPTANCE.

The Contractor shall secure all municipal, County or State permits

4 J. PERMITS AND REGULATIONS

The Contractor shall pay all royalties and license fees; Contractor shall save City free from all loss or damage that may result from the wrongful or unauthorized use of any patented article or process hereunder.

4 I. ROYALTIES AND PATENTS

The Contractor and all his sub-contractors engaged on the project shall provide industrial accident insurance for all persons employed on the work to be done under the contract. This insurance protection shall be carried with the Industrial Accident Commission of the State of Oregon insofar as such protection is available from the Commission. Employees for whom protection is not available from that Commission due to employment on navigable streams or to other cause shall be adequately protected by industrial accident insurance carried with a reliable insurance company or agent licensed to do business in Oregon. Such insurance in amount, form and company shall be subject to approval by the City Attorney.

INDUSTRIAL ACCIDENT INSURANCE

If the contract involves any work or structure which is subject to damage by fire or if any material upon which progress estimates have been allowed are subject to damage by fire, then the Contractor shall obtain, in the name of the City, fire insurance policy with extended coverage in amount, form, coverage and company satisfactory to the City and the premiums upon such policy shall be borne by the Contractor.

FIRE INSURANCE

all claims for damages or personal injury including death, which may arise from operations under this contract or in connection therewith, including all operations of sub-contractors. Unless otherwise required by the Special Specifications, such insurance shall provide coverage for not less than \$100,000 for personal injury to each person, \$300,000 for each accident and \$50,000 for general property damage; such insurance shall be without prejudice to coverage otherwise existing, and shall name as additional insureds the City and all other governmental bodies with jurisdiction in the area involved in this project, their officers, agents, and employees, and shall further provide that this policy shall not be terminated or be cancelled prior to the completion of this contract without ten (10) days' notice to the Auditor of the City and shall be subject to the approval of the City Attorney.

Contractor shall promptly, as due, make payment to any person, co-partnership, association or corporation, furnishing medical, surgical and hospital care, or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all moneys and sums which the Contractor (1) may or shall have deducted from the wages of his employees for such services pursuant to the terms of Oregon Revised Statutes Chapter 655, and any contract entered into pursuant thereto; or, (2) collected or deducted from the wages of his employees pursuant to any law, contract or agreement for the purpose of providing or paying for such service.

4 m. EMPLOYER'S CONTRACT FOR MEDICAL CARE OF EMPLOYEES.

No part of the work shall be assigned, transferred, sublet or subcontracted without the prior written consent of the City, and no such written consent shall release the Contractor from any obligation to the City or to persons employed by the sub-contractors, or to those supplying materials to the sub-contractors. In all cases, sub-contractors will be considered by the City merely as foremen employed by the Contractor, and liable to be replaced for incompetency, neglect of duty or misconduct.

4 l. SUB-CONTRACTORS.

The minimum wage to be paid to any employee of a contractor or a sub-contractor engaged in performance of the public work required in the contract, other than an employee paid on a monthly or per diem basis and specifically exempted by Statute, shall be the prevailing rate of wages paid for the same class of work in the trade or industry in the Portland, Oregon area as required by ORS 279. See also Section E subsections 7 a. and 7 g. of these General Conditions.

4 k. MINIMUM WAGE.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations, Federal, State or local bearing on the conduct of the work as drawn and specified. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Engineer in writing and necessary changes shall be made as provided for in the contract for changes in the work.

under this contract, and shall, during its progress, comply with all laws, ordinances and government regulations pertaining to the project or licenses, necessary or incident to the actual performance of the work

General requirements for street and sewer improvements contained in Article 7 of Ordinance No. 76971 (Public Works Code of the City) shall apply to all applicable improvements.

4 p. GENERAL REQUIREMENTS FOR LOCAL IMPROVEMENTS.

Whenever work under this project affects or may affect public property owned by or under the jurisdiction of any governmental authority, including governmental subdivision (other than City), agency or district, Contractor agrees to indemnify and save harmless such governmental authority, its officers, agents and employees from any loss, damage or claim of loss or damage to such property or the use thereof, arising from work under this project. Contractor further agrees to supply any bond or insurance and make any special guarantee deposit required by such governmental authority, before beginning any portion of the work which affects or may affect the property of such governmental authority or the use thereof.

4 o. PROTECTION OF OTHER GOVERNMENTAL AUTHORITIES.

Contractor shall make payment promptly, as due, to all persons supplying to him labor or material for the prosecution of work under the project. Contractor shall pay all contributions or amounts due from him to the State Industrial Accident Fund and shall pay to said Fund all amounts due from any subcontractor and remaining unpaid, incurred in the performance of the project. Contractor shall not permit any lien or claim to be filed or prosecuted against the City on account of any labor or material furnished. Contractor shall pay to the State Tax Commission all sums withheld from employees pursuant to Oregon Revised Statutes Chapters 315 or 316.

4 n. LABOR, MATERIALS AND LIENS; WITHHELD TAXES.

All tests of materials, appliances, fittings or work completed or in process of completion, required by the Specifications, by City ordinance

5 c. TESTS

The Engineer shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for inspection. The Contractor shall make application to the Engineer for inspection at least forty-eight (48) hours in advance of starting any work. Inspectors shall be recognized as authorized agents of the Engineer, and their duties shall be to pass upon materials used and direct the construction in conformity to the specifications. The Authority of any inspector shall be limited to the particular section of the project assigned to him. Instructions given by the inspector shall be respected and executed by the Contractor, but no inspector shall have any power to waive the terms of the contract or the obligations of the Contractor thereunder to furnish good materials or do the work in a thorough and workmanlike manner. Failure or oversight of the Engineer or any inspector, to condemn defective materials at the time of use, or condemn improper work at the time it is done shall not release the Contractor of his obligations under these Specifications. The Contractor shall tear out, remove and replace the faulty materials or work at no additional cost to the City, upon discovery of the defects and upon receipt of notice from the Engineer to do so. If any work should be covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense. Defective work and materials may be rejected prior to the date of acceptance of the work notwithstanding that such defective work or material has been previously inspected or estimated for progress or partial payment, and progress or partial payment made. Acceptance shall not constitute approval of latent defects or waiver of maintenance requirements.

5 b. INSPECTION

The work shall be done under the direction and to the satisfaction of the Engineer. The Contractor shall do all the work and furnish all labor, materials, equipment, tools and machines necessary for the performance and completion of the project in accordance with the specifications within the specified time.

5 a. WORK TO BE DONE TO SATISFACTION OF THE ENGINEER

5. CONTROL OF PROJECT

or by other law, shall be made under direction of the Engineer by and at the sole expense of the Contractor, who shall repair at his own expense all damage resulting from such tests. When additional tests are required by the Engineer, the Contractor shall furnish all tools, labor and material to make an examination of any work that may be in progress or completed. Cost of such additional examination disclosing faulty work shall be paid for by the Contractor. Should the work prove to be satisfactory any additional examination ordered by the City but not specifically required by the Specifications or law will be paid for by the City as extra work.

The City shall have the right to require, and the Contractor agrees to do extra work over and above that which is indicated by the Plans and Specifications and covered by the unit prices of the contract, but which is logically part of the improvement, arising from reasonably unforeseeable foundation conditions, changed requirements or new information. Such additional work shall be undertaken only upon written instructions from the Engineer.

6 e. EXTRA WORK

The City shall have the right to make such alterations, eliminations and additions in the line, grade, location, or dimensions of the project as it may deem necessary, or as may be required due to reasonably unforeseeable conditions encountered during the progress of the work.

6 d. CHANGES IN PLANS OR QUANTITIES

During the progress of the work, such additional detail drawings as the Engineer may consider necessary will be furnished to the Contractor.

6 c. ENGINEER MAY FURNISH ADDITIONAL DRAWINGS

For any work or unit of the project of substantial magnitude, or requiring special methods, plant or equipment, the Contractor shall, in advance, prepare a layout, program and schedule of operations and shall submit it to the Engineer for approval before beginning operations. The material and construction details of plants, forms, shoring, falsework and other structures built by the Contractor but not a part of the permanent project, shall meet the approval of the Engineer, but such approval shall not relieve the Contractor from responsibility for their safety and sufficiency.

6 b. METHODS, EQUIPMENT AND SCHEDULE

Within ten (10) days after the date of the contract, or such other time as may be fixed by the contract, the Contractor shall commence the work and shall notify the Engineer forty-eight (48) hours in advance of the time and place where such work will be started. If it shall appear to the Engineer that insufficient force is being employed, or if inadequate equipment and methods are used, or if progress is for any reason unduly delayed, he may instruct the Contractor in writing to increase his force or equipment, or adopt improved methods to expedite the work, and the Contractor shall heed and follow such instructions, but conformably to the Engineer's instructions shall not relieve the Contractor of any of his responsibilities under this contract.

6 a. COMMENCEMENT AND PROGRESS OF THE WORK

6. PROSECUTION AND PROGRESS OF THE WORK

The Contractor, or his authorized representative, shall give personal attention to the prosecution of the work, and shall be present on the site continually during its progress. It called for in the Special Specifications he shall maintain an office on or adjacent to the site of the project. A complete copy of the Drawings and Specifications shall be kept on or near the site at all times. When the Contractor is not present on any part of the work where it may be necessary to give instructions, orders may be given by the Engineer to the superintendent or foreman who may have charge of that particular part of the project, and such order shall be received and followed. Such directions shall not be deemed to change the status of Contractor or Subcontractor, nor to make the City an employer, nor to give the City direct responsibility for the methods and manner of the work. If any person employed on the project shall refuse or neglect to obey the instructions of the Engineer relating to the work thereon, or shall appear to the Engineer to be incompetent, disorderly, or unfaithful, he shall, upon written request from the Engineer, be at once replaced and not again employed upon any part of the project.

6 i. CONTRACTOR'S REPRESENTATIVE

The Contractor shall make arrangements for adequate sanitary conveniences for the use of all persons employed on the project. These conveniences shall be located and maintained, and, when otherwise not available, specially constructed, all in a manner that is unobjectionable to adjoining property owners and that meets the approval of health authorities. The use of these conveniences shall be strictly enforced. Upon completion of the project any specially constructed conveniences shall be removed from the premises, and such premises shall be left clean and free from nuisance.

6 h. SANITARY CONDITIONS

The Contractor shall be responsible for all expense involved in making any required changes in the Plans or Specifications to accommodate a substitution approved by the Engineer for the convenience of the Contractor or to circumvent an unforeseen difficulty in obtaining a specified article.

6 g. SUBSTITUTIONS

The Contractor shall furnish to the Engineer for general approval, four (4) copies of all layout, detail, shop and working drawings requested by the Engineer. After review and approval by the Engineer, two copies will be returned to the Contractor. It is understood that the approval by the Engineer of the Contractor's drawings is a general approval relating only to their compliance with the intent of the contract, and shall not constitute a waiver of errors, misfits, discrepancies or omissions.

6 f. CONTRACTOR TO FURNISH DRAWINGS

If the Contractor should neglect to prosecute the project properly, or fail or refuse to perform any of the terms or conditions of the contract, the City may, without prejudice to any other remedy, supply or correct any deficiency or defect. Such action by the City shall be taken only after three (3) days' notice by the Engineer to the Contractor and his surety, unless in the judgment of the Engineer an emergency or danger to the work or to the public exists, in which event City action as set forth above may be taken without any notice whatsoever. The cost of such City action

6 m. CITY'S RIGHT TO DO WORK

At least 24 hours before blocking any street, the Contractor shall notify the Chief of the Bureau of Fire.

6 l. NOTICE TO BUREAU OF FIRE

The Contractor shall conduct the project with a proper regard for the safety and convenience of the public. When the project involves use of public ways the Contractor, as required by the Specifications or the Engineer, shall provide flagmen when needed and install and maintain means of free access to all fire hydrants, service stations, warehouses, stores, houses, garages and other property at all times. Private residential driveways shall be closed only with approval of the Engineer or specific permission of the property owner. The Contractor shall not interfere with the normal operation of public transit vehicles unless otherwise authorized. The Contractor shall not unnecessarily obstruct or interfere with travel over any public street or sidewalk. Where detours are necessary, they shall be maintained with good surface and shall be clearly marked. Open trenches and excavations shall be provided with adequate barricades of a type approved by the Engineer which can be seen from a reasonable distance. At night all open work and obstructions shall be marked by lights. The Contractor shall install and maintain all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges and facilities. Safety instructions received from the Engineer or governmental authorities shall be observed, but following of such instructions shall not relieve the Contractor from his responsibility or liability for accidents to workmen or damage or injury to person or property.

6 k. PUBLIC SAFETY AND CONVENIENCE

If Saturday, Sunday, holiday or overtime work is to be performed, the Engineer or his Inspector shall be notified 24 hours in advance.

6 j. NOTIFICATION OF OVERTIME WORK

shall be deducted from the payment then or thereafter due the Contractor and the Contractor shall pay to the City any excess of cost over such payment due.

6 n. TERMINATION OF OR DEFAULT ON CONTRACT

All terms and conditions of the contract are considered material, and failure by the Contractor to comply with any of said terms or conditions shall, at the option of the City, be deemed a breach of the contract. Upon such failure the City shall have the right, whether an alternative right is provided or not, to declare the contract terminated. The issuance by the City or by the Engineer of an order stating that the contract is terminated, and service of a copy of said order upon the Contractor and the bonding company, shall be deemed a complete termination of the contract. Upon the contract being so terminated, the City may retain all sums due under the contract and both the Contractor and his sureties shall be liable under his bond for all losses, expenses and damages caused to the City by reason of his failure to complete the contract, and the surety shall be required, at the City option, to complete the project notwithstanding such termination, the Contractor and his sureties shall remain liable under the terms of the contract for work performed prior to such termination.

If the Contractor fails to begin work as required by the contract or if at any time he refuses, neglects or fails, in the judgment of the Engineer to have available on the work a sufficient amount of suitable materials, adequate equipment and a sufficient force of competent workmen to insure completion of the work within the specified time, or if the Contractor fails to make adequate progress in the prosecution of the project so that its completion within the specified time is endangered, or if the Contractor fails to perform the work in good faith, in an acceptable manner, in accordance with the Specifications, or if he refuses, neglects or fails for any reason whatsoever to observe any of the terms and conditions of the contract, or if he abandons the work, the Engineer may give the Contractor written notice specifying the default and requiring its correction. Should the Contractor, for three (3) days after receipt of such notice of default, fail to proceed in accordance therewith to remedy such default, he shall, when so ordered in writing by the City, discontinue or not begin the work, and any or all payments due or that may become due to the Contractor may be withheld by the City until the completion by City or another person of all work included in the contract, and expiration of any maintenance and/or guarantee period.

The City may, for good and sufficient reason, suspend temporarily, Contractor's operations on the project or upon any part of it. In the

6. SUSPENSION OF WORK

None of the foregoing provisions shall be construed to require the City to complete the work, nor to waive or in any way limit or modify the provisions of the contract relating to the fixed and liquidated damages suffered by the City on account of the failure of the Contractor to complete the project within the time prescribed.

Upon completion of the project under the contract, the Contractor shall be entitled to the return of all his material which has not been used in the work, of his plant, tools, equipment and other property, provided, however, that he shall have no claim on account of usual and ordinary depreciation, loss, wear and tear.

The Contractor shall continue to prosecute to completion all the work from which he has not, as above provided, been ordered to desist, and he shall cooperate with and in no way hinder or interfere with the forces employed by the City or other Contractor or otherwise, to do any designated part of the work as above specified.

After service on the Contractor of such order to desist from work or part thereof, the City may take possession of the project or such designated equipment, materials or other property on the project, none of which shall be removed by the Contractor as long as they may be required for the work, and the City may, by contract or otherwise, provide the supervision of workmen, materials, appliances and equipment necessary for the completion of, and may complete the project or such designated part thereof. The expense so incurred for the completion of the project or part thereof, together with all damages liquidated or otherwise sustained or to be sustained by the City, shall be deducted from the fund or appropriation set aside for the purpose of the contract and shall be charged to the Contractor as if paid to him. In case the amount of such expenses and damages shall exceed the sum which would have been payable under the contract if completed entirely by the Contractor, the amount of such excess shall be paid to the City by the Contractor and both he and his sureties shall be liable to the City therefor; in case the amount of such expenses and damages shall be less than the sum which would have been payable under the contract if completed entirely by Contractor, he shall be entitled only to payment in accordance with the contract terms for the work Contractor actually performed, subject, however, to all the terms of said contract.

The Contractor shall comply with all of the provisions of the laws of the State of Oregon, ordinances of the City, and governmental regulations relating to the employment of labor. Contractor agrees that no person shall be required or permitted to labor more than eight (8) hours in any one day, or forty (40) hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, in which event, the person or persons so employed for excessive hours shall receive at least time and one-half pay for all overtime in excess of eight (8) hours a day, and for work performed on Saturday and on legal holidays. This subsection does not apply to the employment by any Contractor or foremen, watchmen and timekeepers paid on monthly rate, and this subsection shall not apply to labor performed in the manufacture or fabrication of any material ordered by the Contractor or manufactured or fabricated in any plant or place other than the place where the main contract is to be performed.

6 d. WORKING CONDITIONS

Contractor shall comply with the work preference provisions contained in Section 5-1801 of the Public Works Code of the City as though fully set forth herein, and any violation of the provisions thereof shall render the contract void.

Contractors shall in the performance of contracts, give preference to local labor and before employing non-resident labor shall notify the appropriate Commissioner of said City of his intention to do so, stating in said notice his reasons for employing said non-resident labor. If the Contractor gives preference to non-resident labor the Council may, at its option, terminate this contract and the Contractor shall in such event forfeit all rights hereunder.

6 p. LOCAL LABOR

Contractor shall in the performance of contracts, give preference to local labor and before employing non-resident labor shall notify the appropriate Commissioner of said City of his intention to do so, stating in said notice his reasons for employing said non-resident labor. If the Contractor gives preference to non-resident labor the Council may, at its option, terminate this contract and the Contractor shall in such event forfeit all rights hereunder.

The City will provide the rights of way and easements necessary for the work. It shall be the responsibility of the Contractor to obtain information regarding width, status and special conditions attached to particular sections of the rights of way or easements which may be found in the plans or Specifications, or can be obtained from the Engineer. Special occupancy and use of public ways are subject to permits issued by the

6 u. RIGHTS OF WAY

Contractor must present to the inspector satisfactory evidence that a permit from the governing authority has been obtained designating each hydrant that may be used for obtaining water for the project before these hydrants may be used. Cost of water and all expense incidental thereto, shall be borne solely by the Contractor unless otherwise noted in the Specifications.

6 t. WATER SERVICE

Any information shown on the plans as to the location of existing water courses, drains, sewer lines or utility lines, which cross or are adjacent to the project, has been compiled from the best available sources, but is not guaranteed to be accurate. The Contractor shall provide for the flow of all sewers, drains 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. The Contractor shall make excavations and borings ahead of his work, where necessary, to determine the exact location of interfering utilities or services. He shall support and protect private or public utility lines or other services, where necessary, in a manner approved by the Engineer, and Contractor shall be responsible for damage or interruption of service that may be due to his operations. Arrange-ments must be made by the Contractor with respective owners for moving or maintaining any lines or services which must be cut or moved because of the work. All costs resulting from interferences or obstructions, whether or not herein specifically mentioned, shall be borne solely by the Contractor.

6 s. INTERFERENCE AND OBSTRUCTIONS

Until acceptance of the project, the Contractor shall at all times protect from damage all public property and private property which may be affected by the work and preserve all materials, supplies, equipment of any description, and all work already performed. Contractor shall be responsible for protecting same from the nature of the work, the action of the elements, damage by any person or persons or from any other cause whatsoever.

6 r. PROTECTION OF WORK AND PROPERTY

The Engineer shall set stakes for lines and grades in conformity with the plans and with customary engineering practices for the particular type of work involved, and the Contractor shall not be expected to furnish men or materials for the initial staking of the work. The Contractor shall give forty-eight (48) hours notice to the Engineer when stakes or levels are required upon any part of the work. All stakes, bench marks or monuments shall be carefully protected and preserved, and shall not be changed by the Contractor or any of his employees. If they are required to be replaced unnecessarily, due to carelessness or other reason, the Contractor shall be charged the expense thereof, and the same may be deducted from any payment. After the original staking of the work, if it be necessary to re-place stakes that are unavoidably moved, or to give supplemental stakes or elevations, or to check measurements or elevations previously given, the Contractor shall, for brief intervals, furnish the Engineer with men to assist him in such work.

6 w. LINES AND GRADES

Whenever the project or work thereunder involves the crossing of any railroad line or the encroachment on any railroad right of way, unless otherwise specifically noted in the specifications, the Contractor shall submit a program of his proposed operations within the railroad right of way area which shall be approved by the appropriate railroad officials and the Engineer before the work is started within such area. The Contractor shall pay for services of flagmen and/or watchmen furnished by the railroad company and provide and drive piling, set cribbing, build bridges or tunnels, install enclosing pipe, and do all other work required by the railroad company or necessary for the safety or maintenance of railroad traffic. Contractor agrees to furnish any bond required of the City by the railroad company as a result of such intended operations and agrees to indemnify the City for any and all expenses incurred by the City, and to assume any and all liability or claims thereof imposed on the City as a result of Contractor's operations in the railroad right-of-way area. All costs resulting from interferences, obstructions or liabilities set forth in this subsection, whether or not herein specifically mentioned, shall be borne solely by Contractor.

6 v. RAILROAD RIGHT OF WAY

The use of private property outside of the designated right of way, for storage of materials or spoil, construction of access roads or other usage, must be arranged by the Contractor at his expense.

As a condition precedent to final acceptance of the project, Contractor shall remove all equipment and temporary structures, and all rubbish, waste and surplus materials, and shall grade and relevel ground surfaces, repair pavements, walks and travelled surfaces, re-establish plantings, and generally clean up the right of way and premises to conform substantially to conditions as they existed before the improvement was made, as the Engineer may determine.

6 y. CLEANING UP

The Contractor shall, without cost to the City, make all necessary repairs and replacements to remedy, in a manner satisfactory to the Engineer, any and all defects, breaks, or failures of the work due to: faulty or inadequate materials or workmanship; disturbances of or damage to City improvements under, within, or adjacent to the work; or settling, washing, or slipping from any cause. When such defects or damages occur within one year following the date of acceptance of the work in any part of the surface work done under the contract, or in adjacent surface improvements not included in the work under this contract, including but not limited to pavements, curbs, walks, tracks, poles, wires, walls, stairways, buildings or other surface structures, the maintenance period required of the Contractor shall, with relation to such required repair, be extended one year from the date of completion of such repair. When such defects or damages occur within two years following the date of acceptance of the work, in any part of the subsurface work done under this contract or in any adjacent subsurface improvement not included in the work under this contract, including but not limited to sewers, drains, culverts, other drainage structures, pipes, valves, conduits, conductors, basements, foundations or other subsurface structures, the maintenance period required of the Contractor shall, with relation to such required repair, be extended two years from the date of completion of such repair.

6 x. MAINTENANCE

It shall not be considered a part of the Engineer's work to provide grade, line or batter boards or to transfer lines and grades from the stakes to such boards, or to measure and lay out the work, or to furnish elevations beyond those initial elevations customarily set by the Engineer.

any other governmental authority in whose jurisdiction such work may be done.

Any blasting or use of explosives on any City project requires a permit and is subject to all the provisions relating thereto contained in Article 21 of Ordinance No. 76339 (Police Code of the City) and also applicable provisions contained in Ordinance No. 78461 (Fire Code of the City), and also is subject to all of the laws, orders and regulations of any other governmental authority in whose jurisdiction such work may be done.

6 2. BLASTING AND USE OF EXPLOSIVES

7. ACCEPTANCE AND PAYMENT FOR WORK.

7 a. PAYMENTS

Payments for all work under the contract will be made at the price or prices bid therefor, and the prices shall include full compensation for all incidental work.

Before any payment is made under the contract for the particular project the Contractor or his surety and every subcontractor or his surety performing work on the project during the period covered by the payment, shall first file with the City Auditor a statement in writing under oath, in form prescribed by the State Labor Commissioner, certifying the hourly rate of wages paid each classification of workmen not exempt by statute, employed by him upon such project and further certifying that no workman employed by him upon such project, has been paid less than the minimum prevailing rate of wage as required by these Specifications. Such certificate shall be supplied by the Contractor and all subcontractors who have performed any work on the project up to the time of such payment and shall comply with Oregon Revised Statutes, Chapter 279. A new certificate shall be filed before each payment.

If the contract price is determined, in whole or in part, on a lump sum basis, progress or partial payments prescribed in the Special Specifications will be made on progress estimates based on an estimated cost schedule relating thereto which shall be prepared by the Contractor and approved by the Engineer before the start of the work.

Progress estimates of the work performed will be made by the Engineer near the end of each calendar month if progress payments are provided in the contract. Estimates will be acted upon by the City Commissioner under whom the project falls, on or before the 20th of the following month and warrants will be issued by the City Auditor for the amount of the estimate, less fifteen (15) per cent or other per cent retainage specifically set forth in the Special Specifications. Such amount of retainage shall be withheld and retained by the City until after the project is completed, tested, and accepted by the City and satisfactory evidence has been furnished to show that all bills have been paid and satisfied and all claims and damage actions have been settled or are adequately covered by insurance. If the Contractor fails to complete the project within the time limit fixed in the contract or any extension thereof, no estimates shall be made or progress or other payments allowed thereafter until the project is finally completed.

These estimates shall include the value of the labor performed and materials incorporated in the work since commencing of the work under contract. Such estimates need not be made by strict measurements but

The Engineer may at any time, by a written order, and without notice to the sureties, make changes in the Plans and/or Specifications of this

7 e. CHANGES

The City shall be given facilities to obtain complete cost data on the project. The Contractor shall permit full access to all bills, pay-rolls, and other data, shall provide a list of tools and equipment used, and generally shall cooperate with City representatives.

7 d. COST DATA.

Payments may at any time be withheld if the work is not proceeding in accordance with the contract or if in the opinion of the Engineer the Contractor is not fully complying with the requirements of the contract.

7 c. PAYMENTS MAY BE WITHHELD.

Payments shall be based on measurements of the completed work in accordance with United States Standard Measures and the units of measurement for payment shall be as shown on the plans or as specified in the Specifications. The Engineer will make the measurements at no cost to the Contractor. In calculating quantities, all lengths and areas will be based on horizontal and vertical measurements unless otherwise specified.

7 b. MEASUREMENT OF PAY QUANTITIES.

The making of such progress payment shall, under no circumstances, be construed as an acceptance of any of the work or materials under the contract. The Engineer may include in such progress estimate, fifty (50) per cent of the cost to the Contractor of materials delivered to the site, properly stored, protected from damage and insured, provided that after any such payment such materials must be used in the particular project.

In unit bids, in making progress estimates on work to be paid on a unit price basis, the Engineer may use the unit prices bid by the Contractor in his proposal. In case the said unit prices do not, in the opinion of the Engineer, truly represent the actual relative costs of the different parts of the work, he may use a percentage of the unit price in making progress estimates.

they may be approximate only, may relate to the cost schedule mentioned above, and shall be based upon the whole amount of money that will become due according to the terms of the contract when the project has been com-pleted.

When extra work is ordered by the Engineer to be done on a force account basis, such work will be paid for on the basis of cost plus certain percentage allowances.

7 g. FORCE ACCOUNT

Payments for extra work shall be made and rendered with progress and final payments.
Extra work may also be performed at an agreed price in writing instead of by force account at the direction of the Engineer.
All extra work shall be done in accordance with the terms and provisions of this contract and shall be subject to the same control and inspection as regular contract items.

The Engineer may at any time by a written order, without notice to the sureties, require additional work which the Engineer finds necessary or appropriate in connection with the contract but not within the scope thereof, and not classified by the Engineer as incidental work which may result in alterations in the amounts of work for which unit prices have been established in the contract. Upon such order the Contractor shall carry out such work at prices agreed upon between the Contractor and the City, but in no event exceeding the unit prices established in the contract. When such order pertains to work of a class or classes for which no unit prices are so established, then the agreed adjustment shall be based either on unit prices decided on fair and equitable grounds or shall be a lump sum similarly decided, as the City may determine, or such work may be done as extra work at force account. In no case shall the Contractor make any claim for extra work unless ordered as such.

7 f. PAYMENT FOR EXTRA WORK.

contract and within the general scope thereof. If such changes cause an increase or decrease in the amount due under the contract, or in the time required for its performance, an equitable adjustment shall be made and the contract shall be modified accordingly by written change order. The decision of the City Council as to the amount of the adjustment to be made, if any, shall be final and binding. Any claim of Contractor under this clause must be asserted in writing within 30 days from the date of receipt by the Contractor of the notification of change: provided, however, that the City, if it determines that the facts justify such action, may receive and consider and adjust any claim prior to the date of the acceptance of the project. But, nothing provided in this clause shall excuse Contractor from proceeding with the prosecution of the work as changed. Except as otherwise herein provided, no charge for extra work or material will be allowed. In determining the adjustments to be made, if any, no allowance to Contractor will be made for anticipated profits.

Materials and supplies produced by the Contractor or a subcontractor will be paid for at prices to be agreed upon between the Contractor and the Engineer, which prices shall be no greater than the prices at which materials and supplies are produced.

Freight and express on material and supplies will be considered to be a part of the cost of the materials and supplies and will be paid for as

Payment for purchased materials and supplies used on force account work will be computed at the prices billed to the Contractor or subcontractor by the supplier, less all discounts plus the allocable allowance set forth on the preceding page. It shall be presumed that the Contractor or his subcontractor has taken advantage of all possible discounts on bills for materials and supplies, and such discounts shall be subtracted from the total amounts of bills regardless of any failure of the Contractor to take advantage of same.

The payment to be made for labor used in the work will be computed at the rates actually paid to the laborers by the Contractor or subcontractor, plus the allocable allowance set forth above, unless these rates are in excess of the current local rates, in which event the payment shall be computed at the current local rate, plus allocable allowances. The time allowed shall be the number of hours worked directly on force account operations.

Rental on each piece of equipment having a value in excess of \$100. 5

Materials and supplies actually used on the force account work. 5

Employer's contributions under the Unemployment Compensation Act and under the Social Security Act for old age insurance. 15

Employer's contribution to State Industrial Accident Fund under terms of Workmen's Compensation Act. 15

Labor, including time of foreman, while engaged directly upon force account work. 15

Percentage Allowance Additional To Actual Cost	Items of Cost for Which Payments Will be Made
	Labor, including time of foreman, while engaged directly upon force account work. 15
	Employer's contribution to State Industrial Accident Fund under terms of Workmen's Compensation Act. 15
	Employer's contributions under the Unemployment Compensation Act and under the Social Security Act for old age insurance. 15
	Materials and supplies actually used on the force account work. 5
	Rental on each piece of equipment having a value in excess of \$100. 5

The items of cost for which payment will be made and to which payment will be restricted, together with the percentage allowances applicable to the respective items, are as follows:

The percentage allowances made to the Contractor in accordance with the terms outlined above will be understood to be reimbursement and compensation for all superintendence, use of tools and small equipment, overhead expense, bond cost, insurance premiums, profits, indirect costs and losses of all kinds, and all other items of cost not specifically designated herein as items for which payment is to be made, whether the services, costs and other items involved are furnished or incurred by

The rentals allowed for equipment will in all cases be understood to cover all fuel, supplies, repairs, and renewals, and no further allowances will be made for those items unless specific agreement to that effect is made in writing before the work is commenced. Individual pieces of equipment having a value of one hundred dollars (\$100) or less will be considered to be tools or small equipment, and no rental shall be allowed on such.

For equipment rented on a day or hour basis, rental will be allowed for only those days or hours during which the equipment is in actual use. For equipment rented on a monthly basis, straight time rental will be allowed from the day the equipment is first used on the particular piece of force account work until and including the last day on which it is used on that particular work, excluding, however, the time during which the equipment is used on other work during the period, and further excluding the time that the equipment is idle for a continuous period of more than six (6) days.

When a piece of equipment and the operators thereof are hired, rented, or furnished as a unit, the additional percentage to be allowed shall be five (5) per cent, and the Contractor shall not be entitled to fifteen (15) per cent on the time of the operators of such equipment. Neither shall the Contractor be entitled to payment for contributions made under the terms of the Workmen's Compensation Act, the Unemployment Compensation Act, or the Social Security Act, to cover the time of operators of equipment hired, rented or furnished on this basis.

Rental on equipment used will be computed at the rates actually paid by the Contractor or subcontractor plus the allocable allowance set forth on the preceding page unless these rates are in excess of the current local rates, or unless the equipment is owned by the Contractor or subcontractor, in either of which events payments shall be computed at rates to be agreed upon between the Contractor and the Engineer prior to beginning work, which rates shall in no case be greater than the current local rates.

the materials and supplies can be obtained elsewhere.

Upon notification by the Contractor that the work is completed and ready for final inspection, the Engineer shall make such inspection as soon as possible. If he finds that the work covered by the contract has been fully and satisfactorily completed, the Engineer shall so notify the Contractor and the City Commissioner under whom the project falls, shall make a final estimate and shall recommend acceptance of the work as of a certain date. Upon approval and acceptance, the Contractor will be paid a total payment equal to the amount due under the Contract less the retained percentage. Payment of this final estimate will be made at the same time in the month and in the same manner as provided for progress estimates. This retained percentage shall be retained for a period of thirty days following the final acceptance of the project. Every person performing labor or furnishing material or supplies toward the completion of the project, shall have a lien upon such retained percentage provided such notice of lien shall be given in the manner and within the time provided by law.

7 i. ACCEPTANCE AND FINAL PAYMENT.

If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a subcontractor by any person in connection with the project as such claim becomes due, the City may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due the Contractor by reason of his contract. Payment by City of such a claim shall not relieve the Contractor or his surety from his or its obligation with respect to any unpaid claims.

7 h. PAYMENT OF LABOR OR SERVICES CLAIMS.

All claims for extra work done in any month shall be filed in writing by the Contractor with the Engineer before the fifth of the following month, and such claims shall show the names and number of each workman employed thereon, the date and the number of hours so employed, the character of work he is doing and the wages paid or to be paid him; also the claim shall show the materials delivered for the extra work, the quantity and character of such material, from whom purchased and the net amount paid or to be paid therefor.

Should any percentage allowance or other corresponding allowance be made by the Contractor to a subcontractor, in connection with force account work, such allowance shall be at the sole expense of the Contractor and the Contractor shall not be reimbursed or otherwise compensated for the same by the City.

the Contractor or by the subcontractor. No other reimbursement, compensation or payment shall be made for any such services, costs or other items.

If all or any portion of the project has been designated by the City prior to award of contract as a local improvement to be paid for, in whole or in part, by local improvement assessment and the City has created a local improvement assessment district therefor, then it is expressly agreed and the contract is made upon the condition that the Contractor will look for payment for the material and work contracted for, to the special assessment fund created by assessment upon the property benefited by such local improvement, collected and paid into the City treasury for that purpose, and to the owners of the real property within that assessment district: as to the whole of the payments in case the project is to be paid for solely by the special assessment procedure, or for so much thereof as may be allocated by the City to the special assessment procedure in case only part of the project is to be paid therefrom; the Contractor shall not require the City or any of its officers to pay the same, excepting out of such special fund so assessed and collected into the City treasury for such purpose, nor seek to enforce the payment of the same or any part thereof against the City or any of its officers by legal process or otherwise, or out of any other fund, or in any manner other-wise than as herein provided.

7 j. SPECIAL ASSESSMENT FUND.

Upon completion of such prerequisites, Contractor shall be paid the retained percentage except for any special retainage required under the contract.

If the City declares a default of the contract, and the surety completes said contract, all payments after declaration of default and retainages held by the City, shall be paid to the surety and not to the Contractor in accordance with the terms of the contract.

As a further prerequisite to final payment Contractor shall execute and deliver to the City in form approved by the City Attorney a receipt for all amounts paid or payable to Contractor under the contract, and a release and waiver of all claims against the City growing out of or connected with the contract and shall furnish satisfactory evidence that all amounts due for labor, materials and other obligations under the contract have been fully and finally settled or are fully covered by insurance protecting the City, its officers, agents and employees as well as the Contractor.

Before final payment of retained percentage is made under the contract, the Contractor or his surety and every subcontractor or his surety shall first file with the City Auditor a statement in writing under oath, as heretofore set forth, certifying the hourly rate of wage paid each exempt classification of workmen employed by him upon such project. Such certificate shall be supplied by the Contractor and all subcontractors who have performed any work on the project up to the time of such final payment, and shall comply with Oregon Revised Statutes, Chapter 279.