CITY OF ST. PAUL

Construction Standards for Public Works Facilities in the City of St. Paul

Ordinance Number 1994-164

B. These standard specifications shall related only to public works construction in the City and are not to be identified with building codes, zoning ordinances, and other regulations for which procedures and standards have been established. Planning, zoning, and related matters shall be satisfied prior to referral of a project to the City for review of proposed facilities.

C. These standard specifications may be amended from time to time upon recommendation by the City Engineer, or Water, Sewer, or Public Works Superintendent to the City Council, who may then take such appropriate action as it deems necessary to amend these specifications.

1.103 CONFORMANCE REQUIRED.

All work performed and materials used for public works construction in the City of St. Paul, Oregon, shall conform to these standards, unless otherwise provided by Ordinance or in a particular specification for work authorized by the City Council.

1.103.01 Suspension of Rules.

No employee of the City of St. Paul or the Public Works, Water, or Sewer Departments is authorized to suspend or alter any of the policies, rules or provisions cited herein without specific approval or direction of the City Council, except in cases of emergency involving loss of life or property or which would place operation of the City in jeopardy.

1.104 VIOLATIONS/ENFORCEMENT.

A. Upon failure to comply with any provision of this Ordinance, or with any restrictions or conditions imposed hereunder, the Council may withhold any further permits and may halt construction until correction is made. Not withstanding any such action taken by the Council, any person, firm or corporation who violates, disobeys, omits, neglects, or refuses to comply with any of the provisions of the Ordinance, or who resists the enforcement of such provisions, shall be subject to civil penalties of no more than $500.00 for each offense. Each day that a violation is permitted to exist shall constitute a separate offense.

1) Whenever the City proposes to assess a monetary civil penalty under this provision, opportunity for a hearing shall be accorded as provided in ORS 183.310 to 183.550. The City may appoint a hearings office to conduct hearings under this section. The hearings officer may administer

oaths and conduct the hearings as provided in ORS 183.413 to 183.470. Salaries and expenses of the hearings officer shall be as the City determines and shall be paid by the City.

B. Whenever the City Engineer or Public Works Superintendent or his/her designee finds work in progress in violation of this Ordinance, he/she shall issue a stop work order to the person or entity performing the work. The stop work order shall require the person or entity to immediately stop all work until compliance can be assured. Any work already completed that does not comply with the provisions of this Ordinance shall be corrected within fourteen (14) days of the issuance of the stop work order by issuing a notice of correction with the stop work order.

C. Upon failure to comply with any provision of this Ordinance, or with any restrictions or conditions imposed hereunder, or if any person, firm or corporation violates, disobeys, omits, neglects, or refuses to comply with any of the provisions of the Ordinance, stop work order or correction notice, or who resists the enforcement of its provisions, the City may apply to the Circuit Court of Marion County for an order compelling compliance and/or restraining the person, firm or corporation from development or other activities regulated by this Ordinance.

1.105 INTERPRETATION.

The provisions of this Ordinance shall be interpreted as minimum requirements. When this Ordinance imposes a greater restriction than is required by other provisions of law, or by other regulations, resolutions, easements, covenants or agreements between parties, the provisions of this Ordinance shall control.

1.106 SAVINGS CLAUSE.

Should any section, clause or provision of this ordinance be declared invalid by a court of competent jurisdiction, the decision shall not affect the validity of the Ordinance as a whole or of the remaining sections. Each section, clause and phrase is declared severable.

1.107 CONFLICTING ORDINANCES.

1.107.01 Repealing Ordinance in Conflict; Exceptions.

City of St. Paul Ordinances or parts of ordinances in conflict herewith are hereby repealed, excepting that this Ordinance may supplement, but is not intended to repeal, supersede or replace provisions of the St. Paul Zoning and Development Ordinance number 1994-158 that are not otherwise in conflict with Oregon law.

1.107.02 Interpretation of construction standards in conflict with Zoning and Development Ordinance and Water and Sewer Ordinance.

Where construction standards differ from those set forth in the City of St. Paul Zoning and Development Ordinance and/or the Water or Sewer Department Ordinance, the City Council may, acting upon the recommendation of the City Engineer or Public Works, Water, or Sewer Superintendent(s), make written findings of fact which may permit a variance of the standards established in any of the affected ordinances if the City Council finds that such variances are in the immediate public interest, or to protect the health, safety, or welfare of the public. Technical standards established under this Ordinance shall be given precedence.

1.108 PUBLIC WORKS DEPARTMENT AND SUPERINTENDENT.

1.108.01 Office established.

The Council of the City of St. Paul does hereby establish the Public Works Department and the office of Public Works Superintendent.

1.108.02 Appointment.

The Public Works Superintendent shall by appointed by the Council to hold office at the pleasure of the Council and receive such compensation as may be fixed by the Council. The Public Works Superintendent may also concurrently hold other city offices.

1.108.03 Duties.

The maintenance and operation of the city's public works and all of the physical facilities connected with the operation thereof shall be under the direction of the Public Works Superintendent. The Public Works Superintendent shall maintain a record of services and perform such other specific duties as the Council may from time to time require of him.

1.108.04 Service area.

The area served by the Public Works Department shall be all that area included within the corporate limits of the City of and such other contiguous and neighboring territory as the City Council shall, from time to time deem necessary to serve.

1.109 ADOPTION AND AMENDMENT OF STANDARDS

The specific and detailed construction standards after the first adoption by the City Council by approval of this ordinance, may be amended, or new standards adopted, by the City Council upon the recommendation of the City Engineer or Superintendents of the Public Works, Water or Sewer Departments, the text of which and/or accompanying technical drawings shall be attached to and incorporated, by reference, herein. Amendments to, or adoption of, new standards may be made by resolution or ordinance.

1.110 ORGANIZATION.

A. The construction standards identified in this Ordinance may be divided into sections for the purpose of organizing the standards.

1.110.01 Correction of scrivener's or math errors.

Scrivener's or math errors, if found within this Ordinance and the attached standards, may be corrected and the appropriate pages replaced, without the need of a vote of the City Council to formally amend this Ordinance. The City Recorder shall maintain a file which contains a record of all such corrections, and the dates upon which they were made, together with copies of the original document(s) containing said errors.

1.111 DEFINITIONS.

As used in this Ordinance and the attached standards, the following definitions shall apply:

CITY means the City of St. Paul, Oregon.

CITY COUNCIL or COUNCIL means the City Council of the City of St. Paul, Oregon.

COMMISSION or PLANNING COMMISSION means the St. Paul Planning Commission.

REPRESENTATIVE means a City representative appointed by the Council as follows:

a) Superintendent: The Public Works Superintendent, and may include the Water or Sewer Superintendent.

b) Technician: A City staff technician.

c) City Engineer: A registered professional engineer or consulting engineering firm employed by the City. In the case of projects undertaken by the City with no outside engineering involvement, the term City Engineer may appear in the standards in the abbreviated form of "Engineer." Unless otherwise specified, the City Engineer and Public Works Superintendent may be considered to be interchangeable in these public works standards.

d) Director: Means the Public Works Superintendent.

DEVELOPER means a person who undertakes construction of a public works facility within the corporate limits of the City.
PUBLIC WORKS FACILITY means any facility constructed upon public right of way or public easement which is immediately or eventually to be taken over by the City for maintenance and operation. These facilities include, but are not limited to: streets, sidewalks, curbs, parking lots, driveways, drainage facilities, water system works, and sanitary sewer systems.

STANDARDS means these Public Works Standards as adopted for use in the City of St. Paul, Oregon.

1.112 AVAILABILITY AND USE OF STANDARDS

A. Copies of these standards shall be available at City Hall at the City's actual cost, rounded upwards to the nearest whole dollar amount.

B. An Engineer may utilize the standards by direct reference thereto in any contract documents prepared for construction of street, drainage, water, and sewer facilities within the City. If such election is made by the Engineer, contract documents shall contain the following statements:

"Materials and workmanship shall be in strict accordance with the Public Works Construction Standards of the City of St. Paul. No changes from the approved project plans shall be made without prior written approval from the City."

C. These standards are in outline form only, and shall not relieve an Engineer from his/her professional responsibilities during project design and construction. Any additional project requirements shall be set forth in the documents an Engineer prepares for the work. The City provides these standards only as a convenience to facilitate development within the City of St. Paul.

SECTION 2

APPLICATIONS AND FEES

2.100 PURPOSE.

To provide a mechanism for the application for and issuance of permits and the collection of fees related to public works development. Fees shall be collected to reimburse the City for its reasonable expenses in administering the activities regulated by this Ordinance.

2.101 GENERAL PROVISIONS.

2.101.01 Form of Applications.

The City may establish application forms and procedures for the filing of said applications for the purpose of administering activities regulated by this Ordinance.

2.101.02 General Procedures.

A. Upon receipt of an application required by this Ordinance, the City staff shall review the application for completeness.

1. Applications shall not be reviewed until all required information has been submitted by the applicant.

2. Incomplete applications shall be rejected. The applicant shall be notified in writing that the application is incomplete and the application shall be returned for completion, together with a notice that the applicant has thirty (30) days from the date of mailing of the notice to submit a complete application acceptable to the City. On the 31st day following notice under this section, if a complete application has not been received, the application shall be deemed to be void and any fees paid shall be forfeited in full to the City. A new application, together with the appropriate fee(s), must be made to restart the application process.

3. The City shall maintain a written log of all applications received, and record information relating to the date an application was received, the reviewed for completeness, the date the application was accepted or rejected, and the dates of any notices as required by paragraph 2, above were mailed.

2.102 FEES.

Except where specifically prohibited by law, the City Council may by resolution establish a fee to be charged in connection with any action, application, hearing, or related activities addressed by this Ordinance. Such fees shall be reasonably set to reimburse the City for expenses and any added costs of operations to City departments affected as a result.

2.102.01 When fees are payable.

Fees shall be payable at the time of application and shall be as set forth by Resolution of the City Council, and incorporated herein. There shall be no fee required for an application initiated by the Planning Commission or the City Council.

2.102.02 Failure to submit required fees.

The failure to submit the required fee with an application or notice of appeal, including return of checks unpaid or other failure of consideration, shall be a jurisdictional defect.

2.102.03 Refunding of fees.

Fees shall not be refundable except where the application is withdrawn by the applicant prior to any construction. The City may withhold all or a portion of the fees paid in such cases to reimburse the City for its expenses incurred up to the point of withdrawal of the application.

2.102.04 Fee reductions.

The City Council may reduce or waive the fees upon showing of just cause to do so.

2.102.05 Fee schedule review.

The City Council shall, at a minimum, review its fee schedule each January and make any adjustments thereto.

SECTION 3

GENERAL PROCEDURES FOR DOCUMENT SUBMISSION, REVIEW, AND APPROVAL

3.100 PURPOSE.

To establish standard procedures to be used by developers and/or engineers when construction plans for public works projects are submitted for approval.

3.101 DRAFTING REQUIREMENTS

The tentative plans and or engineering drawings, after approval, final plans and drawings for all public works construction shall be drawn with pencil or India ink on a good quality linen tracing cloth or suitable drafting material have the same or better characteristics of strength, stability and transparency, and shall show all pertinent information to scale. The scale and terminology shall be standard as used in the industry. The plan or drawing shall contain the following information:

A. Date. North point, scale, dimensions of all lines and a vicinity map locating the project, subdivision, major partition, or minor partition affected.

B. Name and address of the developer, and engineer.

C. Such other information as may be required by the City, the Planning Commission, or the Public Works, Water, or Sewer Superintendents.

3.102 GENERAL PROCEDURE.

The following procedure shall be used when construction plans for public works projects are submitted for approval.

A. The developer or engineer shall submit three (3) copies of construction plans and specifications to the City. One copy shall be retained by the City, one copy shall be given to the City Engineer, and one copy shall be given to the Public Works Superintendent.

B. The City Engineer and/or the Public Works, Water, or Sewer Superintendent will review the construction plans and specifications and make necessary comments pertaining to necessary changes.

C. The City will return one copy of the corrected plans and specifications to the submitting party.

D. The necessary changes to the construction plans and specifications will then be made by the developer and/or engineer, and four (4) sets of revised plans and specifications will be resubmitted to the City.

E. The City will determine whether or not to approve the revised plans and specification as submitted or repeat steps B and C.

F. If the plans and specifications have been revised to the City's satisfaction, the applicant will then receive approval for the construction from the City.

G. All costs associated with the preparation or revision of plans and specifications shall be borne by the applicant.

3.103 PRECONSTRUCTION CONFERENCES.

Prior to the start of any construction, or phases of construction in major projects, the City may require such pre-construction conferences as are deemed necessary to ensure compliance with the provisions of this Ordinance, and protect the public safety, health and welfare.

3.104 WARRANTY OF NEW CONSTRUCTION.

A. The developer shall warranty any and all work performed for a period of one (1) year following installation or construction. The warranty period shall begin on the first day following final inspection approval by the City.

B. In the event of a dispute over warranty related issues, the developer and City shall submit the dispute to an arbitrator, whose findings of fact shall be final.

3.105 ACTIONS REQUIRING PUBLIC HEARINGS, PLANNING COMMISSION, OR CITY COUNCIL REVIEW

Should any action, other than enforcement actions provided for in section 1.104, arise from the application of these construction standards that requires the review and/or a public hearing by the City, Planning Commission, or City Council, the review or hearing shall be held according to the procedures established by the St. Paul Zoning and Development Ordinance for Type II or III land use actions.

SECTION 4

4.100 EMERGENCY CLAUSE.

A. It is hereby adjudged and decreed that existing conditions are such that this ordinance is necessary for the immediate preservation of the public peace, health, and safety of the City of St. Paul, and an emergency is hereby declared to exist, and this ordinance shall take effect and be in full force and effect from and after its passage.

PASSED BY THE COUNCIL: 5 December 1994
(date)

Ayes: 5 Nays: 0

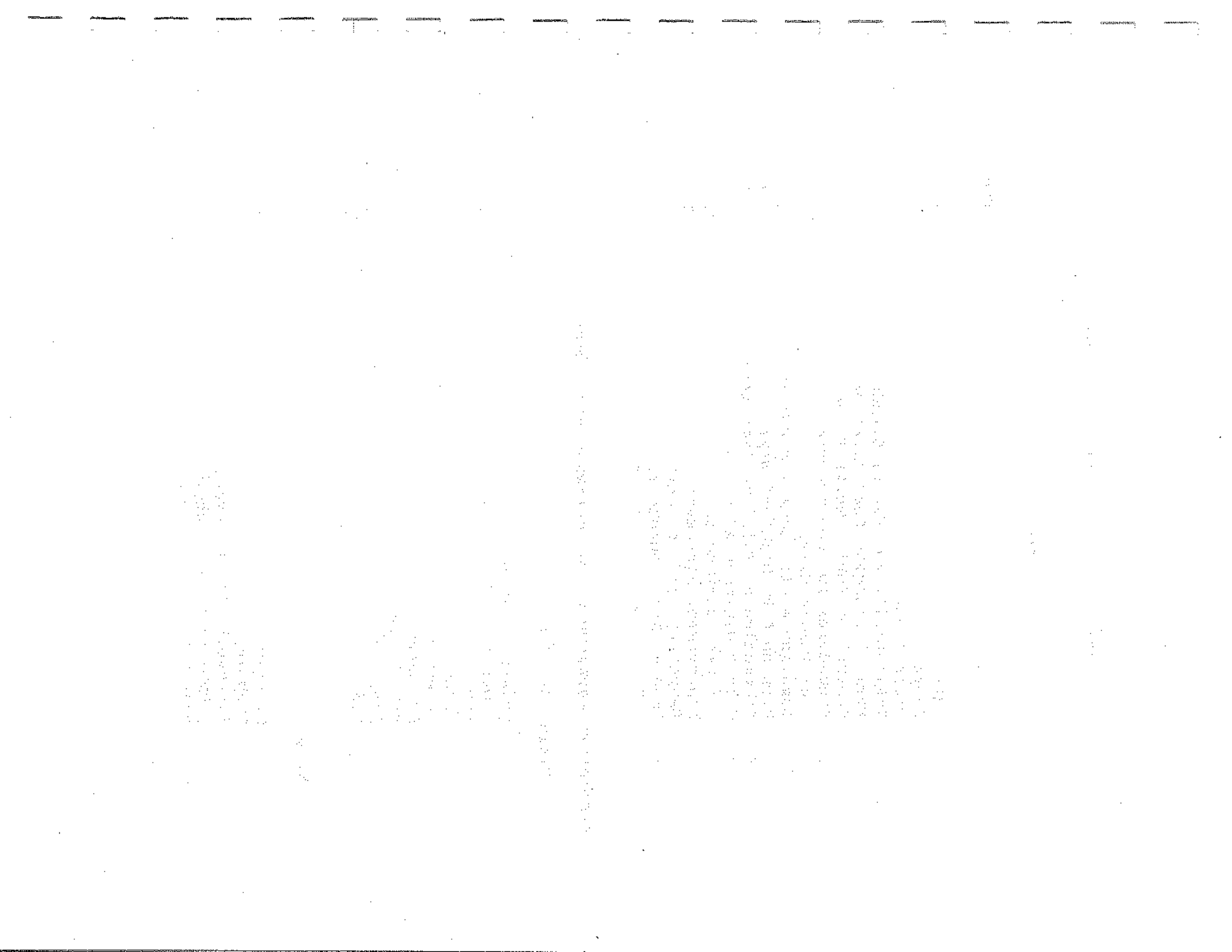
APPROVED BY THE MAYOR: 12-5-94
(date)

Joe McKay
Mayor

FILED IN THE OFFICE OF THE CITY RECORDER:

Date: Dec. 5, 1994

Attest: Patti Raymond
Recorder of the City of St. Paul, Oregon



PUBLIC WORKS CONSTRUCTION STANDARDS

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PUBLIC WORKS CONSTRUCTION STANDARDS
for the
City of St. Paul, Oregon

SECTION I -- SPECIAL CONDITIONS

1. INTENT

These Public Works Construction Standards are for the intent specified in section 1.100 of the St. Paul Construction Standards Ordinance.

2. SCOPE

These Public Works Construction Standards are intended to be within the scope specified in section 1.102 of the St. Paul Construction Standards Ordinance.

3. DEFINITIONS

As used in this Ordinance and the attached standards, the following definitions shall apply:

CITY means the City of St. Paul, Oregon.

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a) Superintendent: The Public Works Superintendent, and may include the Water or Sewer Superintendent.

b) Technician: A City staff technician.

c) City Engineer: A registered professional engineer or consulting engineering firm employed by the City. In the case of projects undertaken by the City with no outside engineering involvement, the term City Engineer may appear in the standards in the abbreviated form of "Engineer." Unless otherwise specified, the City Engineer and Public Works Superintendent may be considered to be interchangeable in these public works standards.

DEVELOPER means a person who undertakes construction of a public works facility within the corporate limits of the City.

PUBLIC WORKS FACILITY means any facility constructed upon public right of way or public easement which is immediately or eventually to be taken over by the City for maintenance and operation. These facilities include, but are not limited to: streets, sidewalks, curbs, parking lots, driveways, drainage facilities, water system works, and sanitary sewer systems.

STANDARDS means these Public Works Standards as adopted for use in the City of St. Paul, Oregon.

4. AVAILABILITY AND USE OF STANDARDS

A. Copies of these standards shall be available at City Hall at the City's actual cost, rounded upwards to the nearest whole dollar amount.

B. An Engineer may utilize the standards by direct reference thereto in any contract documents prepared for construction of street, drainage, water, and sewer facilities within the City. If such election is made by the Engineer, contract documents shall contain the following statements:

"Materials and workmanship shall be in strict accordance with the Public Works Construction Standards of the City of St. Paul. No changes from the approved project plans shall be made without prior written approval from the City."

C. These standards are in outline form only, and shall not relieve an Engineer from his/her professional responsibilities during project design and construction. Any additional project requirements shall be set forth in the documents an Engineer prepares for the work. The City provides these standards only as a convenience to facilitate development within the City of St. Paul.

5. FORM OF STANDARD SPECIFICATIONS

The accepted abbreviations for various societies, associations and organizations are also used for the sake of brevity. Some of these are presented below:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
ORS	Oregon Revised Statutes
OSHA	Occupational Safety and Health Administration
OSHD	Oregon State Highway Division
PCA	Portland Cement Association
UBC	Uniform Building Code
WWPA	Western Wood Products Association

Unless otherwise specifically noted in these Specifications, references to various standard specifications shall mean the current revisions of the same.

6. CONTROL OF PUBLIC WORKS PROJECTS

a. All public works facilities, or facilities to become public shall be designed and inspected under the direction of a Professional Engineer registered in the State of Oregon. At the completion of the construction, this Engineer shall submit a completion certificate to the

City stating that all work has been completed in accordance with the approved project plans and specifications.

b. All surveys for public works facilities shall be performed under the direction of a Professional Engineer or Professional Land Surveyor registered in the State of Oregon. All elevations shall be referenced to USGS datum.

c. Materials and workmanship shall meet or exceed the adopted Standards and at all times they shall be subject to the approval of the City Engineer.

d. Approval by the City of the plans and specifications will be contingent upon necessary approvals by the applicable County, State and Federal agencies. For example, water and sewerage system facilities will require, as a minimum, approval from the State Health Division and the Department of Environmental Quality respectively.

e. Upon completion of projects to become public works, a Developer or the Developer's Engineer shall submit one complete set of reproducible mylar "as-built" drawings to the City. Such "as-built" drawings shall show any deviations from the original construction drawings and shall have sufficient information, including water and sewer elevations, to accurately locate water and sewer service extensions, reports on water and sewer line leakage tests, etc. In addition, the Developer or his Engineer shall submit water and sewer "ties" on 8-1/2" x 11" sheets. Samples of these sheets are shown in Section V - "Acceptance Policies." Two (2) copies of completed tie sheets shall be submitted to the City Engineer upon project completion.

f. Prior to acceptance of public works projects by the City for operation and maintenance, a one-year guarantee on all materials and workmanship incorporated therein shall be provided to the City in one of the acceptable forms described hereinafter.

7. <u>PROCEDURES FOR CONSTRUCTION OF PUBLIC WORKS</u>

a. Public Works serving a single lot less than 1/2 acre in size, consisting of a residence or business:

1) Anyone wishing to construct a public works facility as hereinbefore defined to serve a single lot, residence or business shall apply for a <u>Type A Construction Permit</u> from the Public Works Department. A sample Type A form is appended to this section.

Type A permits will normally be processed coincidental with building permits.

2) A twenty-five dollar ($25.00) fee is charged for Typed A permit.

3) At the discretion of the Public Works Superintendent, a pre-construction conference will be held with representatives from the project engineering firm, contractor and City. The purpose for the pre-construction conference is to familiarize the aforementioned representatives with the City Public Works procedures and to establish tentative schedules for construction and inspection. The permit holder shall give 24 hours notice to Public Works Superintendent prior to inspections that the permit holder may require for documentation.

4) When engineering and/or surveying services are provided by the City, construction plans, cut sheets and related data will be furnished to the permit holder within a reasonable time after date of permit issuance.

5) By his signature on a Type A permit, the permit holder agrees as follows:

   a) To submit a project schedule.

   b) To construct the improvement in accordance with the City Standards.

   c) To guarantee all materials and workmanship incorporated into the work for a period of one (1) year following final inspection and acceptance of the improvement by the City.

   d) To provide the City with a bond for the project as follows:

      - Single Family $2,000.
      - Other 10% of construction cost

   e) To indemnify and hold harmless the City, its officers, representatives and employees from liability of every nature and kind as may result from the operations or negligent acts of the permit holder in performing the work described herein.

6) Upon completion of all work, the permit holder shall notify the Public Works Department who shall within

48 working hours, make a final inspection of the project. If the work meets requirements, the improvement will be accepted by the City and a date then established for the 1 year guarantee period.

b. Public Works serving more than one lot, residence, or business (partitions, subdivisions, etc.).

1) Anyone wishing to construct a public work facility as hereinbefore defined to serve more than one lot, residence or business shall apply for Type B Construction Permit from the Public Works Department. A sample Type B form is appended to this section.

2) Requirements for issuance of a Type B permit include:

a) Prior satisfaction of all planning, zoning and building code requirements.

b) Submission and approval of detailed construction plans and specifications as prepared by a registered Professional Engineer. Four (4) sets of plans shall be submitted. If acceptable, one set of plans and specifications shall be marked "approved" and shall be returned to the applicant. If not acceptable, any deficiencies shall be noted when these documents are returned to the applicant; the applicant shall then make the necessary corrections and resubmit the documents for approval prior to construction activity.

c) Submission of a copy of a construction performance bond or other written guarantee acceptable to the City in the full amount of the construction cost. This bond shall guarantee materials and workmanship for a period of 1 year following acceptance of the improvements by the City, and it shall ensure the satisfactory repair or replacement of any public facility damaged during construction.

d) Submission of a copy of a certificate indicating that the applicant or each of his/her contractors is covered by public liability and property damage insurance in amounts of not less than $200,000/$500,000 liability and $100,000 property damage.

e) Submission of letters from applicable State and Federal agencies approving the plans and specifications.

f) Payment of permit fee to defray the City's costs of inspection and administration. The permit fee shall be based on a rate of NOT LESS than 1.5 percent of total construction cost, but not greater than 5 percent of total construction costs (see Permit Fees Type B, Page I-13).

c. Periodic inspection of construction by City representatives shall be required. No concrete shall be poured or pipe backfilled without such inspections being made and approvals given. A tentative schedule for inspection shall be established when the permit is issued. The permit holder shall give the City a minimum of 48 working hours advance notice before inspections fall due. It shall be the permit holder's responsibility to obtain City inspections and approvals before installing the work.

d. The City shall provide the permit holder with a letter formally accepting the improvements for City ownership, operation and maintenance subject to the usual exception as to the 1 year guarantee on materials and workmanship, when the following conditions are met:

1) Construction is complete.

2) The Director or his duly authorized representative has inspected the finished work and found it acceptable.

3) The permit holder's Engineer submits a certificate of completion and reproducible "as-built" plans to the City as required under paragraph 6e of these Special Conditions. Copies of satisfactory passage of water and sewer line leakage tests shall also be furnished to the City.

4) The permit holder furnishes the City with a copy of a non-lien affidavit certifying that all bills in connection with the work have been paid in full.

5) Satisfactory provisions have been made in the form of recorded plats or easements to ensure the City's access to the public works facility for purposes of operation and maintenance.

6) Follow all guidelines set forth in the acceptance policies for water, sanitary sewer, streets, and storm drainage as set forth in Section IV herein.

8. COMPLIANCE WITH LAWS AND REGULATIONS

The required provisions of all applicable laws, regulations, and codes shall be deemed incorporated in all public works construction documents and they shall have equal force and effect as though written out fully therein.

9. WORK ON CITY RIGHT-OF-WAYS

Work on City right-of-ways shall require the following:

a. Compliance with City approved construction documents.

b. Furnishing the City with a copy of the construction performance bond or other written guarantee acceptable to the City to ensure satisfactory restoration or replacement of any damaged public facility existing on City right-of-way.

c. Erection and maintenance of suitable warning signs, barricades, danger lights and flagging as necessary for the convenience and safety of the traveling public and in accordance with MUTCD standards.

d. The minimum possible interruption to pedestrian and vehicular traffic flow.

10. PROTECTION OF EXISTING FACILITIES

a. The approximate locations of underground City water, sewer, and drainage facilities shall be available at the office of the City Recorder. The approximate locations of underground power, gas, telephone and cable facilities shall be available from the serving utility companies. The locations of existing facilities shall be shown on the construction drawings for public works projects.

b. The exact locations of underground facilities shall be verified in advance of public works construction, in cooperation with the public or private utilities involved.

c. All existing underground and surface facilities shall be protected from damage during construction of public works projects.

d. Any existing facilities not specifically designated for alteration or removal which are damaged during construc-

tion shall be restored or replaced to an "in-kind" or better construction at the expense of the contractor.

e. Suitable notice shall be given to all public and private utility companies in advance of construction for the purpose of protecting or relocating existing facilities.

11. CITY ORDINANCES AFFECTING PUBLIC WORKS CONSTRUCTION

a. New subdivisions and land partitions under the jurisdiction of the City of St. Paul shall comply with the requirements of the City's Zoning and Development Ordinance as adopted by the City Council, or as it may be hereafter amended or superseded.

b. The physical requirements for all public works construction within the City shall comply with these standards.

c. Sections II through IV of these Public Works Standards set forth to be used in the design of public works facilities in the City. Variances to these design standards may be considered by the City Engineer upon adequate showing that a special case exists. The City Engineer shall file a decision granting or denying such variance with the City Recorder. Such decision may be appealed to the City Council under the procedures for the appeal of a variance.

12. IMPROVEMENT AGREEMENT

If a developer desires to defer construction of a portion of the public works improvements to be constructed, and if such deferral is determined by the City Engineer or City Council to have no adverse effect on the City's interests, the Developer shall enter into an improvement agreement with the City. Said improvement agreement shall set forth completion dates for the items of work to be deferred, and it shall constitute assurance that all improvements will be made in a timely manner. The City Engineer or City Council may impose conditions of approval of such deferments.

13. TEMPORARY TRAFFIC CONTROL

a. The contractors of public works projects shall provide and maintain such signs, barricades and warning lights as are necessary to warn and protect the public at all times on highways, roads, or streets affected by work operations. In addition, the contractor shall also provide all necessary flagging, barricades, signs, and traffic control devices necessary to warn and protect the public, all in conformance with the Manual on Uniform

Traffic Control Devices (MUTCD), published by the U.S. Department of Transportation.

b. The Contractor shall patrol the traffic-control area and reset all disturbed signs and traffic-control devices immediately, and shall remove or cover all non-applicable signs during periods not needed.

c. When necessary, public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible.

d. The contractor shall provide access to private properties at all times, except during urgent stages of construction when it is impractical to carry on the construction and maintain traffic simultaneously.

e. The contractor shall give occupants of property fronting a street at least 24 hours notice before more than half the street is closed to vehicular traffic.

f. When, in the judgment of the City, vehicular parking is a hazard to through traffic or to the work, the contractor shall furnish and place "No Parking" signs on any street which is directly involved in the construction work.

g. The contractor shall construct and maintain approved temporary detours for the protection of the work and the safe passage of traffic through the work area.

h. When detours are not available, the contractor shall confine operations to a width which provides for safe passage of traffic. If, in the judgment of the City, one-way piloted traffic is necessary, the contractor shall provide flaggers to control traffic, one flagger being stationed at each end of the roadway and flaggers stationed at each intersecting street. At the end of each day, the contractor shall leave work in such condition that it can be traveled without damage to the work and without damage to the public.

i. The contractor shall comply with the requirements of the Oregon State Highway Division and Marion County Road Department for work affecting roadways under their respective jurisdictions.

Permit No. _____

DEPARTMENT OF PUBLIC WORKS
TYPE B CONSTRUCTION PERMIT APPLICATION

Application is Made to: _____ Construct _____ Alter

_____ Street _____ Curb _____ Sanitary Sewer
_____ Storm Drain _____ Driveway _____ Water Main
_____ Sidewalk _____ Parking Lot _____ Other

Description of the Work: _____

_____

_____

Location of Work:

_____ Private Property Address _____
Lot _____ Block _____ Addition _____
Owner(s) Name _____
Address _____ Ph. _____
Address _____ Ph. _____

Easements Required: _____ Obtained? _____
_____ Right-of-way, Street _____
From _____ To _____
Engineer _____ Address _____ Ph. _____
Contractor _____ Address _____ Ph. _____
_____ Address _____ Ph. _____
State of Oregon approval for water and sanitary sewer projects. Date _____
Public Liability Coverages $_____ Certificate of Insurance Attached _____

Proposed Work Schedule:
Begin _____ Complete _____
Remarks _____
_____

_____ Plans cleared by local, public and private utilities.
_____ Three sets of plans attached.
Number of lots served by above facilities _____

Permit Fee Basis:
Total Permit Fee $_____ Paid By: _____
_____ Attach 100% Performance and Maintenance Bond.

NOTICE: After issuance of a permit, the contractor shall give the City and all local utility companies at least 24 hours notice before commencing work.

I agree to compply with the above description, plans and specifications herewith submitted, and also with the regulations of the City of St. Paul and the State of Oregon covering such work.

Applicant: _____
Application Received (date) _____ by _____

Plans Checked By:
Department of Public Works _____ _____ _____
Approved Not Approved Date
Permit Issued (date) _____ 19__ by _____
ACTUAL CONSTRUCTION:
Date Started _____ Date Completed _____ Date Accepted _____

Permit No. _____

DEPARTMENT OF PUBLIC WORKS
TYPE A CONSTRUCTION PERMIT APPLICATION

Application is Made to: _____ Construct _____ Alter

_____ Street _____ Curb _____ Sanitary Sewer
_____ Storm Drain _____ Driveway _____ Water Main
_____ Sidewalk _____ Parking Lot _____ Other

Description of the Work: _____

_____

_____

Location of Work:
_____ Private Property Address _____
Lot _____ Block _____ Addition _____
Owner(s) Name _____
Address _____ Ph. _____

Easements Required: _____ Obtained? _____
_____ Right-of-way, Street _____
From _____ To _____
Engineer _____ Address _____ Ph. _____
Contractor _____ Address _____ Ph. _____
_____ Address _____ Ph. _____
State of Oregon approval for water and sanitary sewer projects. Date _____

Proposed Work Schedule:
Begin _____ Complete _____
Remarks _____

_____

_____ Plans cleared by local, public and private utilities.
_____ Three sets of plans attached.
Permit fee ($25) paid by: _____

CONDITIONS OF THIS PERMIT

1. Applicant agrees to comply with the above description of work, attached plans, and the regulations of Construction Standards for Public Works Construction of the City of St. Paul.

2. Applicant agrees to guarantee all materials and workmanship covered by this permit for a period of one year following acceptance of the improvements by the City.

3. Applicant agrees to indemnify and hold harmless the City, its officials, representatives and employees from any and all liability resulting from the applicant's negligent acts or performance of work under this permit.

Applicant: _____
Application Received (date) _____ by _____

Plans Checked By:
Department of Public Works _____ _____ _____
Approved Not Approved Date

Permit Issued (date) _____ 19__ by _____
ACTUAL CONSTRUCTION:
Date Started _____ Date Completed _____ Date Accepted _____

Type B Permit Fee

The applicant for a Public Works Construction Permit shall pay a permit fee at the time construction plans are submitted for review and approval by the City Engineer, the applicant shall pay a fee deposit as shown in Table A.

TABLE A

Total Estimated Construction Costs ($)			Construction Permit Fee
0	to	1,000	$ 25.00
1,000	to	2,000	60.00
2,000	to	5,000	107.00
5,000	to	10,000	218.00
10,000	to	20,000	413.00
20,000	to	30,000	655.00
30,000	to	40,000	889.00
40,000	to	50,000	1,112.00
50,000	to	75,000	1,463.00
75,000	to	100,000	1,969.00
100,000	to	150,000	2,650.00
150,000	to	200,000	3,535.00
200,000	to	300,000	4,750.00
300,000	to	400,000	6,335.00
400,000	to	500,000	7,875.00
500,000	and	Over	1.5% of Total Construction Costs

The permit fee is intended to defray all costs incurred by the City in providing technical services related to any Public Works Construction performed through a private engineer and contractor at the applicant's expense. Services provided by the City include, but are not limited to the following:

1. Meeting with the applicant, his engineer or agent to review City standards, specifications, ordinances and procedures.

2. Providing the applicant's engineer with information on existing conditions and facilities.

3. Providing information and data for any State or County approvals that are required.

4. Reviewing all construction drawings, engineering and specifications.

5. Making inspections necessary to assure compliance with City standards and specifications.

PUBLIC WORKS CONSTRUCTION STANDARDS

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SECTION II (CONT'D.)

SECTION II--STREETWORK AND DRAINAGE FACILITIES

A. DESIGN STANDARDS

1. General Reference - Subdivision and Land Partitioning Ordinance

   a. **Alignment** - As far as practical, streets other than minor streets shall be in alignment with existing streets by continuations of the centerlines thereof. Staggered street alignment resulting in "T" intersections shall, whenever practical, leave a minimum distance of 200 feet between the centerlines of streets having approximately the same direction and otherwise shall not be less than 100 feet. Whenever possible, local streets will be aligned along true east/west; collector streets will be aligned along true north/south. A variation of not more than 25° is allowable.

   b. **Future Extension of Streets** - Where necessary to give access to or permit a satisfactory future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision; and the resulting dead-end streets may be approved without a turn-around. Reserve strips and street plugs may be required to preserve the objectives of street extensions.

   c. **Intersections of Streets** - Streets shall intersect one another at an angle as near to the right angle as is practicable considering topography of the area and previous adjacent layout. Where not practicable, the right-of-way and street paving within the acute angle shall have a minimum of 30 feet centerline radius where such angle is not less than 60 degrees. The intersection of an arterial or collector street with another street shall have at least 100 feet of tangent adjacent to the intersection unless topography requires a lesser distance. Other streets, except alleys, shall have at least fifty (50) feet of tangent adjacent to the intersection unless topography requires a lesser distance. Intersections which contain an acute angle of less than 80° or which include an arterial street shall have a minimum corner radius sufficient to allow for a roadway radius of 20 feet and maintain a uniform width between the roadway and the right-of-way line.

d. **Cul-de-sacs** - A cul-de-sac shall be as short as possible and no more than 600 feet long or serving more than 18 dwelling units. Each cul-de-sac shall have a circular end with a minimum diameter of right-of-way width and paving as shown in the Table 1 of this sub-chapter. The use of cul-de-sacs shall be discouraged and may only be approved upon a showing by the applicant of unusual or unique circumstances justifying the cul-de-sacs.

e. **Grades and Curves** - Grades shall not exceed six percent (6%) on arterials, ten percent (10%) on collector streets or twelve percent (12%) on any other street. Centerline radii of curves shall not be less than 300 feet on major arterials, 200 feet on collectors and continuing residential streets, and 100 feet on other streets and alleys, and shall be to an even ten (10) feet. Where existing conditions, particularly topography, make it otherwise impractical to provide buildable lots, the Planning Commission may accept steeper grades and sharper curves. In flat areas, street grades shall have a minimum slope of 0.25 percent with curb and gutter and 0.40 percent with full depth standard curb.

f. **Alleys** - Alleys shall be provided in commercial and industrial districts, unless other permanent provisions for access to off-street parking and loading facilities are approved by the Planning Commission. The corners of alley intersections shall have a radius of not less than 12 feet.

1) Dedication - The Planning Commission or City Council may require adequate and proper alleys to be dedicated to the public by the land divider of such design and in such location as necessary to provide for the access needs of the subdivision or partition.

2) Width - Width of right-of-way and paving design for alleys shall be not less than 20 feet. Slope easements shall be dedicated as required by the City Council.

3) Corner Cut-Offs - Where two alleys intersect, 10 feet corner cut-offs shall be provided.

4) Grades and Curves - Grades shall not exceed 12% on alleys and centerline radii on curves shall be not less than 100 feet.

5) Other Requirements - All provisions and requirements with respect to streets in this chapter shall apply to alleys the same in all respects as if the work

"street" or "streets" therein appeared as the work "alley" or "alleys" respectively.

2. Streets

a. Symmetrical street cross sections per Standard Details are preferred, with opposite curbs at the same grade.

b. Tilted and warped street cross sections are only allowed under the special cases of sidehill lies and to match existing facilities.

c. The maximum difference in opposing curb grade elevations shall be one foot for tilted and warped sections.

d. The finished pavement grade from the center point of cul-de-sac turn-arounds to the gutter line shall be at least 2.0 percent negative.

e. Improvement widths shall conform to Table 1 of this sub-chapter.

f. Design of Roadway

1) Standard roadway designs per Standard Details can be used for residential streets and collector streets. Standard sections are to be considered minimum designs and actual soil conditions may require thicker base rock or pavement installations.

2) For roadways with design capacities over 10,000 vehicles per day, street designs shall be submitted to the City Engineer with appropriate soils bearing test results and design calculations.

3) Intersection design details shall be approved by City Engineer. Standard curb radius at corners to be 20 feet.

TABLE 1
ROADWAY STANDARDS

Section	Type of Street	Right-of-Way Width	Min. Paving Width	Design Capacity Vehicles Per Day
A	Arterial	88'*	64'*	32,000
B	Collector Streets	66'*	44'*	10,000
C	Commercial and Industrial Other than Arterials	80'*	44'*	12,000
D	Local Residential Streets Serving More than 20 Dwelling Units	60'	34'	7,000
E	Local Streets and Cul-de-sacs Serving 20 or less Dwelling Units	50'	28'	1,200
F	Circular Ends of Cul-de-sacs	90'	76'	200

Note: Design capacities based on level of service "D," 5% commercial vehicles, 10% right turns, 10% left turns, peak hour factor 85-90%, peak hour directional distribution 55-60% peak hour 9-12% of daily volume and average signal timing for collector and arterial streets.

* Width shall be reviewed on a case-by-case basis by the City.

3. Curbs

a. Curbs shall conform to Standard Details.

b. Curb tops shall be set below adjacent ground levels to receive surface drainage.

c. Three-inch diameter weepholes shall be provided through curbs with inverts one inch above gutter line, at the following locations:

1) Opposite existing or anticipated roof drain downspouts (minimum of two per lot).

2) At 16 foot on centers along low areas where curb top is above adjacent ground.

3) At 16 foot on centers adjacent to bank areas to receive groundwater.

d. Curb shape to conform to standard details. No "glue down" extruded type curbs shall be permitted in public right-of-way.

e. Monolithic curb and gutter sections may be required where curb grades are below the 0.40 percent minimum recommended.

f. Machine extruded curbs, as well as formed and poured curbs, shall require two inches of 3/4" minus crushed rock base.

g. Maximum tolerance for finished curbs shall be 1/2" on alignment, and 1/4" on grade at any point, providing a drainage pocket does not occur.

h. Provide drop curbs for driveways, curb radii and ambulatory ramps with original curb pour when locations can be determined in advance.

4. Sidewalks

a. Sidewalks shall conform to Standard Details.

b. Sidewalks shall maintain 1/4" per foot cross slope for drainage to curbs.

c. Sidewalks may be deferred until lots are built upon, when commitment for sidewalk construction is made to the City in writing and written City approval is received.

d. Sidewalk locations shall be determined by the Planning Commission and City Council.

e. Sidewalks adjacent to curbs may be permitted on minor streets, cul-de-sacs, and in some commercial areas subject to Planning Commission approval.

5. Driveways

a. Driveways shall conform to Standard Details.

b. Driveways may be deferred until lots are built upon, if approved by the City Planning Commission or City Council.

c. Maximum driveway ramp slope shall not exceed 15 percent (15%). Ogive shall not be less than 20 feet.

6. Bike Paths - Bike paths shall conform to Standard Details.

7. Storm Drainage

a. Storm sewers and appurtenances shall be provided for new subdivisions, land partitions and industrial and commercial lots as determined by the City Engineer.

b. Low corners at street intersections shall be drained through storm sewer systems. No street drainage shall be allowed except as provided under (c) below.

c. Concrete valley gutters of designs approved by the City Engineer may be used to continue surface drainage across intersections of cul-de-sac streets serving no more than 10 lots.

d. ADS N-12 or corrugated aluminum storm sewers shall be used under all street improvements, with a minimum of one and one-half foot cover to finished grade. Ductile iron pipe shall be used where cover is less then one and one-half feet to finish grade.

e. Storm sewers shall be designed for at least 2 feet per second (fps) self-cleaning flow velocities when full; outlet protection shall be provided where storm sewers daylite with scouring velocities. Storm drainage detention shall be used where practical or when required by the City.

8. Signing

a. All newly platted streets shall be signed with name approved by Planning Commission.

b. Signs shall conform to City Standards and Standard Details.

c. Signs along County or State right-of-way shall be approved by the Yamhill County Road Department or State Highway Division as appropriate.

9. Permanent Barricades and Guard Rails

a. All permanent barricades and guard rails along City right-of-way shall conform to Standard Details.

b. Permanent barricades and guard rails along County or State right-of-way shall be approved by the Marion

County Road Department or State Highway Division as appropriate.

B. MATERIALS

1. Clearing - All unclassified material of natural or man-made origin occurring within right-of-ways, the removal of which is necessary to accommodate permanent construction, shall be cleared.

2. Grubbing - All natural or man-made matter including but not limited to: stumps, roots, buried vegetation and debris which occur within a 24 inch depth below subgrade, shall be cleared and removed.

3. Earthwork: Street Excavation, Embankment and Subgrade

   a. Street excavation shall be classified as common excavation, except where the documents for a project specifically contain a rock excavation bid item.

   b. Where provided for, rock excavation shall include only solid bedrock and ledge rock or substantial concrete foundations which cannot be removed by ordinary mechanical means, but which require drilling and blasting. Only rock which can not be removed by a Cat 225 excavator (or equivalent), or larger shall be considered as rock excavation.

   c. Overexcavation and backfill, when directed by the Engineer, shall be performed to firm up soft or spongy foundations occurring below subgrade level. Backfill material shall be either:

      1) Select native materials resulting from site excavations and approved by the City Engineer, or

      2) Imported base rock as hereinafter defined, when authorized by the Public Works Superintendent.

   d. Subgrade and embankment material shall be:

      1) Approved native clays, silts, sands, gravels, and mixes of same.

      2) Free from sod, roots, vegetative matter, debris, boulders and rock fragments over six inches in diameter.

3) Capable of being compacted and graded into a dense, smooth, stable mass as required under the "workmanship" section of this chapter.

e. Top soil backfill for curbs and planting strip areas shall be approved native or imported fine grained soil mixes free of deleterious matter.

4. Trench Excavation, Backfill and Bedding for Storm Sewers

a. Trench excavation shall be unclassified, except where the project documents specifically contain a trench rock excavation bid item.

b. Where provided for, trench rock excavation shall include solid bedrock, ledge rock, and boulders over 3/4 cubic yards in volume which cannot be removed by a Cat 225 or equivalent excavator, but which requires drilling and blasting.

c. Pipe embedment material shall be 3/4"-0" or 1"-0" crushed rock conforming to Section 703 OSHD.

d. Pipe zone material shall be 3/4"-0" or 1"-0" crushed rock conforming to Section 703 OSHD.

e. Backfill above pipe zone shall be:

1) Class I Granular Backfill:

a) 3/4"-0" or 1"-0" crushed rock; conforming to Section 703 OSHD specifications.

b) All material shall be approved by the City Engineer.

c) The City Engineer may visually reject material until tests are made.

d) Use under gravel drives, paved roadways, paved driveways, or as directed by the City Engineer.

2) Class II Select Backfill:

a) Well graded pit run, pea gravel, sand, or crusher screenings shall meet the following minimum requirements:

(1) One hundred percent (100%) passing 6" sieve (U.S.) and 5 to 15 percent passing #200 mesh (U.S.).

(2) Free of deleterious matter.

b) All material to be approved by the City Engineer.

3) Class III and IV Native Backfill

a) Select native excavated material free of vegetable matter and debris.

b) Individual particles shall be less than 1/3 trench width in greater dimension.

c) Class III and Class IV shall be used in unimproved areas.

f. All backfill shall conform to Standard Details for storm sewer pipe trench.

5. Storm Sewer Pipe

a. Materials*

1) Aluminum CMP

a) Aluminum CMP storm drain pipe shall be aluminum spiral ribbed, with 2-2/3" x 1/2" corrugations and conforming to AASHTO M-196 specifications. Gauge of pipe shall be per manufacturer recommendations. Fourteen gauge shall be the minimum thickness.

b) All pipe connections shall be made with 12" wide dimple bands and of the same material and gauge as run of pipe. Use minimum 20' long CMP pipe sections except for end run.

2) Non-Reinforced Concrete Pipe (for pipe diameters 8"-15" only)

a) Concrete storm sewer pipe shall conform to ASTM C-14 Class 3.

b) Joints to be tongue and groove, open joint with 12" wide strips standard building paper or 2000 psi grout for top half of pipe circle for driveway culvert locations. All other installations shall be bell and spigot with rubber gasket.

3) Reinforced Concrete Pipe

a) Reinforced concrete storm sewer pipe shall conform to ASTM C-76 Class IV.

b) Joints shall be bell and spigot with rubber gasket.

b. Storm sewer pipes with less than one and one-half feet of cover below finished grade shall be Class 50 ductile iron pipe.

c. Pipe fittings including tees, bends and plugs shall be of the same material as the mainline pipe.

* Design Engineer to determine which pipe material is suitable for the project based on a pipe load analysis.

6. Manholes, Catch Basins and Appurtenances

a. Precast or monolithic cast-in-place concrete units are permitted.

b. Precast sections shall conform to ASTM C478 specifications; cast-in-place units shall be equivalent as to concrete and reinforcement design and workmanship.

c. All concrete shall be Class A per Section 504 of OSHD specifications, with minimum 28 day compressive strengths as follows:

1) Catch basins and manhole bases - 3000 psi.

2) Manhole risers (48" dia. min.), cones and flat tops - 4000 psi.

d. Flat tops for manholes 48" in diameter shall be 6" thick; for manholes over 48" in diameter, 8" thick.

e. Portland cement shall be per ASTM C150, Type II.

f. Concrete aggregate shall be per ASTM C33 - 1-1/2" maximum size.

g. Reinforcement design for manholes shall conform to items 9 through 13 of ASTM C478, with either:

1) Welded wire fabric - ASTM A185.

2) Deformed bars - ASTM A615, Grade 60.

h. Mortar Proportions - Mortar shall consist of one part Portland cement (Type II) and two parts clean, well graded, concrete sand of which 100 percent passes a #8

(U.S.) mesh sieve. No mortar shall be mixed longer than 30 minutes.

i. Manhole castings shall have the following minimum requirements:

1) All castings shall be true to size, weight and tolerances shown on the Standard Plans. Delivered weight shall be ±5 percent of the specified weight. The bearing seat shall not rock when checked by the test jig. The foundry shall supply all test gauges and shall not subcontract any of the work other than testing procedure, patterns, machining and cartage. The casting shall not be made by the open mold method and shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted. All castings shall be shot or sandblasted, and the application of paint or other coating will not be permitted. Each casting shall have distinctly cast upon it the initials of the manufacturer and the year of the cast. These characters shall be minimum 1-1/4-inch in height and 1/8-inch in relief.

2) Casting material shall conform to ASTM A 48, Class 30B.

3) Castings shall conform to dimensions shown on Standard Details.

j. Catch Basin Castings

1) Frames and grates for catch basins and storm drain inlets shall be fabricated of steel conforming to ASTM A 7, A 36 or A 373 in accordance with the details shown on the Standard Plans. All connections shall be welded. Welding shall conform to requirements of current code for welding in building construction of the American Welding Society. Frames and gratings shall be tested one within the other and there shall be no more than 1/16-inch rock. When checked by a test jig, the bearing seat of either component shall have no more than 1/16-inch rock. Test jigs shall be furnished by the manufacturer.

k. Rock riprap shall be provided where required by the approved project plans.

1) Such riprap shall conform to Section 714 of OSHD specifications for loose riprap.

2) Size and grading class shall be noted on plans.

3) Such riprap shall be angular in shape. Rounded stone shall not be allowed.

l. Special structures shall be as detailed on the approved plans and required by specifications for each project.

m. Manholes, catch basins and appurtenances shall conform to Standard Details.

7. Concrete Curbs

a. Such curbs shall conform to Section 609 of OSHD specifications as to aggregate, concrete, joint filler and steel.

b. All concrete shall conform to Section 504 of OSHD specifications; minimum compressive strength to be 3000 psi at 28 days.

c. Conform to Standard Details.

d. Expansion joints shall be 1/2" premolded filler per subsections 705.01 and 609.35 of OSHD specifications, at intervals not to exceed 40 feet and at all abutting concrete.

e. Contraction joints shall be 1/8" weakened plane type per subsection 609.37 of OSHD specifications at intervals not to exceed 15 feet.

f. Aggregate base for machine extruded curbs shall be 3/4"-0" crushed rock.

g. Curb weep hole pipe shall be 3" diameter PVC or ABS solid wall.

h. Drop curbs shall be of the same material and shape shall conform to Standard Details.

i. Drop curbs for ambulatory ramps shall conform to Standard Details.

8. Sidewalks and Driveways

a. Sidewalks and driveways shall conform to Section 608 of OSHD specifications as to aggregate, concrete, joint filler and steel.

b. All concrete shall conform to Section 504 of OSHD specifications; minimum compressive strength to be 2500 psi at 28 days.

c. Sidewalks and driveways shall conform to standard details for sidewalk and driveway dimensions and details.

d. Expansion joints shall be 1/2" premolded filler per subsection 705.01 and 608.35 of OSHD specifications at intervals not to exceed 15 feet and at all abutting concrete.

e. Contraction joints shall be 1/8" weakened plane type per subsection 608.36 of OSHD specifications at intervals not to exceed 15 feet.

f. Aggregate base where required for sidewalks and driveways shall be 3/4"-0" crushed rock.

g. Sidewalk joints shall line up with curb joints.

9. Base Rock and Surfacing Rock

a. Base rock shall be 1"-0" crushed rock or crushed gravel conforming to Section 703 of OSHD specifications, minimum lift required is 6 inches.

b. City Engineer may require gradation, plasticity, sand equivalent and abrasion test data to be provided prior to placement of material.

10. Soil Sterilant

a. Soil sterilant shall be required only adjacent to existing curbs where streets are to be improved.

b. Sodium chlorate, chlorea, or approved non-selective herbicide shall be used.

11. Asphaltic Concrete Pavement

a. Basic street paving shall be a Class B asphaltic concrete mix conforming to Section 403 of OSHD specifications.

b. Class C and finer concrete mixes shall be used for patching and overlays less than 2" in thickness and shall conform to the above specifications.

c. Asphalt cement shall be AC-15 grade, minimum 6.0% by weight.

d. Tack coat shall be CRS-1 conforming to ASTM D-977 for "emulsified asphalt."

e. Joint seal shall be CRS-1 conforming to ASTM D-977 for "emulsified asphalt."

f. Engineering fabric shall be needle-punched, non-woven polypropylene fabric, fused on one side only, and having the following properties:

Weight, oz/sq. yd.	3.8 Min.
Tensile Strength, 16 (ASTM D-1682)	90 Min.
Elongation at Break, % (ASTM D-1682)	55 Min.
Asphalt Retention, gal/sq. yd.	0.25 Min.
Min. Melting Temp.	350°F.

The fabric used shall be capable of retaining a minimum of 0.20 gal/sq.yd. However, additional sealant may be needed to fully saturate the fabric. This additional amount should be added to the quantity of sealant applied to the pavement.

12. Surface Restorations

a. Surface restorations shall conform to Standard Details for the following types of surface replacements:

1) Class A Pavement Replacement - Arterials and major streets.

2) Class B Pavement Replacement - Minor streets, cul-de-sacs, etc.

3) Class C Gravel Shoulder Replacement - Gravel shoulders of paved roadways.

4) Class D Gravel Street, Driveway and Shoulder Replacement.

5) Class E Top Soil Replacement for Unimproved Areas.

b. Trench backfill, base rock, surfacing rock, asphaltic concrete pavement, joint seal, etc. Shall conform to the material requirements hereinbefore specified.

c. Restoration of surfaces not described herein or shown on the standard details shall be such as to replace the disturbed surface to equal or better original condition, and shall be to the satisfaction of the City Engineer.

C. WORKMANSHIP

1. Clearing

a. Clear improvement area of all surface vegetation, stumps, roots, downed timber, brush, weeds, grasses and deleterious matter necessary to accommodate permanent construction.

b. Clearing limits shall normally be limited to one foot behind curbs and one foot on each side of sidewalks unless otherwise noted on project plans or directed by the City Engineer.

c. Protect all trees, shrubs, landscaped areas and lawns from damage unless otherwise designated or directed by the City Engineer.

d. Protect existing street surface facilities, adjacent properties, and survey monuments from damage. Confine operations to clearing limits shown on the approved plans.

e. Tree branches which extend over curbs and which are less than 10 feet above curb level shall be sawn off next to the boles, and the cuts treated with an approved tree sealant.

f. Dispose of clearing waste off project limits at site provided by Contractor and approved by the City Engineer.

g. Clean up street right-of-ways and adjacent work areas of all litter and debris resulting from Contractor's clearing operations.

2. Grubbing

a. Grub areas under streets, curbs, sidewalks and driveways to remove all stumps, roots, buried vegetative matter and debris to a depth of 8 inches below subgrade.

b. Dispose of grubbing waste off site as for clearing waste.

3. Earthwork: Street Excavation, Embankment and Subgrade

a. Excavate to subgrade lines and grades required by the approved plans.

b. Excavate to subgrade for connecting street and driveway approaches as directed by the City Engineer.

c. Advise utility companies in advance of excavation for field location, marking, and for relocation of underground utilities as necessary.

d. Protect existing facilities from damage during excavations. Any damaged facility not designated for removal or alteration to be repaired or replaced "in kind" at Contractor's expense. Protect construction stakes set by Engineer, survey monuments, and private properties.

e. Along existing streets or utility easements only, City may at its option, participate in the relocations of water and sewer lines if required to accommodate new construction.

f. Where excavation is required alongside edges of existing pavements, any ravelled or deteriorated pavement edges shall be saw cut clean and straight.

g. Overexcavate to remove soft or otherwise unsuitable subgrade material when directed by City Engineer. Backfill with imported base rock or approved native backfill at 95 percent of maximum density per AASHTO T99 test method as directed by City Engineer. City Engineer may require engineering fabric be used to provide additional subgrade stabilization.

h. Unauthorized overexcavations to be backfilled as above described and at the Contractor's expense.

i. In street embankment areas, all sod, vegetative matter, and debris to be stripped away from under subgrade before embankment is placed.

j. Rock excavation, if required, shall conform to the Manual of Accident Prevention in Construction published by AGC, in regard to Section 5, Explosives. Prior to commencing use of explosives, the Contractor shall submit a certificate of insurance to the City showing coverage of blasting operations and blasting produce liability to the limits required by Section I, Paragraph 7 contained herein. Coverage for this extra hazard shall be maintained during all blasting operations.

k. Approved excavated materials may be used directly in street embankment and site fill grading areas where provided for on the plans or as approved by the City Engineer. Unsuitable material including broken pavement, rubble, large rocks and debris shall be disposed of offsite by Contractor as approved by the City Engineer.

l. Top soil shall be selectively excavated and a sufficient amount windowed or stockpiled for curb backfill and planting strip areas.

m. Shape and grade all cut and fill slopes. Final slopes shall be smooth, uniform, and compacted in conformance to lines and grades required by plans.

n. Rough grade subgrade prior to utility crossings to 0.20 foot vertical and 0.50 foot horizontal tolerance to design cross section and grades.

o. After utility crossings and curb installation, fine grade subgrade to within 0.10 feet vertically of design grade at any point.

p. Proof roll subgrade to achieve the specified compaction at a 6 inch depth.

q. All embankment material to be placed in lifts not to exceed 6 inches in compacted thickness.

r. Place no embankment when material is frozen or too wet to achieve the required compaction.

s. Condition fill material for optimum moisture content before placing in embankment.

t. Sprinkle subgrade as necessary to achieve compaction and for dust control.

u. All subgrade, embankment and backfill of overexcavation lifts shall be compacted to 95 percent of maximum density per AASHTO T-99 test method.

v. City Engineer to approve subgrade prior to rocking of streets.

w. Compact curb backfill to 80 percent maximum density per AASHTO T-99 test method.

x. Backfill under sidewalks shall be compacted to 90 percent maximum density per AASHTO T-99.

y. Place top soil backfill behind curbs and dress back disturbed planting strip area, smooth and uniform to property lines. Compact until firm as evidenced by insignificant deflection under wheel or track loads.

z. Dispose of all waste materials and debris caused by Contractor's operations off site.

4. Trench Excavation, Backfill and Bedding for Storm Sewers

a. Developer to set grade stakes for storm sewers at intervals not to exceed 50 feet plus structure stakes, and furnish both Contractor and City Engineer with copy of cut sheets.

b. Excavate pipe trenches to lines and grades required by plans and as staked in field.

c. Excavate below pipe to allow for placement of 4 inch lift of bedding material under pipe.

d. Sheet, shore and brace trench walls as required for safety. Dewater trenches as necessary for construction. Conform to all applicable safety requirements.

e. Provide barricades, warning signs and flaggers for safety of traveling public during work on streets.

f. Confine operations to right-of-ways provided. No work to be done on private property without express written permission of property owner.

g. Contractor shall coordinate with public and private utility companies for locations and relocations of underground utilities as required to accommodate new construction.

h. Protect underground utilities and surface facilities not designated for removal or alteration from damage. Restore any damaged facility to equal or better original condition.

i. Blasting, if required for trench rock excavation, shall be performed carefully and in compliance with applicable safety codes and regulations and in conformance with Section II.C.3.j. above.

j. Place specified pipe embedment material, walk in, spade, and shape material to receive and uniformly support pipe.

k. Place pipe zone material around and over pipe carefully to prevent pipe damage; no free fall of material directly on pipe shall be allowed. Bring pipe zone material up uniformly on each side to prevent pipe displacement.

l. Place classified backfill above pipe zone in lifts not to exceed 12" in compacted thickness and consolidate as follows:

1) Class I rock backfill shall be used under all streets, curbs, sidewalks and driveways, placed in 6" lifts, and shall be compacted to 95% of maximum density per AASHTO T-99 test method.

2) Class III, City Engineer approved native backfill shall be used under planting strips and landscaped areas, lawns, etc. as required by plans as directed by City Engineer and shall be compacted to 90% of maximum density per AASHTO T-99 test method.

3) Class IV approved native backfill to be used in open and unimproved areas; shallow trenches may be filled to surface, wheel compacted until visually firm, to the satisfaction of the City Engineer, and then refilled, compacted and struck off smooth.

4) Contractor shall maintain trench surfaces for a period of one year following final inspection of the work by the City Engineer. Any settled trenches, or damage to surface improvements resulting from settled trenches, shall be restored to acceptable condition within this period by the Contractor.

m. City Engineer approved materials from trench excavations may be used directly for Class III and IV backfill. Excess and waste materials to be removed from site by Contractor unless plans provide on-site fill grading area for same.

n. Where trenching is performed along streets that have been excavated to subgrade, trench contractor shall restore street subgrade to original condition.

o. Trenching through existing pavements requires clean, straight saw cutting of pavement.

p. Work on public road and on railroad right-of-ways shall be done under permit from the agency having jurisdiction, and in accordance with the terms of the permit.

q. Trenches across roads and existing driveways shall not be left open at the close of any working day.

5. Storm Sewer Pipe

a. Handle pipe carefully to avoid damage. Pipe shall not be dropped off truck or into trenches. Broken, cracked or damaged pipe shall be rejected by City Engineer and removed from site by Contractor.

b. Maintain a minimum of 1 foot of cover on all pipe before crossing with equipment.

c. Developer to provide line and grade stakes at 50 foot intervals, or closer as judged necessary by City Engineer.

d. Contractor to utilize sufficient string lines, targets, batterboards and survey instruments as necessary for accurate installation.

e. Tolerance for laying pipe is a maximum of 1/2"± on line and 1/4"± on grade.

f. Install concrete pipe in accordance with methods set forth in Concrete Pipe Handbook by American Concrete Pipe Association, unless modified herein.

1) Lay pipe in upstream direction, grooves facing upstream.

2) Gap pipe joints 1/4" to ±1/8" around full circle of butt joint. Out-of-round pipe shall be rotated to comply with this tolerance. Pipe which does not comply with ASTM specified roundness limitations and which would result in gaps over 3/4" shall be rejected.

3) Mortar exterior top half circle of pipe joint and work mortar into joint. Alternately cover top half circle of each pipe joint with 12" wide strip of specified roofing mesh.

g. Install corrugated aluminum culvert pipes (CMP) per manufacturer's written installation manuals and per Oregon State Highway Department Standard Specifications for Highway Construction, Section 603. All CMP shall be handled carefully to prevent damage.

h. Lay pipe on prepared embedment, bring pipe zone material up uniformly around and over pipe, and consolidate backfill as specified hereinbefore.

i. Lay pipe into manholes, catch basins and drainage structures, and grout connection with 2000 psi concrete in approved workmanlike manner.

j. Install prefabricated pipe fittings where plans require in workmanlike manner as for mainline pipe.

k. Any field connections to existing storm sewers such as cut-in tees are subject to approval of the City Engineer.

l. Where existing field tile, trench drains, etc. are intercepted by new trunk storm sewers, they shall be plumbed into the trunk in a manner approved by the City Engineer.

m. Where pipe is on curved alignment, sweep in on long radius shall not exceed pipe joint gap tolerance.

n. Pipe laid directly over existing water and sewer mains shall be cradled in 2000 psi concrete cushion to adequately spread imposed loads and prevent crushing of pipe below. Conform to applicable state agency requirements.

o. Any proposed relocation of existing storm sewers is subject to approval of City Engineer.

p. Clean all dirt and debris from inside of pipe as work progresses.

6. Manholes, Catch Basins and Appurtenant Structures

a. Contractor shall conform to the requirements of standard details.

b. Structures to be built on public right-of-ways shall conform to requirements of agency having jurisdiction.

c. Manhole and catch basin concrete shall be free from fractures, honeycombs, surface roughness and clipped edges. Damaged precast sections will be rejected.

d. Comply with Section 504 of OSHD specifications as to workmanship for poured in place concrete.

e. Place manhole base on compact granular material as required by standard details. Dewater excavations for structures if necessary.

f. Place and compact backfill in 12" lifts around structures; backfill class and compaction shall be the same as for adjacent pipe.

g. Mortar all joints in precast sections to make watertight joints.

h. Grout manhole inverts smooth and uniform to channel water flow per standard details and as directed by City Engineer.

i. Pipe connections shall be set into precast or monolithic concrete walls smoothly. Any broken out concrete to be

grouted back solid for a minimum of 6 inches around the entire connection.

j. Each catch basin shall have two 4" diameter weepholes with rock surrounded at subgrade level per standard details.

k. Frames and extension rings are not to be grouted in until rims can be set accurately to finished grade.

l. Manhole rims shall be set flush with finished pavement grade. Catch basin rims shall be set 1" below grade and the pavement apron feathered thereto per standard details.

m. Special and appurtenant structures shall be detailed on the approved project plans, and constructed accordingly.

n. All workmanship for public facilities is subject to approval of the City Engineer.

7. Concrete Curbs

a. Provide all labor, equipment and materials to construct concrete curbing as indicated on approved project plans or otherwise directed by the City Engineer.

b. Engineer to set top of curb cut stakes at intervals not to exceed 50 feet and at critical radii and grade points, on offset line requested by Contractor.

c. Do minor filling and grading as required for curb foundation.

d. Formed and poured curbs can be set on compacted subgrade or base rock. Machine laid curbs are required to have a minimum 2" lift of compacted base rock.

e. Extruded curbs shall be epoxy grouted to asphalt concrete. Epoxy to cover 75 percent of area under curbs. Use suitable thickener if necessary.

f. Concrete curbs shall conform to dimensions shown on standard details for type of curb specified.

g. Construct drop curbs for driveways and bike paths where plans require and as field directed by City Engineer. Conform to standard details.

h. Install curb weepholes where required by approved plans in conformance with standard details.

i. Block out curbs as required where plans call for side inlet catch basins.

j. Standard City curb is Type C with 6" exposure per details. Other types of curbs are special cases requiring City Engineer approval. Provide 7" curb exposure for collector and arterial streets.

k. Construction tolerance for curbs is 1/2" on line and 1/4" on grade.

l. Construct curbs in accordance with Section 609 of OSHD specifications, smooth and uniform.

m. Construction 1/2" curb expansion joints at intervals not to exceed 45 feet, at radius points, and at all abutting concrete construction. Cold cutting curb joints at 10' centers is allowed in lieu of the above.

n. Construct 1/8" minimum weakened plane contraction joints at intervals not to exceed 15 feet per OSHD specifications.

o. All work is to the approval of City Engineer who reserves the right to reject improperly located or constructed curbs.

p. Contractor shall notify City Engineer for form or grade checks prior to pouring curbs.

q. Place top soil backfill as required by approved plans and City Engineer and dress back planting strip.

8. Sidewalks and Driveways

a. Sidewalks and driveways shall conform to plans and standard details as to locations and dimensions.

b. Workmanship shall conform to Section 608 of OSHD specifications.

c. Expansion joints shall conform to subsection 608.35. Contraction joints shall conform to subsection 608.36.

d. Sidewalk shall be marked in a 5' x 5' square by grooving. Edges shall be tooled to 1/4" radius.

e. Cross broom or burlap finish in a workmanlike manner. Finish shall match existing adjacent facilities.

f. Cure walks and driveways per subsection 608.34 of OSHD specifications.

g. Sidewalks shall be sloped up 1/4" per foot from top of curb to drain over same.

h. Sidewalks and driveways shall be laid on prepared subgrade, compacted to 95 percent of maximum density per AASHTO T-99 test method or on compacted 3/4"-0" rock fill.

i. Rock base shall be placed and compacted to refill curb excavation where sidewalks are to be constructed adjacent to curbs.

j. Sidewalks shall be constructed to within 1/2" on line and 1/4" on grade tolerance for smooth, uniform alignment and grade.

k. Driveways and sidewalks across driveways shall have a minimum concrete thickness of 6 inches.

l. Install 3" diameter roof drain pipe under sidewalks where required to meet curb weepholes.

m. Restore top soil and dress back disturbed surfaces within planting strip in manner approved by City Engineer.

n. All workmanship is subject to approval of the City Engineer.

9. Base Rock and Surfacing Rock

a. Rocking shall not be performed prior to City Engineer approval of subgrade.

b. Furnish and lay base rock and surfacing rock to lines and grades required by plans.

c. Compact base rock and surfacing rock to 95 percent of relative maximum density per AASHTO T-99 test method.

d. The maximum compacted thickness of each lift of base rock shall be 6 inches.

e. Surfacing rock shall be placed in one lift with a minimum of 1-1/2" in compacted thickness.

f. Soft or spongy subgrade shall be removed, and the excavation backfilled with approved subgrade materials or base rock compacted to 95 percent of maximum density per AASHTO T-99 test method as directed by the City Engineer.

g. Place rock over approved subgrade in accordance with Section 304 of OSHD specifications.

h. Sprinkle with water as necessary for compensation and dust control.

i. Protect structures from damage when placing and spreading rock.

j. Maximum tolerance on finished rock grade is 1/2" on 16' straightedge with no bird baths.

k. Adjust all rims and valve boxes to finished pavement grade after leveling rock course is installed.

l. Rerock existing graveled driveways to match existing where disturbed by construction. Finish with 3/4" or 1" minus crushed rock, minimum 6" deep.

m. Rocking shall be approved by City Engineer prior to paving.

10. Soil Sterilant

a. Required only where streets are to be improved adjacent to existing curbs, and where a bid item is provided for soil sterilant in the contract documents.

b. Following rocking of streets, apply soil sterilant at manufacturer's recommended rate adjacent to curbs and not less than 1 foot out from curbs.

c. Sterilant to be placed to 12" behind curbs where sidewalks are to be constructed adjacent thereto.

d. Protect adjacent vegetation from damage when applying sterilant.

11. Asphaltic Concrete Pavement

a. Pave only after City Engineer approves rock surface, during dry weather, and when temperature is at least 40°F and rising.

b. Cut edges of existing pavement clean and straight and apply tack coat where new pavement will joint.

c. Apply tack coat to manhole frames, valve boxes, curbs, and joints with other pavements.

d. Adjust all rims of manholes, catch basins, valve boxes, etc. to conform to finished pavement grade. Such structures shall not be paved over.

e. Gutter pavement shall conform to required exposures for standard curb and drop curb.

f. Machine lay and compact asphalt concrete paving, all in conformance with State of Oregon, Standard Specifications for Highway Construction Section 403.

g. Finish pavement lines and grades shall conform accurately with lines and grades shown on plans and staked in field. Tolerance on grade is 3/8 inch on a 16' straightedge at any point.

h. Finish pavement thickness shall be as specified on the approved plans.

i. Blend pavement to meet catch basin inlets, existing pavements, valve boxes, manholes and similar structures.

j. Protect new pavement against traffic until it is set.

k. Surface of pavement shall be smooth, well-sealed, tight mat.

l. Repave disturbed driveway pavements as plans require behind drop curbs to match existing surfaces.

m. Maintain barricades, warning signs, and flaggers for safety during construction.

n. All paving is subject to approval of City Engineer.

12. Asphaltic Concrete Pavement Overlay with Non-Woven Fabric

a. Clean existing roadway of all loose debris. Materials shall be disposed of by Contractor in a suitable manner.

b. Cracks greater than 1/8" shall be filled with a premixed sand slurry with CRS-1 as directed by the City Engineer.

c. Patch existing asphaltic concrete areas per approved plan requirements or as City Engineer directs. Excavation is required in designated areas and Contractor shall arrange for and dispose of all waste materials.

d. Application of tack coat shall be a minimum of 0.25 gal. per square yard throughout project paving areas. Rate may vary depending on porosity of the existing pavement and will be determined by the City Engineer.

e. Tack coat application will be made by distributor equipment wherever possible, with hand spraying kept to a minimum. Temperature of the asphalt shall be sufficiently

high to permit a uniform spray pattern. For asphalt cements, the minimum recommended temperature is 290°F.

f. The width of the asphalt track coat application shall be the fabric width plus 2 to 6 inches. Asphalt drools or spills shall be removed from the road surface to avoid flushing or future fabric movement at these asphalt-rich areas.

g. The quantity of asphalt applied to the road surface and later absorbed by the fabric is extremely important. The asphalt product is to fully saturate the fabric to form a membrane; but shall not be excessive so as to cause a slippage plane or flushing of the overlay.

h. The fabric shall be placed in the asphalt sealant with a minimum of wrinkles prior to the sealant cooling and losing tackiness. The fabric shall be unrolled so that the bearded (fuzzy) side is down. Excessive wrinkles shall be slit and laid flat. Small wrinkles (as approved by the City Engineer) disappear under traffic and are not detrimental.

i. Overlays of the fabric joints shall be minimum, although an overlap of 6 to 8 inches is recommended to insure full closure of the joint. Transverse joints shall be "shingled" in the direction of the traffic to prevent edgepick-up. Additional sealant to secure these edges may be necessary.

j. Placement of the hot mix overlay should closely follow fabric laydown. In the event the sealant bleeds through the fabric before the hot mix is placed, it may be necessary to blot the sealant by spreading sand or hot mix over the affected areas. This will prevent any tendency for construction equipment to pick up the fabric when driving over it.

k. Machine lay and compact asphalt concrete paving, all in conformance with State of Oregon, Standard Specifications for Highway Construction, Section 403.

l. Asphaltic concrete placement shall conform to approved plan requirements and details.

m. Feather all asphaltic concrete onto existing pavement not receiving overlay. Rake out coarse aggregate on pavement feather. Surface of pavement to be a smooth, well-sealed, tight mat.

13. Surface Restorations

a. Surface restorations shall conform to standard details for classifications specified on the approved plans.

b. The underground Contractor within the new street improvement area is required to restore subgrade to original condition unless approved project documents specify otherwise.

c. Contractor shall restore any damaged or disturbed surface to equal original condition or better; including replacement of pavements, curbs, walks, graveled surfaces, lawns and landscaped areas.

d. Contractor shall comply with permit requirements by governing authority for surface restorations on public right-of-ways.

e. Contractor shall comply with conditions of easements when work is performed on private properties.

f. Surface replacements shall be completed as soon as practical after trenches have been backfilled and thoroughly compacted.

g. All utility appurtenances such as valve boxes and manhole rims within resurfacing area shall match finished grade.

h. Provide traffic control, barricades and flaggers for safety during work on public right-of-ways.

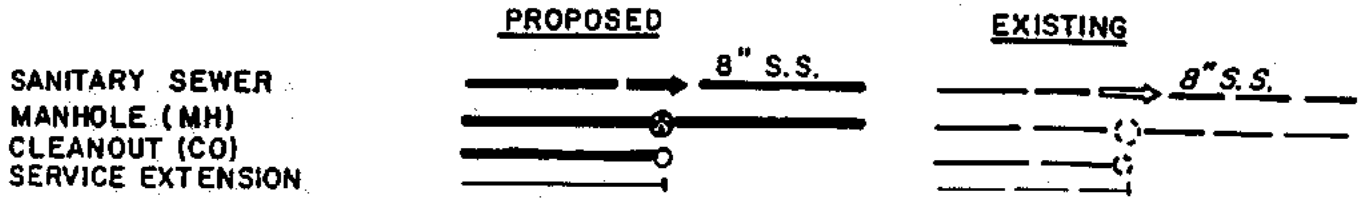
i. Any resurfaced areas which settle shall be promptly restored for which Contractor shall maintain the work.

j. Blend finished surfaces to match adjacent surfaces.

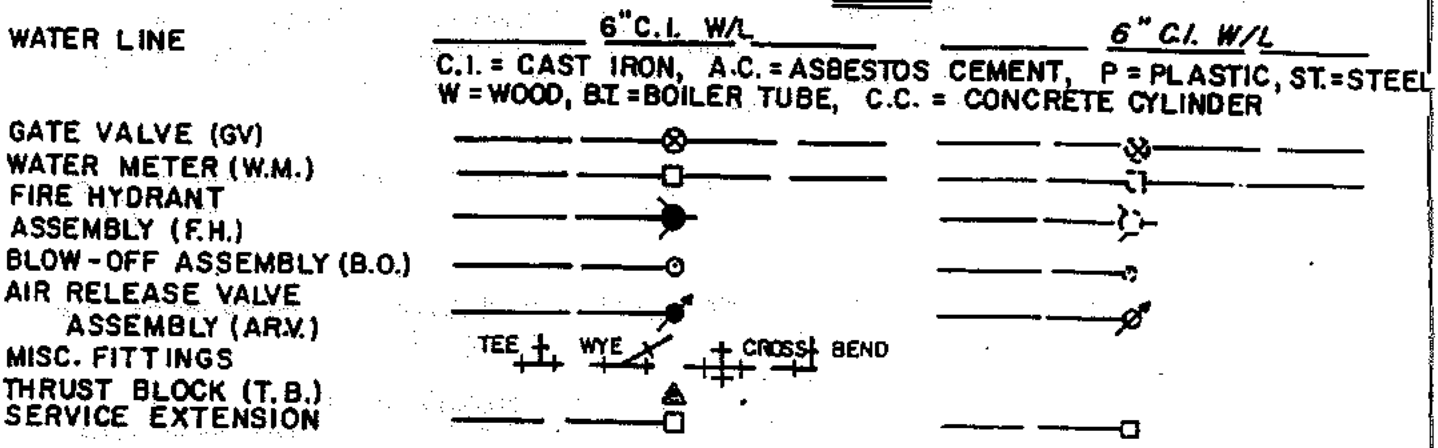
k. Workmanship for gravel and pavement surface replacements shall conform to applicable specifications hereinbefore for rock and paving.

l. Replace disturbed lawns and landscaped areas. All surface restoration work is subject to approval of the City Engineer.

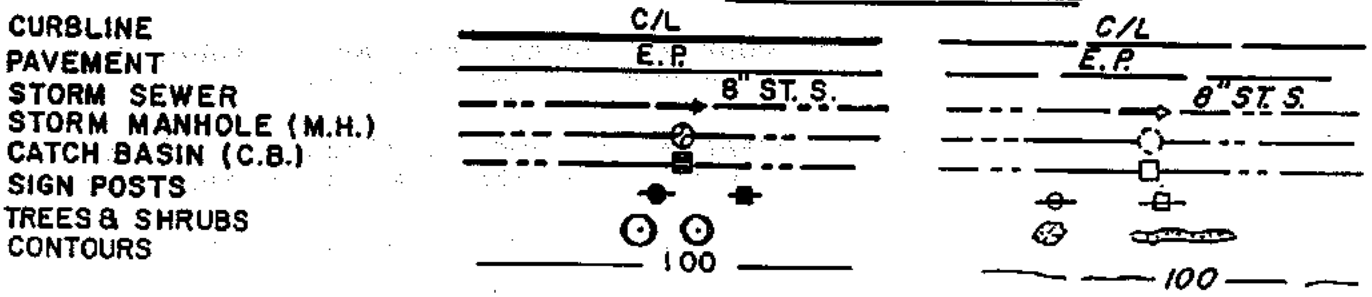
SANITARY SEWERS



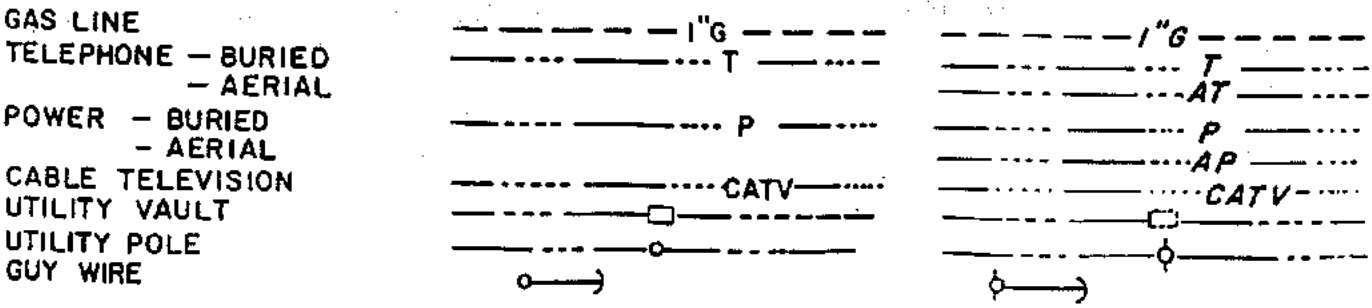
WATER



STREETS & DRAINAGE



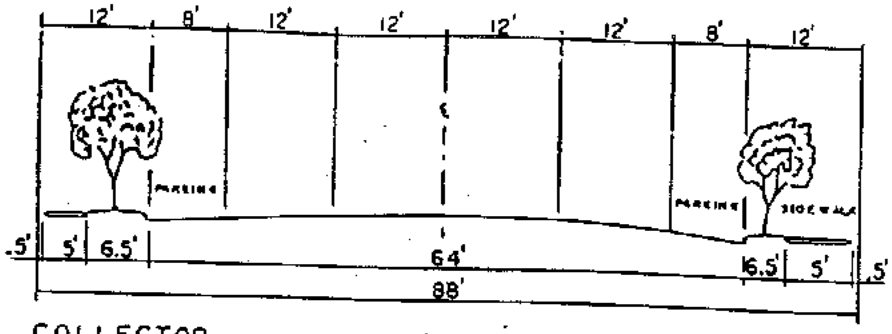
UTILITIES



STANDARD
PLAN LEGEND

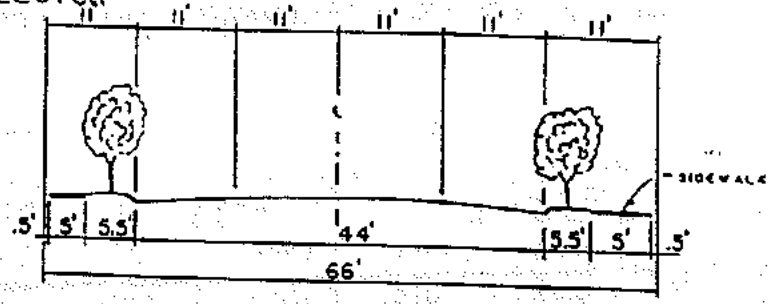
DETAIL II - 1

ARTERIAL



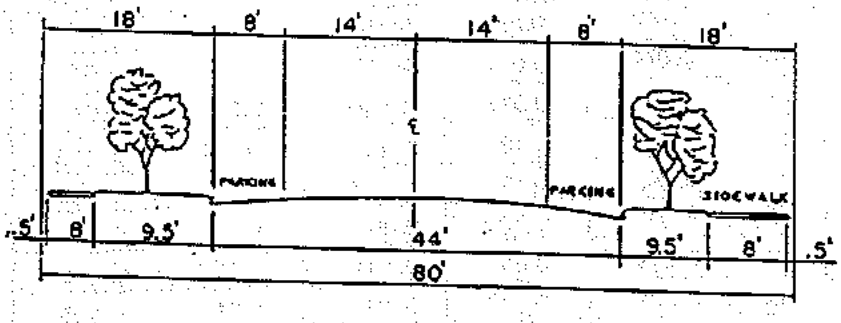
SECTION A

COLLECTOR



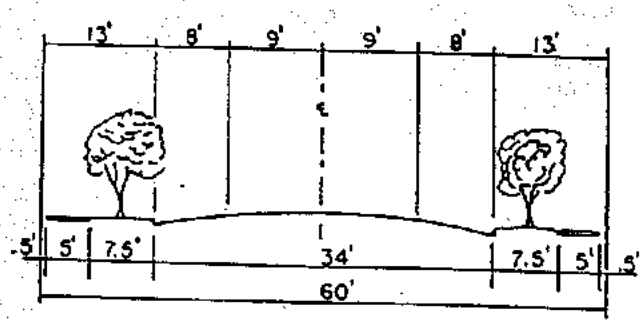
SECTION B

COMMERCIAL- INDUSTRIAL



SECTION C

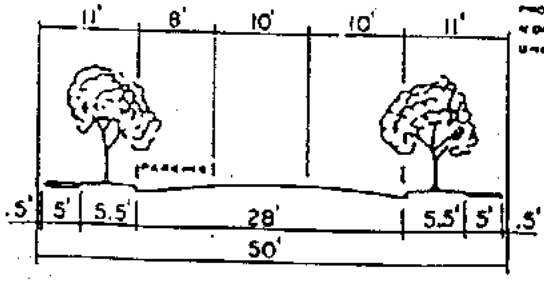
RESIDENTIAL



SECTION D

LOCAL STREET

PROVIDING ACCESS FOR MORE THAN 20 DWELLING UNITS.

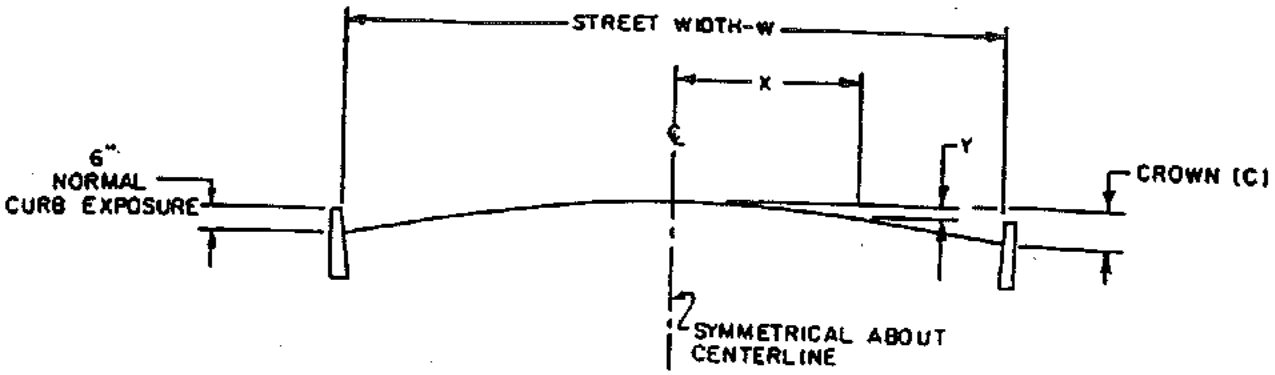


SECTION E

PROVIDING ACCESS FOR 15 OR LESS DWELLING UNITS.

TYP. STREET SECTIONS

DETAIL II-2



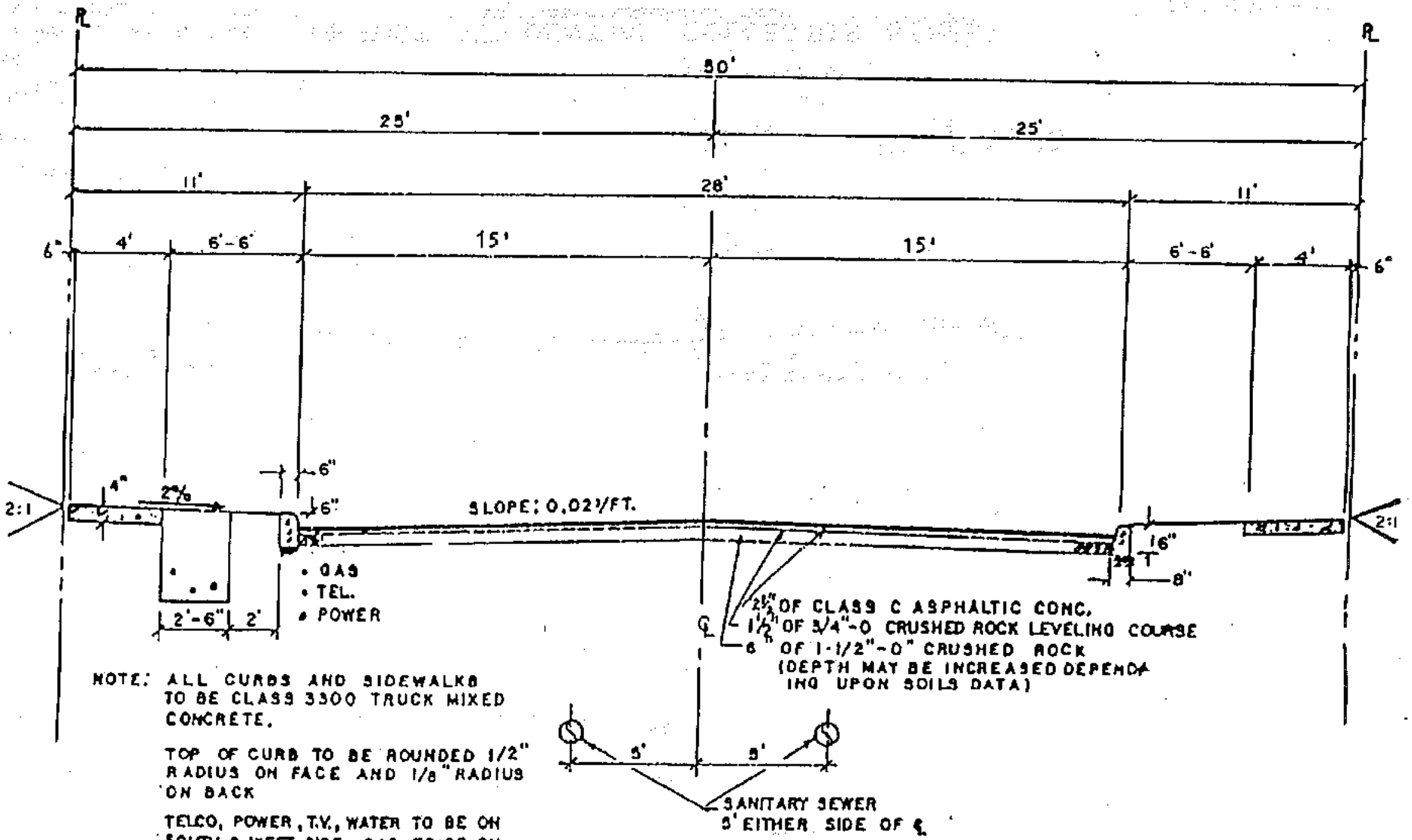
TYPICAL SECTION FOR NON-SUPERELEVATED SYMMETRICAL STREET

STREET WIDTH-W	30'	32'	34'	36'	40'	42'	48'
CROWN (C)	6"=0.500'	6"=0.500'	7"=0.583'	7"=0.583'	8"=0.67'	9-3/8"=0.781'	9-3/8"=0.781'
X (FT.)	Y (FT.)	Y (FT.)	Y (FT.)	Y (FT.)	Y (FT.)	Y (FT.)	Y (FT.)
1.000	0.002	0.002	0.002	0.002	0.001	0.001	0.001
2.000	0.009	0.008	0.008	0.007	0.007	0.007	0.005
3.000	0.020	0.018	0.018	0.016	0.015	0.016	0.012
4.000	0.036	0.031	0.032	0.029	0.027	0.028	0.022
5.000	0.056	0.049	0.050	0.044	0.042	0.044	0.034
6 000	0.080	0.070	0.072	0.065	0.060	0.064	0.049
7.000	0.109	0.096	0.098	0.088	0.082	0.087	0.066
8.000	0.142	0.125	0.128	0.115	0.107	0.113	0.087
9.000	0.179	0.158	0.162	0.146	0.135	0.143	0.110
10.000	0.222	0.195	0.200	0.180	0.167	0.177	0.135
11.000	0.269	0.236	0.242	0.218	0.202	0.214	0.164
12.000	0.320	0.281	0.290	0.259	0.240	0.255	0.195
13.000	0.375	0.330	0.340	0.304	0.282	0.299	0.230
14.000	0.435	0.383	0.392	0.353	0.327	0.347	0.266
15.000	0.500	0.439	0.450	0.405	0.375	0.398	0.305
16.000		0.500	0.520	0.460	0.427	0.453	0.347
17.000			0.580	0.520	0.482	0.512	0.392
18.000				0.583	0.540	0.574	0.439
19.000					0.602	0.639	0.489
20.000					0.667	0.708	0.542
21.000						0.781	0.598
22.000							0.656
23.000							0.717
24.000							0.781

1. FOR STREET WIDTHS AND CROWNS NOT SHOWN SEE PROJECT PLANS
2. IF BOTH W & C ARE KNOWN, Y MAY BE CALCULATED FROM THE FORMULAS: $Y=\frac{4Cx^2}{W^2}$ OR $Y=Px^2$ WHERE, $P=\frac{4C}{W^2}$

PARABOLIC CROWN
FOR
CITY STREETS

DETAIL II-3



NOTE: ALL CURBS AND SIDEWALKS TO BE CLASS 3300 TRUCK MIXED CONCRETE.

TOP OF CURB TO BE ROUNDED 1/2" RADIUS ON FACE AND 1/8" RADIUS ON BACK

TELCO, POWER, T.V., WATER TO BE ON SOUTH & WEST SIDE. GAS TO BE ON NORTH & EAST SIDE.

TELCO, POWER, TV, WATER - MIN. DEPTH 3'. GAS DEPTH 2.5'.

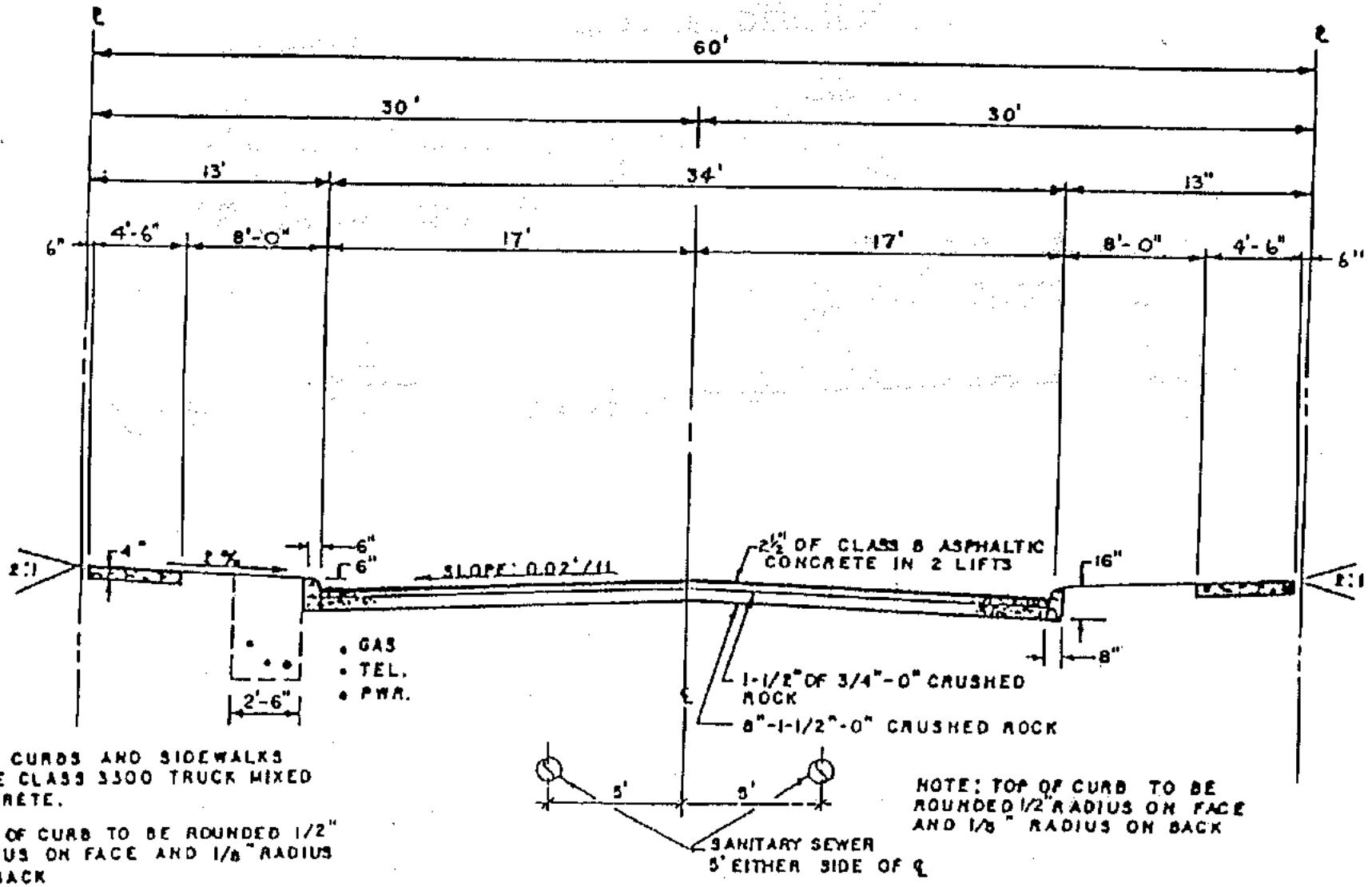
28 FOOT RESIDENTIAL CUL-DE-SAC

50' FOOT RIGHT OF WAY

N.T.S.

TYP. SECTION 28 FT. RESIDENTIAL CUL-DE-SAC

DETAIL II-4



ALL CURBS AND SIDEWALKS TO BE CLASS 3300 TRUCK MIXED CONCRETE.

TOP OF CURB TO BE ROUNDED 1/2" RADIUS ON FACE AND 1/8" RADIUS ON BACK

NOTE: TOP OF CURB TO BE ROUNDED 1/2" RADIUS ON FACE AND 1/8" RADIUS ON BACK

TELCO, POWER, T.V., WATER TO BE ON SOUTH & WEST SIDE. GAS TO BE ON NORTH & EAST SIDE.

TELCO, POWER, TV, WATER - MIN. DEPTH 3'. GAS DEPTH 2.5'.

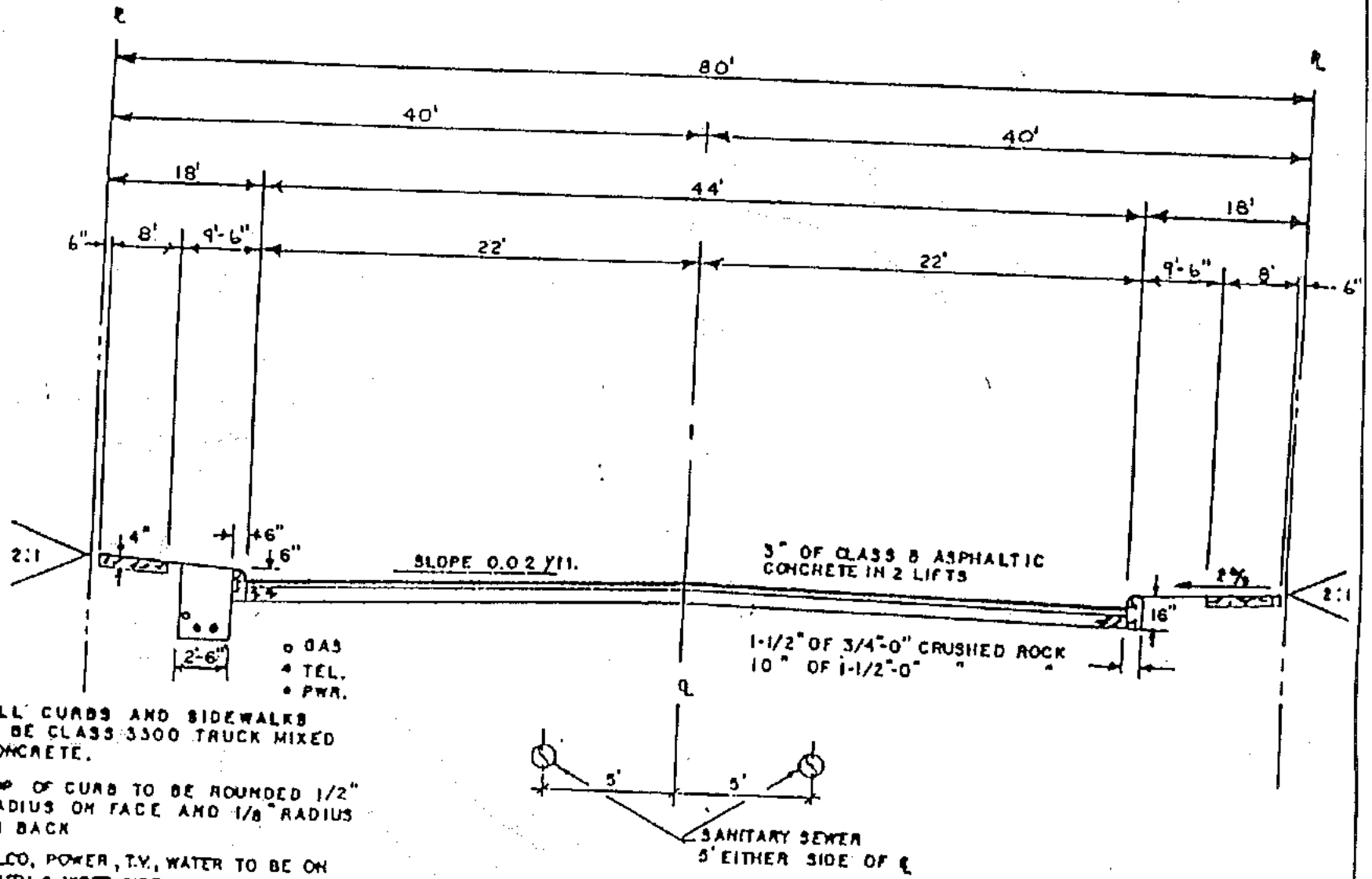
34 FOOT RESIDENTIAL COLLECTOR STREET

60 FOOT RIGHT OF WAY

N.T.S.

TYP. SECTION 34 FT RESIDENTIAL COLLECTOR STREET

DETAIL II-5



NOTE: ALL CURBS AND SIDEWALKS TO BE CLASS 3500 TRUCK MIXED CONCRETE.

TOP OF CURB TO BE ROUNDED 1/2" RADIUS ON FACE AND 1/8" RADIUS ON BACK

TELCO, POWER, T.V., WATER TO BE ON SOUTH & WEST SIDE. GAS TO BE ON NORTH & EAST SIDE.

TELCO, POWER, TV, WATER - MIN. DEPTH 3'. GAS DEPTH 2.5'.

TOP OF CURB TO BE ROUNDED 1/2" RADIUS ON FACE AND 1/8" RADIUS ON BACK.

44 FOOT COLLECTOR STREET

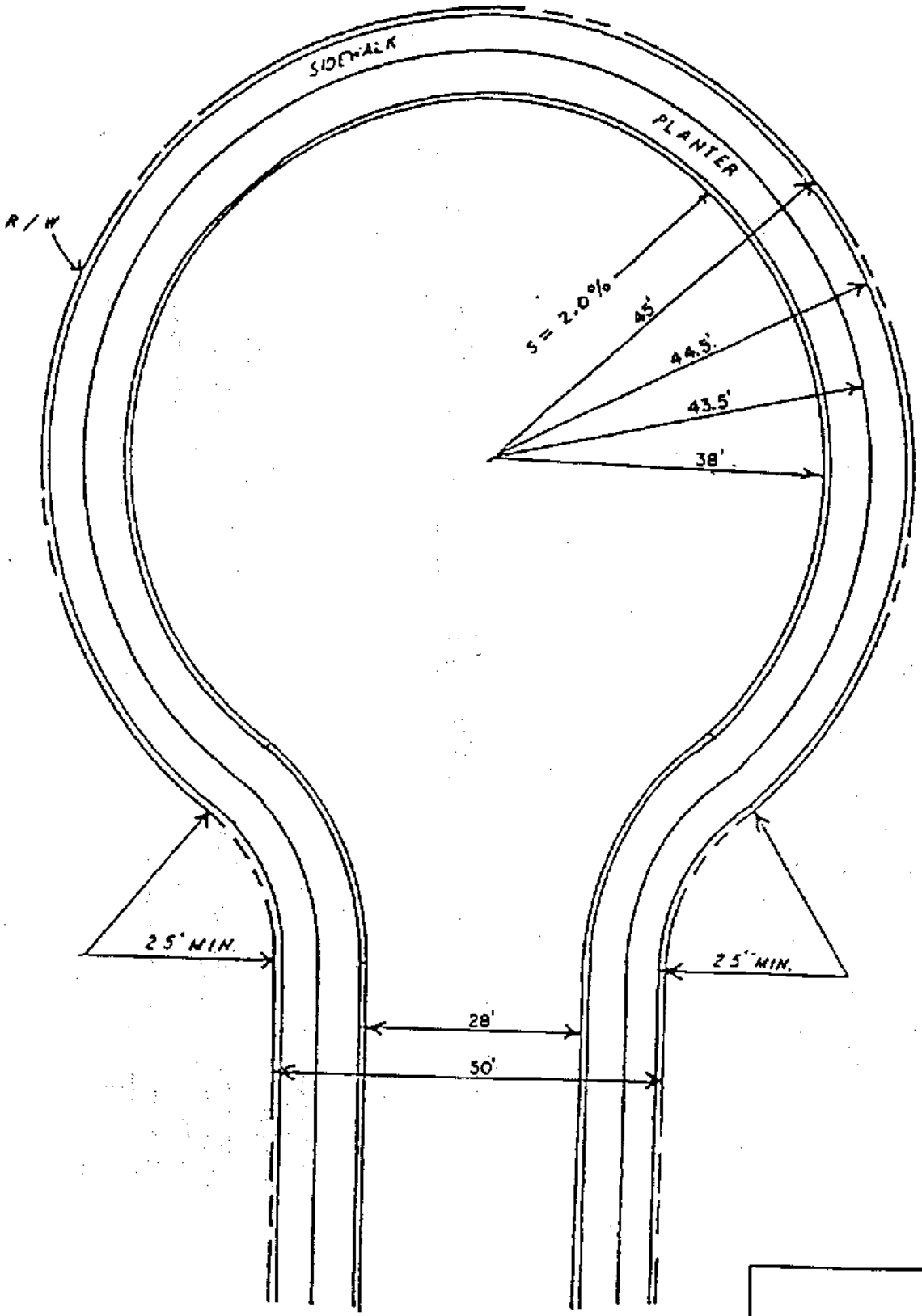
80 FOOT RIGHT OF WAY

N.T.S.

TYP. SECTION
COLLECTOR STREET

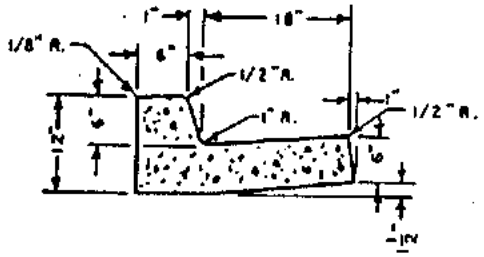
DETAIL II-6

5. STREET STANDARDS

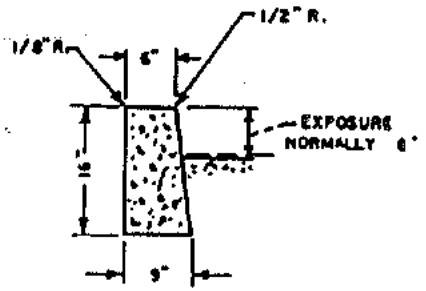


STANDARD CUL-DE-SAC

DETAIL II-7

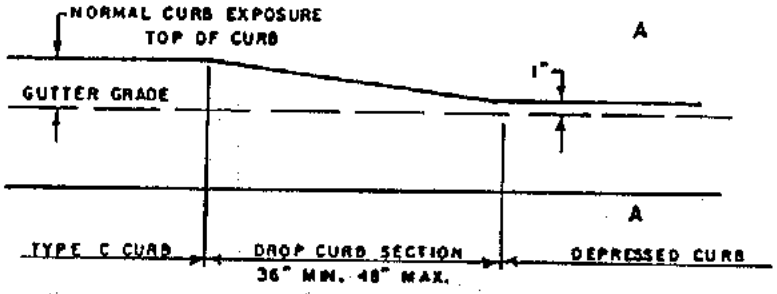


TYPE-A-CURB AND GUTTER

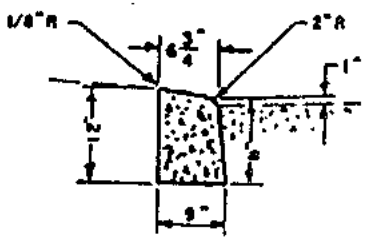


TYPE-C-CURB

PLAN



ELEVATION



SECTION A-A

TYPICAL DRIVEWAY TRANSITION

NOTES

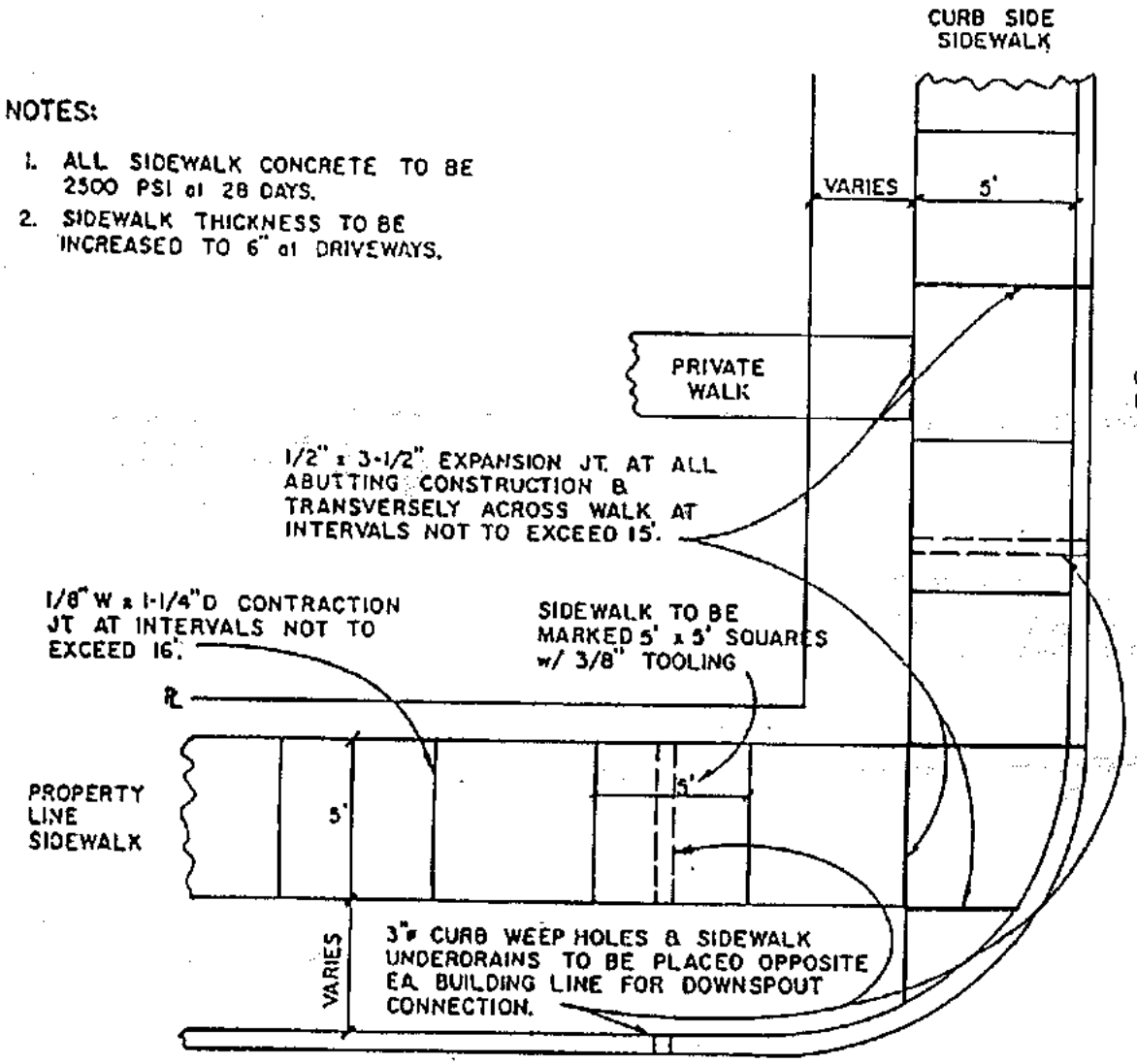
1. CURBS AND GUTTERS SHOWN MAY BE USED WITH EITHER A.C. OR P.C.C. PAVEMENTS.
2. TRANSITIONS FROM ONE TYPE CURB TO ANOTHER WILL BE DETAILED ON PROJECT PLANS AS NECESSARY.
3. EXPANSION & CONTRACTION JOINTS AS SPECIFIED.

STANDARD P.C.C. CURB AND GUTTER SECTIONS

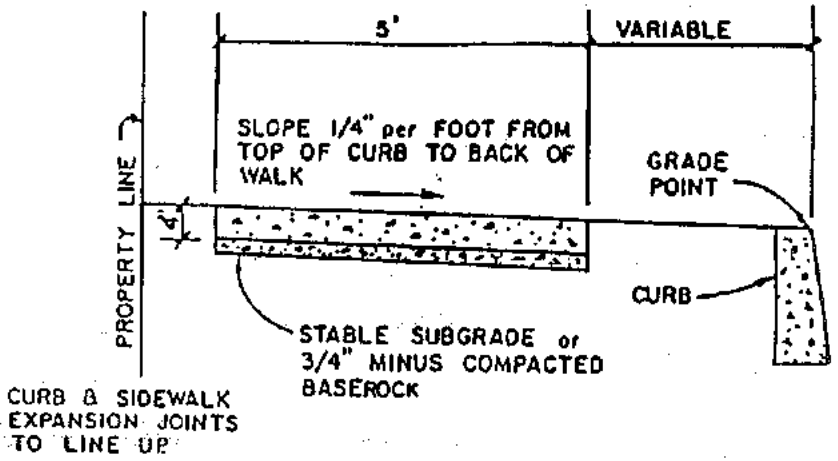
DETAIL II-8

NOTES:

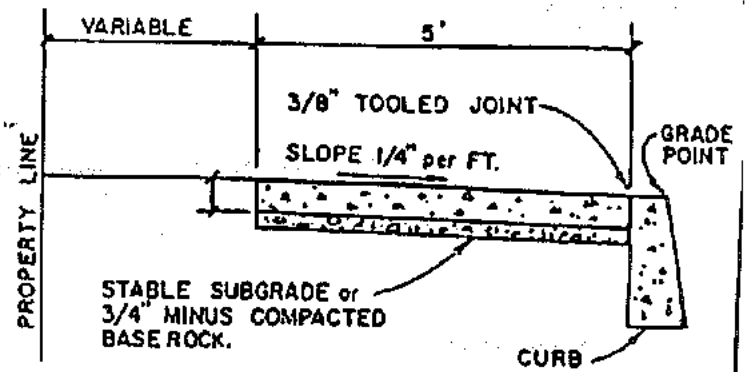
1. ALL SIDEWALK CONCRETE TO BE 2500 PSI at 28 DAYS.
2. SIDEWALK THICKNESS TO BE INCREASED TO 6" at DRIVEWAYS.



PLAN



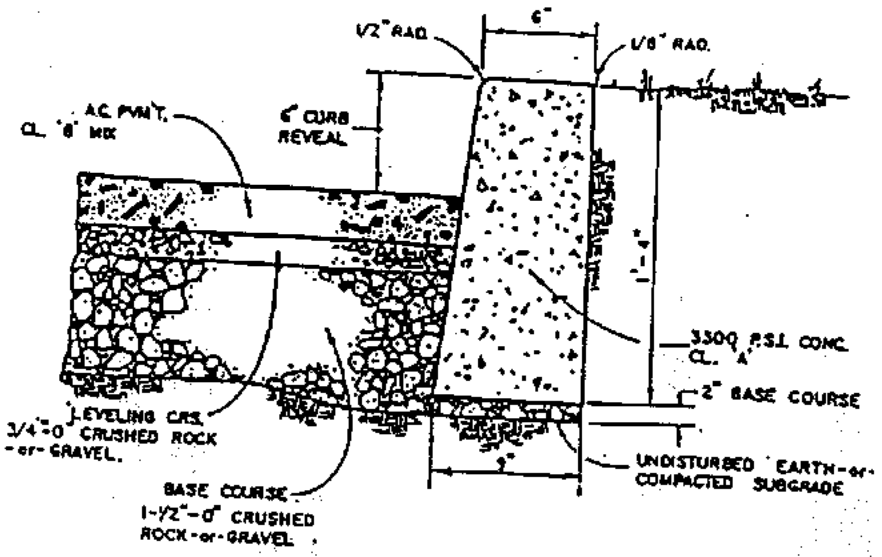
PROPERTY LINE SIDEWALK



CURBSIDE SIDEWALK

STANDARD CONCRETE SIDEWALK DETAILS

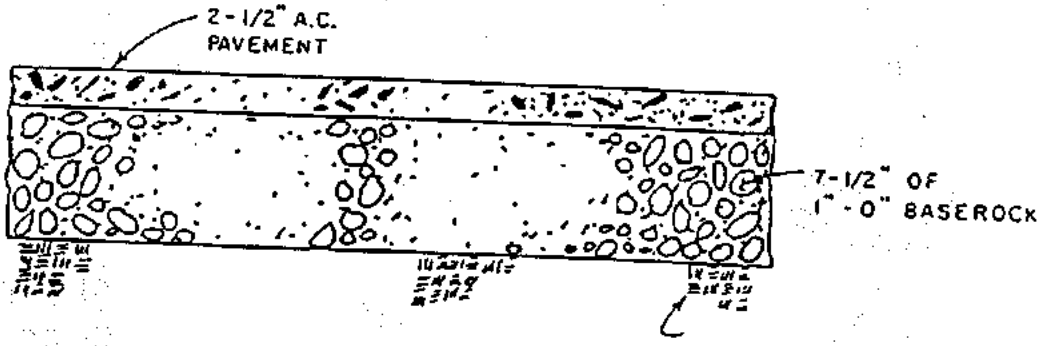
DETAIL II-9



NOTES:

1. 1/2" CURB TRANSVERSE EXPANSION JOINT AT ALL TANGENT POINTS AND AT INTERVALS NOT TO EXCEED 48 FEET.
2. 1/8" x 5-1/4" CURB CONTRACTION JOINTS AT 16 FOOT INTERVALS.

CURB DETAIL

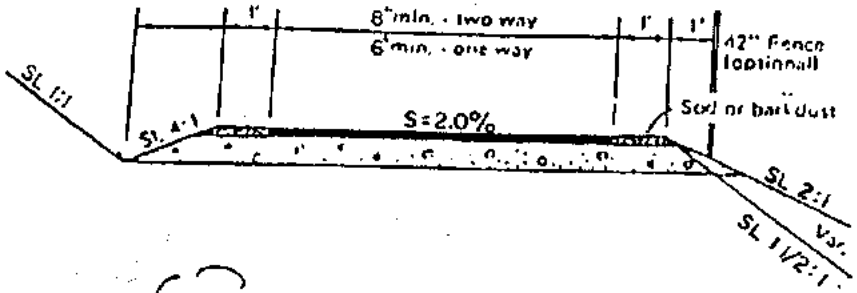


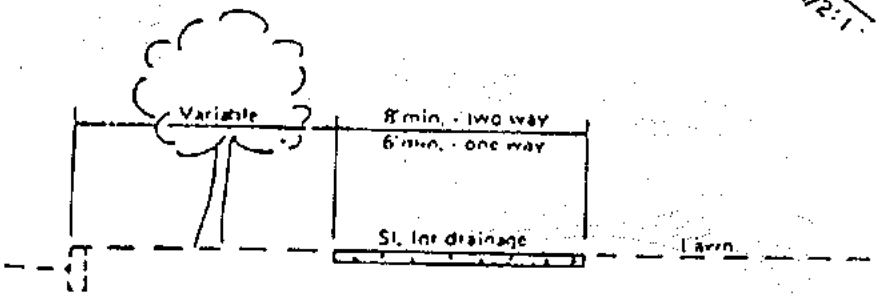
NOTE: AREAS ANTICIPATING TRUCK TRAFFIC SHALL THICKEN SECTION TO 2-1/2" A.C. OVER 12" BASEROCK.

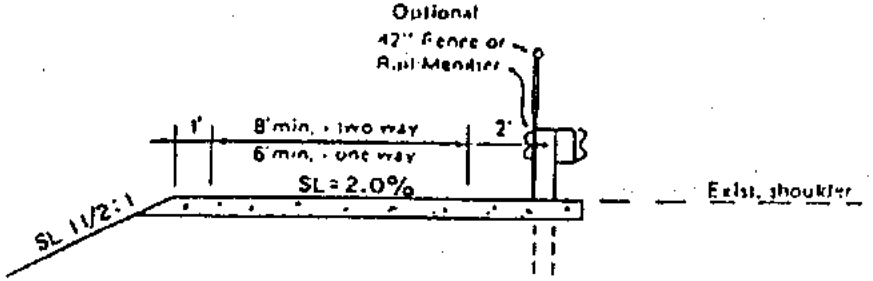
PARKING LOT TYP. SECTION

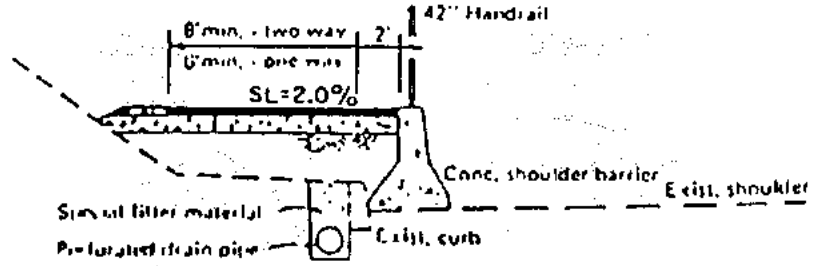
PARKING LOT & CURB DETAILS

DETAIL II-10

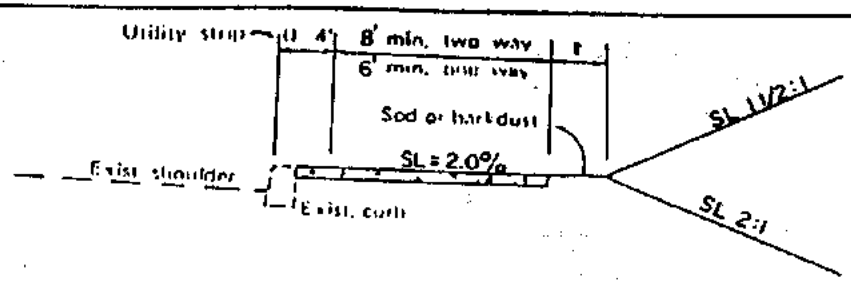


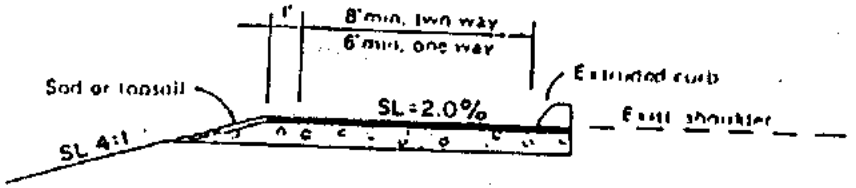






Class I Bikeway
Typical Sections

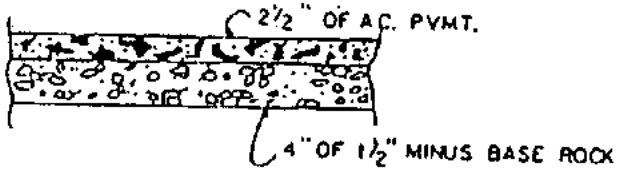




Class II Bikeway
Typical Sections

Class I: A separated trail for joint use of bicyclists and pedestrians. It may be entirely independent of other transportation facilities.

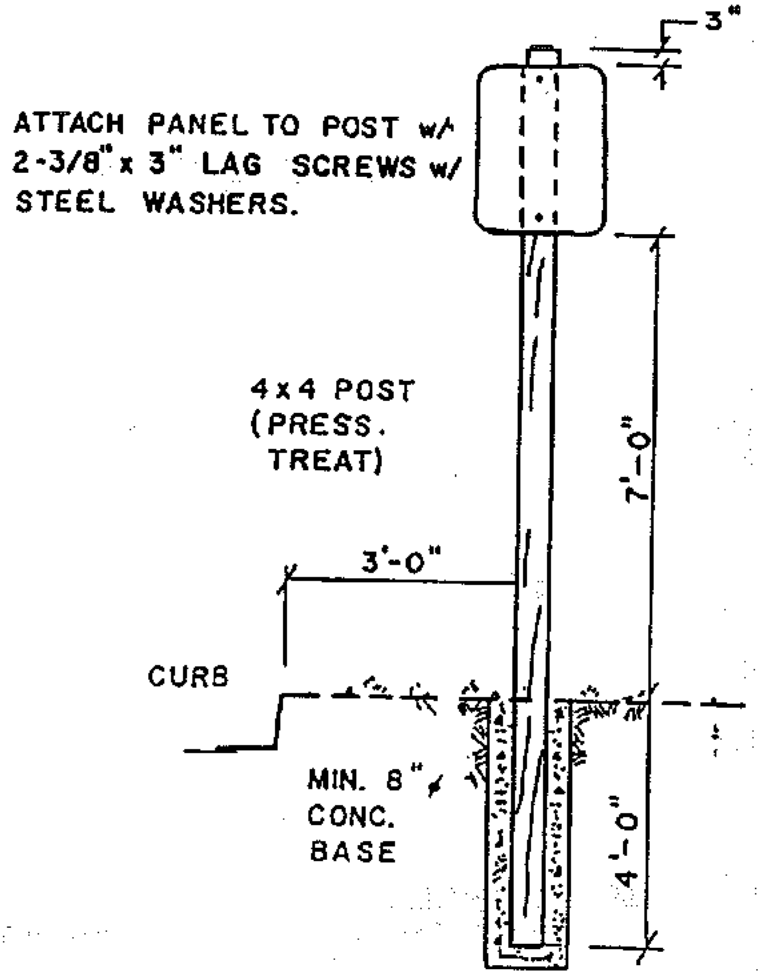
Class II: A bikeway that is adjacent to the travel lane of motorized traffic, but provides a physically separated through lane for bicycles and pedestrians.



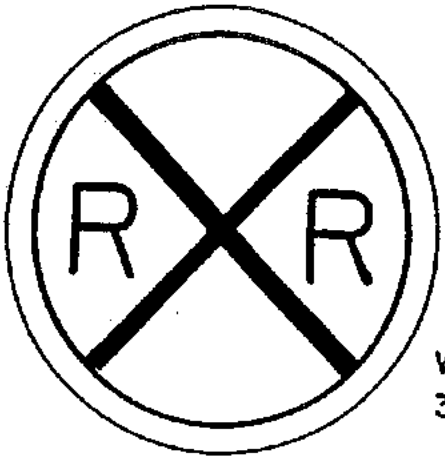
BICYCLE PATH
TYP. SECTION

STANDARD DETAIL

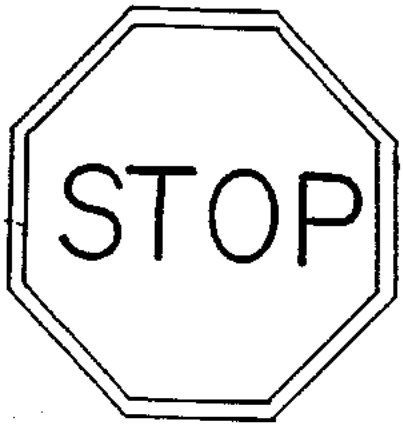
DETAIL



POST

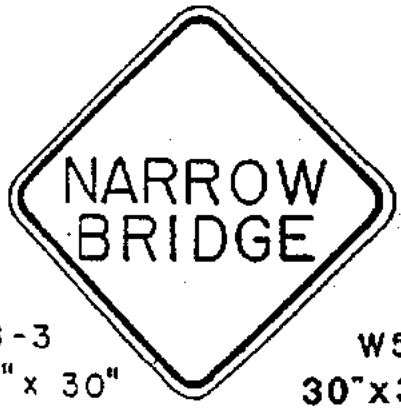


W10-1
36" DIA.



R1-1
30" x 30"

W3-1
36" x 36"



R8-3
24" x 30"

W5-2
30"x30"

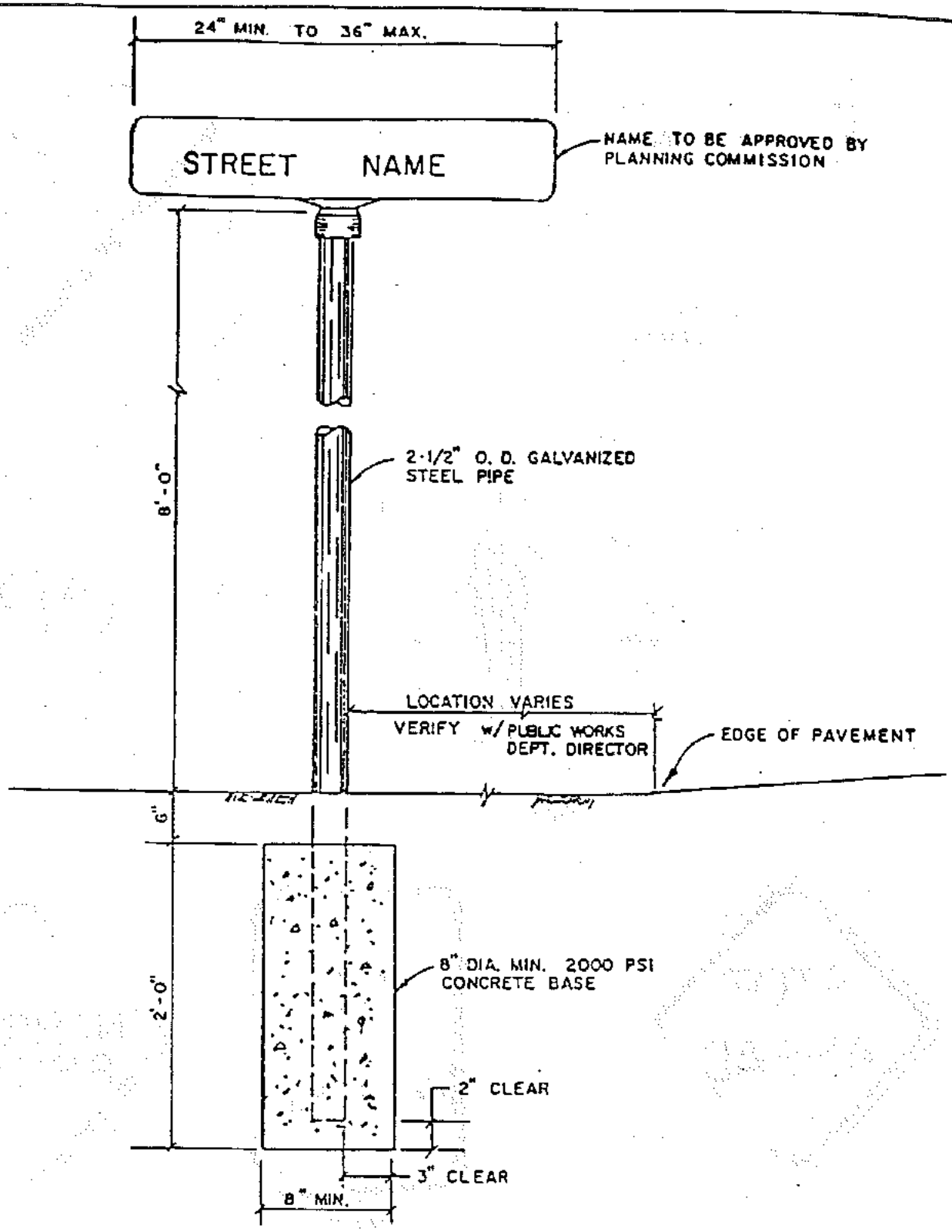
PANELS

NOTES:

1. ALL SIGNS SHALL BE IN CONFORMANCE WITH THE STATE OF OREGON UNIFORM TRAFFIC MANUAL.

NEW SIGN PANEL DETAILS

STANDARD DETAIL 11-14

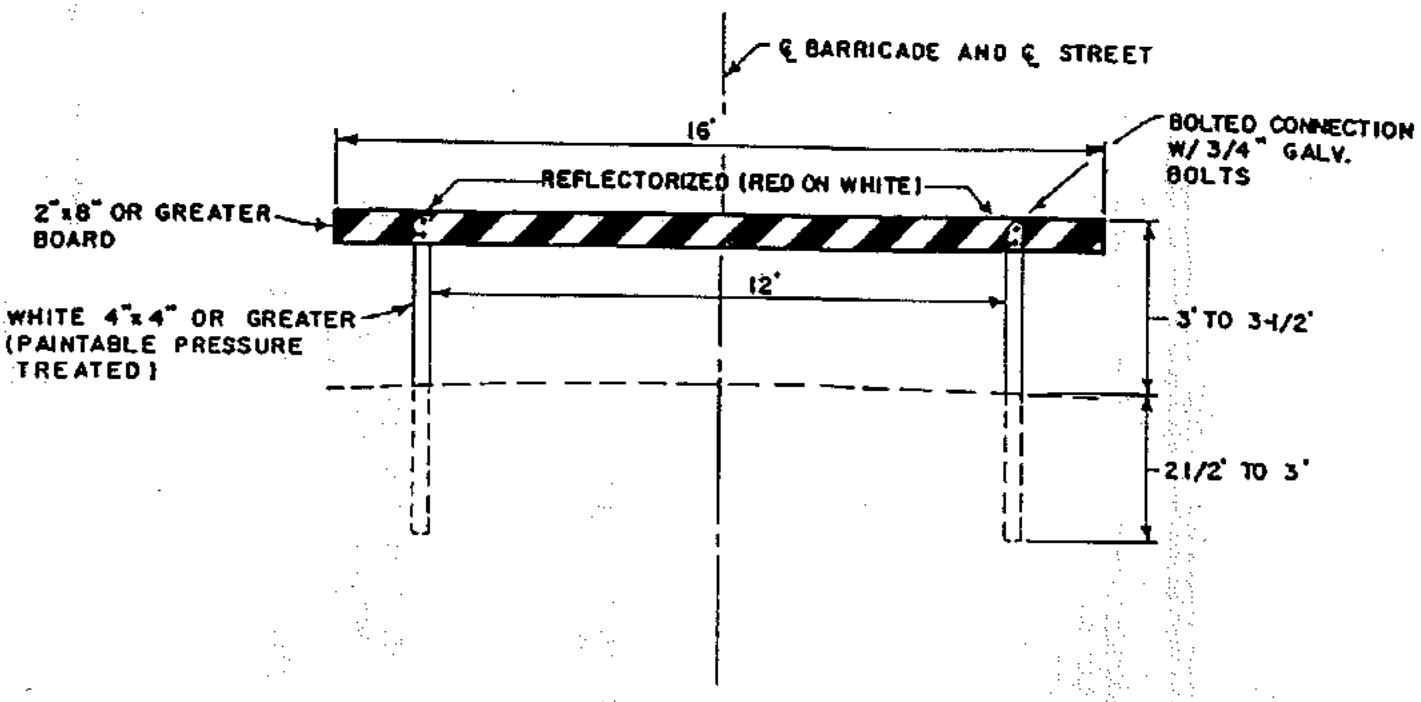


NOTES:

1. ALL NEWLY PLATTED STREETS TO BE SIGNED IN ACCORDANCE w/ CITY STANDARDS.
2. SIGN PANELS TO CONFORM TO SECTION 645 OF OSHC SPECIFICATIONS AS TO MATERIALS.
3. ALL SIGNS SHALL BE IN CONFORMANCE WITH THE STATE OF OREGON UNIFORM TRAFFIC MANUAL.

STREET SIGN

DETAIL II-15



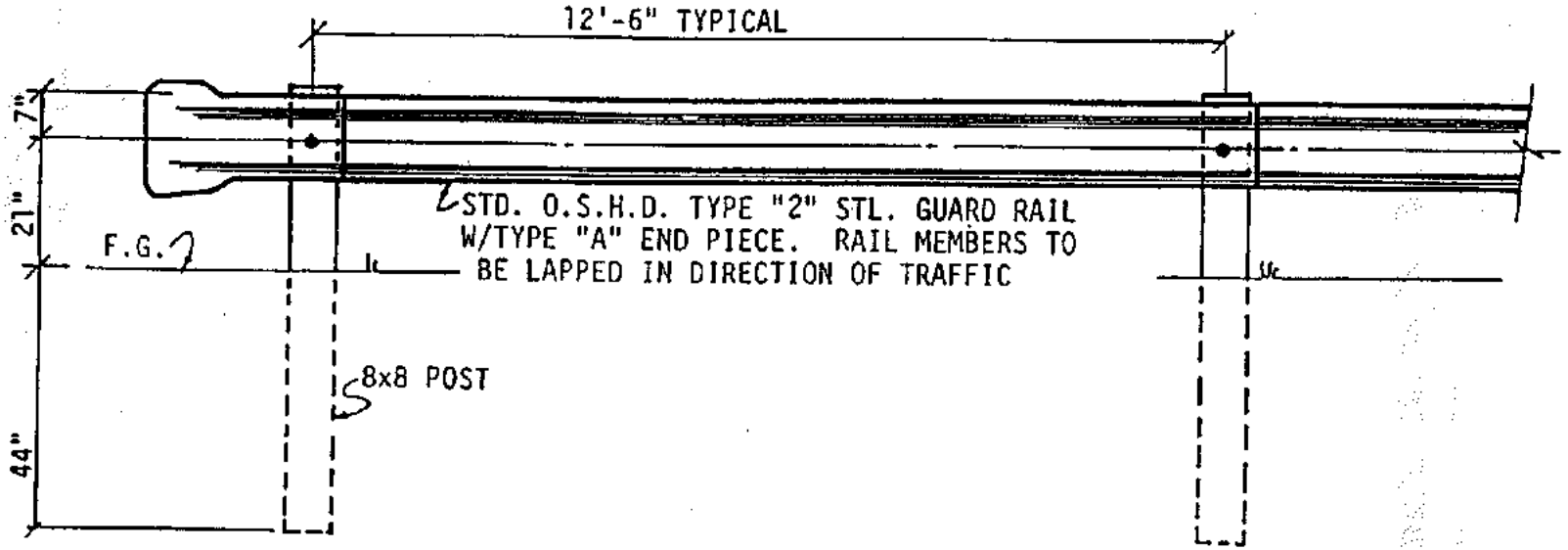
NOTES:

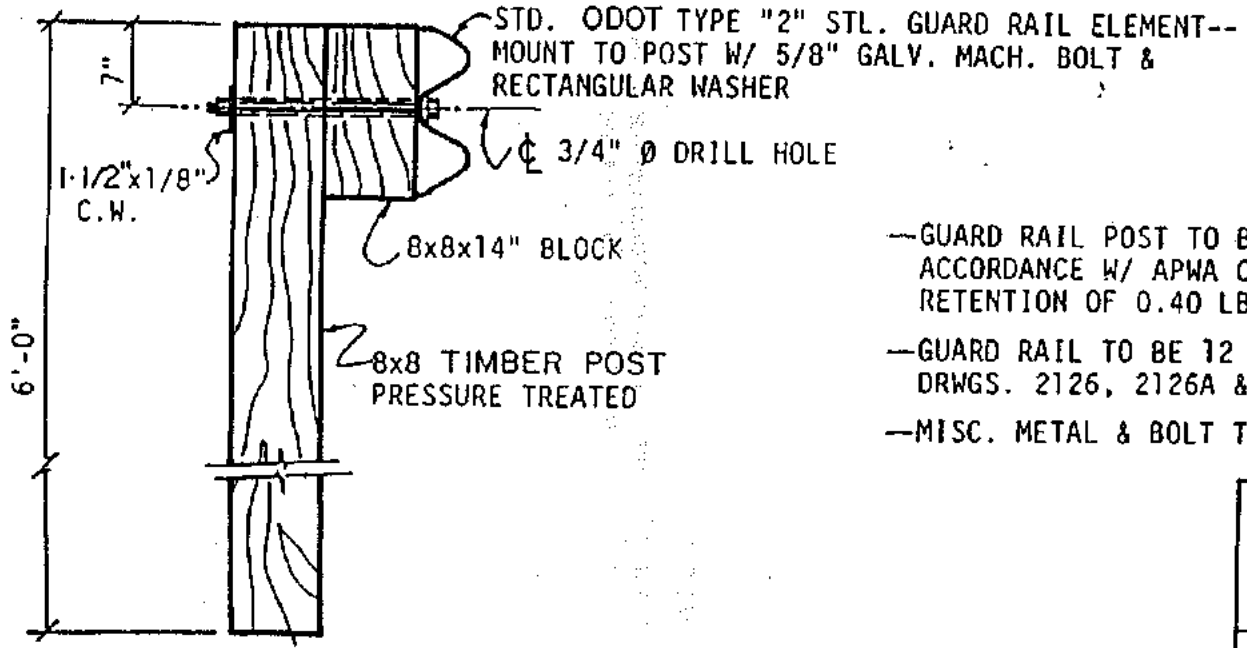
1. ALL SIGNS SHALL BE IN CONFORMANCE WITH THE STATE OF OREGON UNIFORM TRAFFIC MANUAL.

STANDARD FOR PERMANENT BARRICADE

DETAIL II-16

NOTE:
1. ALL SIGNS SHALL BE IN CONFORMANCE WITH THE STATE OF OREGON UNIFORM TRAFFIC MANUAL.





—GUARD RAIL POST TO BE #1 D.F.&L., 1200F, TREATED IN ACCORDANCE W/ APWA C-2 W/ PENTACHLOROPHENOL TO A MIN. RETENTION OF 0.40 LBS/CU.FT.

—GUARD RAIL TO BE 12 GA. GALV. STEEL, CONFORM TO O.S.H.D. DRWGS. 2126, 2126A & 2126B.

—MISC. METAL & BOLT TO BE GALV. ASTM A-36, ASTM A307.

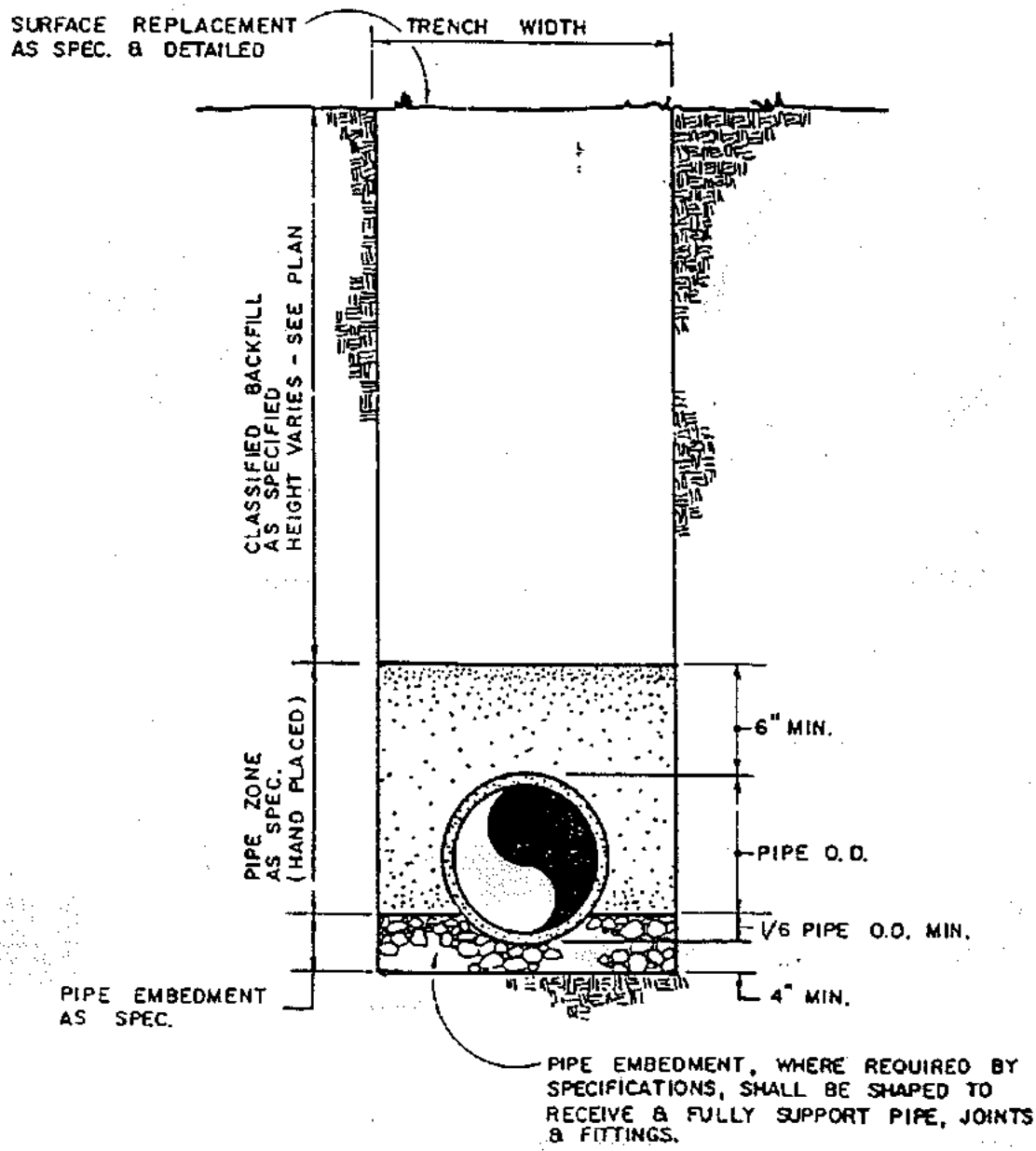
GUARD RAIL DETAIL

DETAIL II-17

MAXIMUM TRENCH WIDTHS

NOMINAL PIPE SIZE	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"
USUAL MAXIMUM TRENCH WIDTH	2'-0"	2'-2"	2'-4"	2'-8"	2'-11"	3'-2"	3'-6"	3'-9"	4'-0"	4'-4"

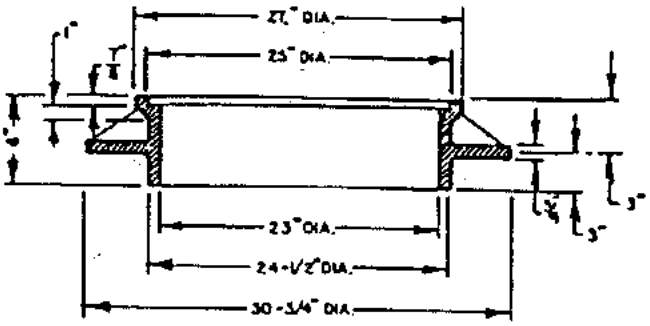
ENGINEER WILL CONSIDER ADJUSTING USUAL TRENCH WIDTH TO ACCOMMODATE CONDITIONS ENCOUNTERED.



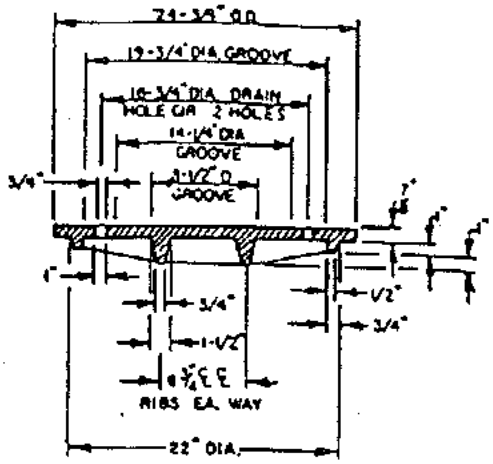
PIPE TRENCH DETAIL

DETAIL II-18

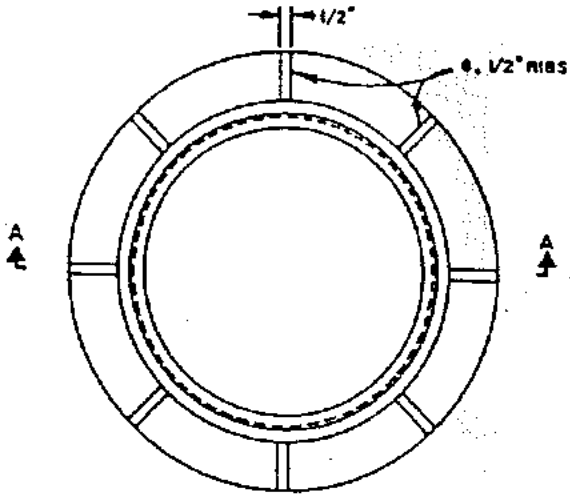
COVER & FRAME TO BE
MACHINED FOR TRUE BEARING



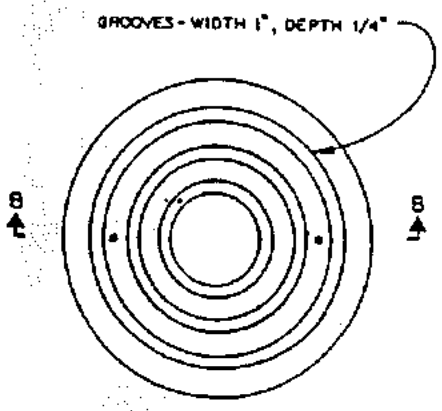
SECTION A-A



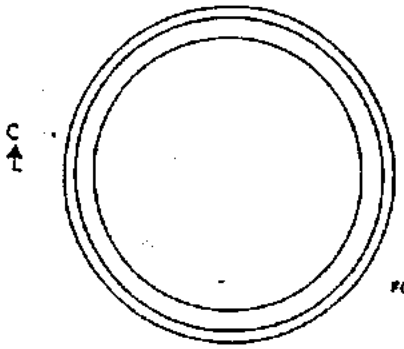
SECTION B-B

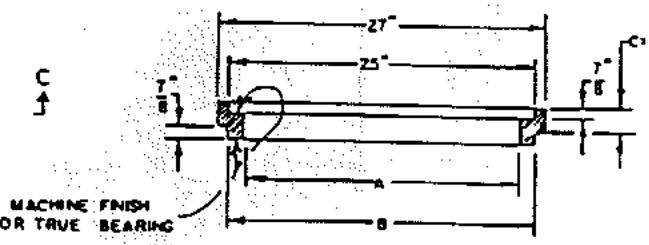


MANHOLE FRAME



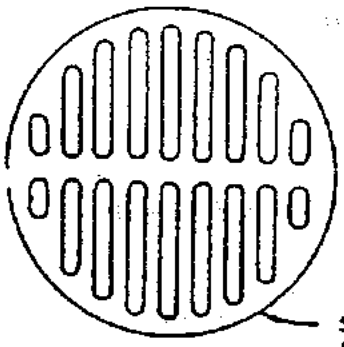
MANHOLE COVER



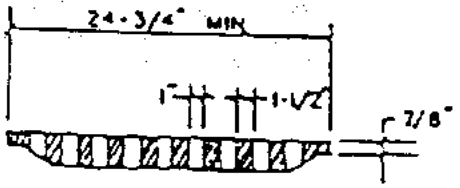


SECTION C-C

ADAPTOR RING SIZES		
	24"	25"
A	22-1/2"	23"
B	23-3/4"	24-3/4"



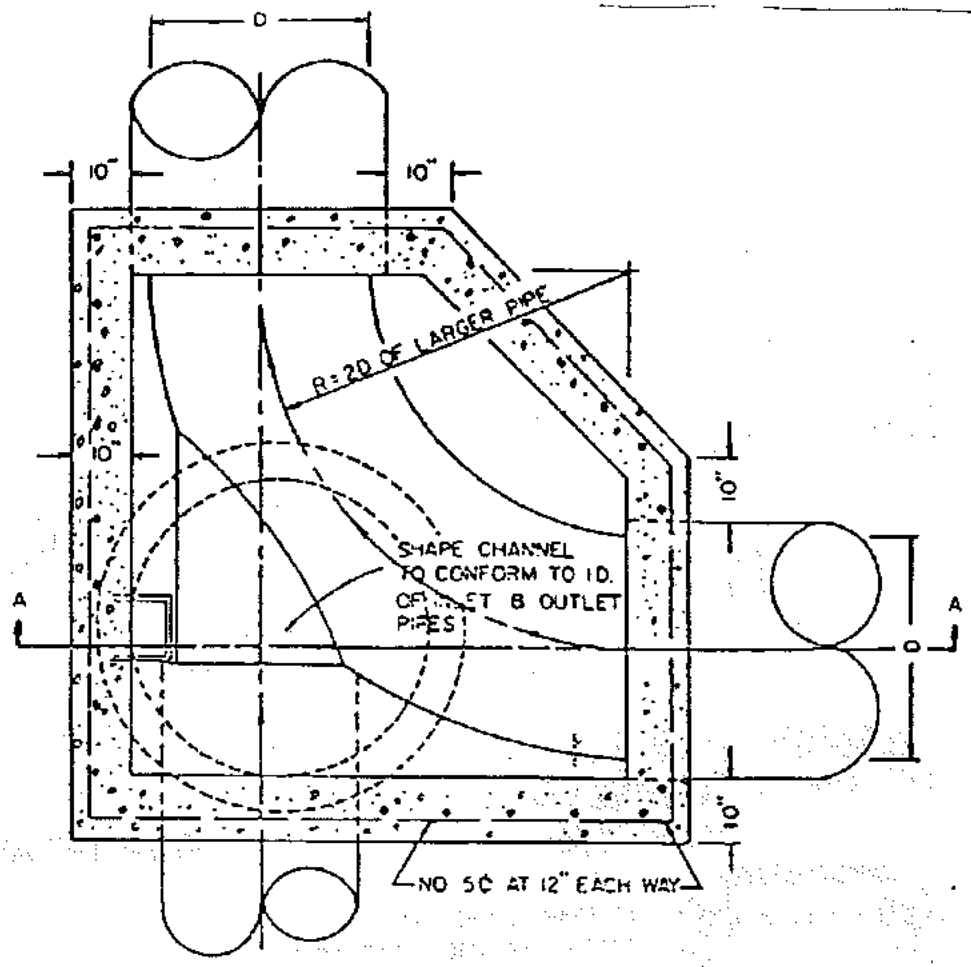
SALEM IRON WORKS
Nº A 4173 OR APPV'D
EQUAL



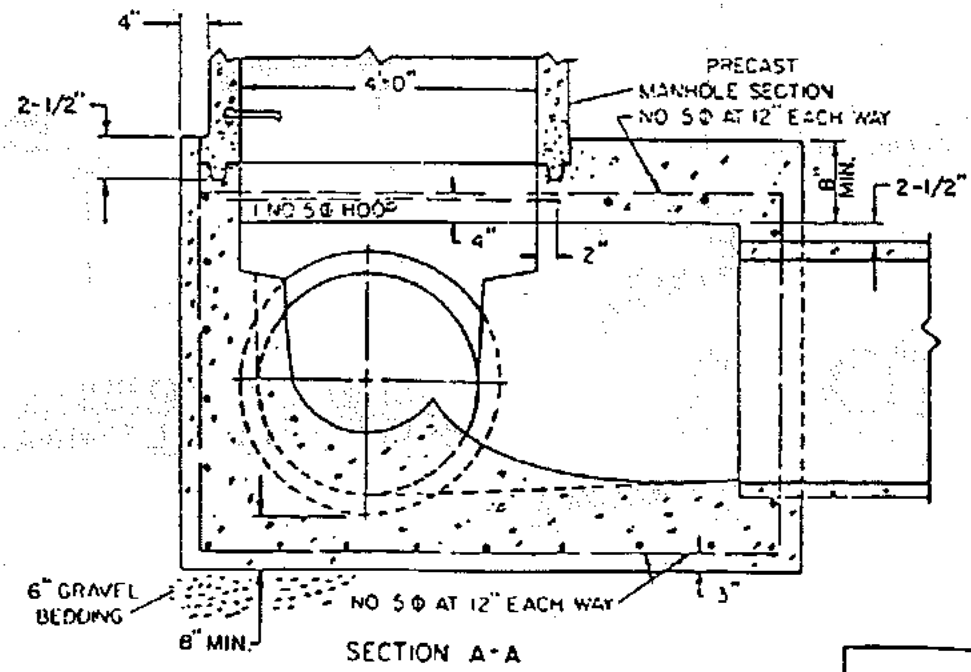
SLOTTED COVER

STANDARD MANHOLE CASTING DETAILS

DETAIL II-19



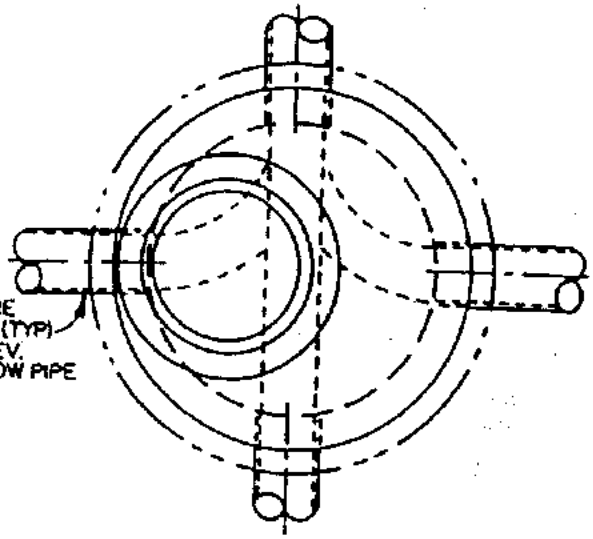
SPECIAL BASE FOR MANHOLES
AT ANGLE POINT IN LINE



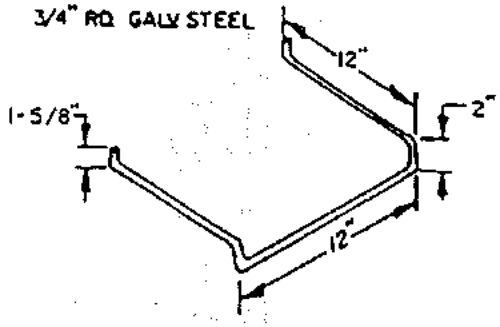
SECTION A-A

MANHOLE DETAILS
FOR PIPE 24" & OVER

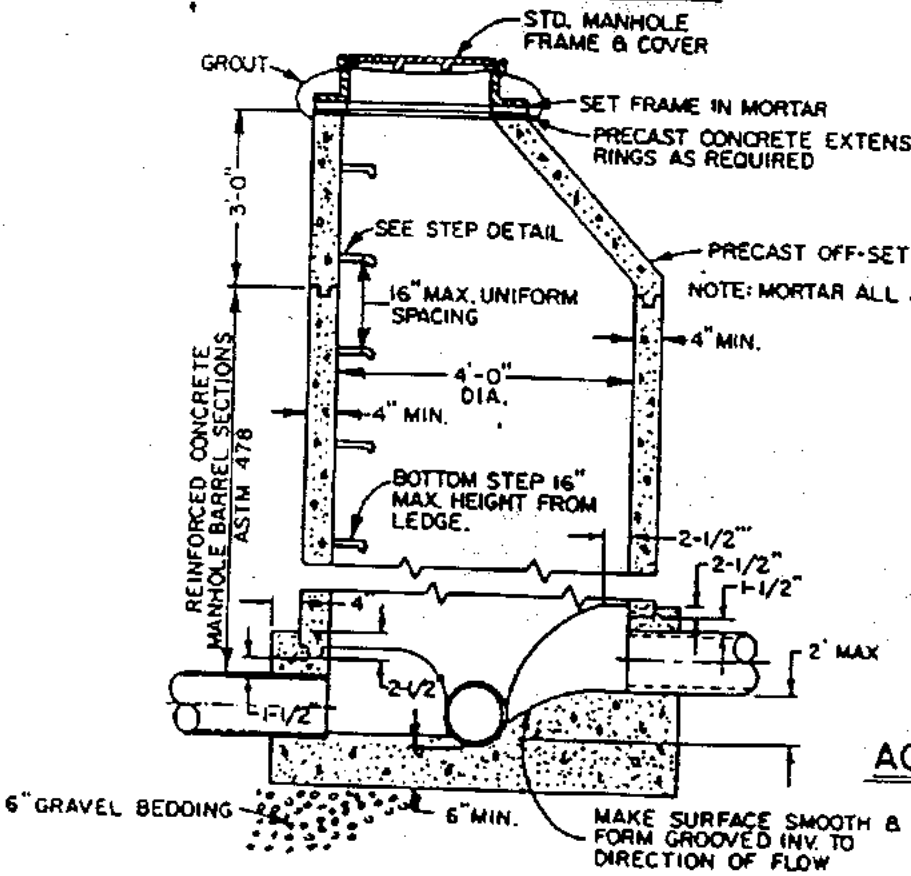
DETAIL II-20

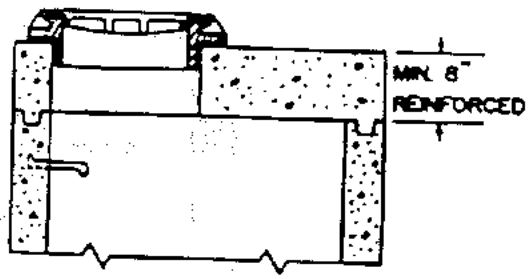


MANHOLE DETAILS FOR PIPE 21" & SMALLER



STEP DETAILS

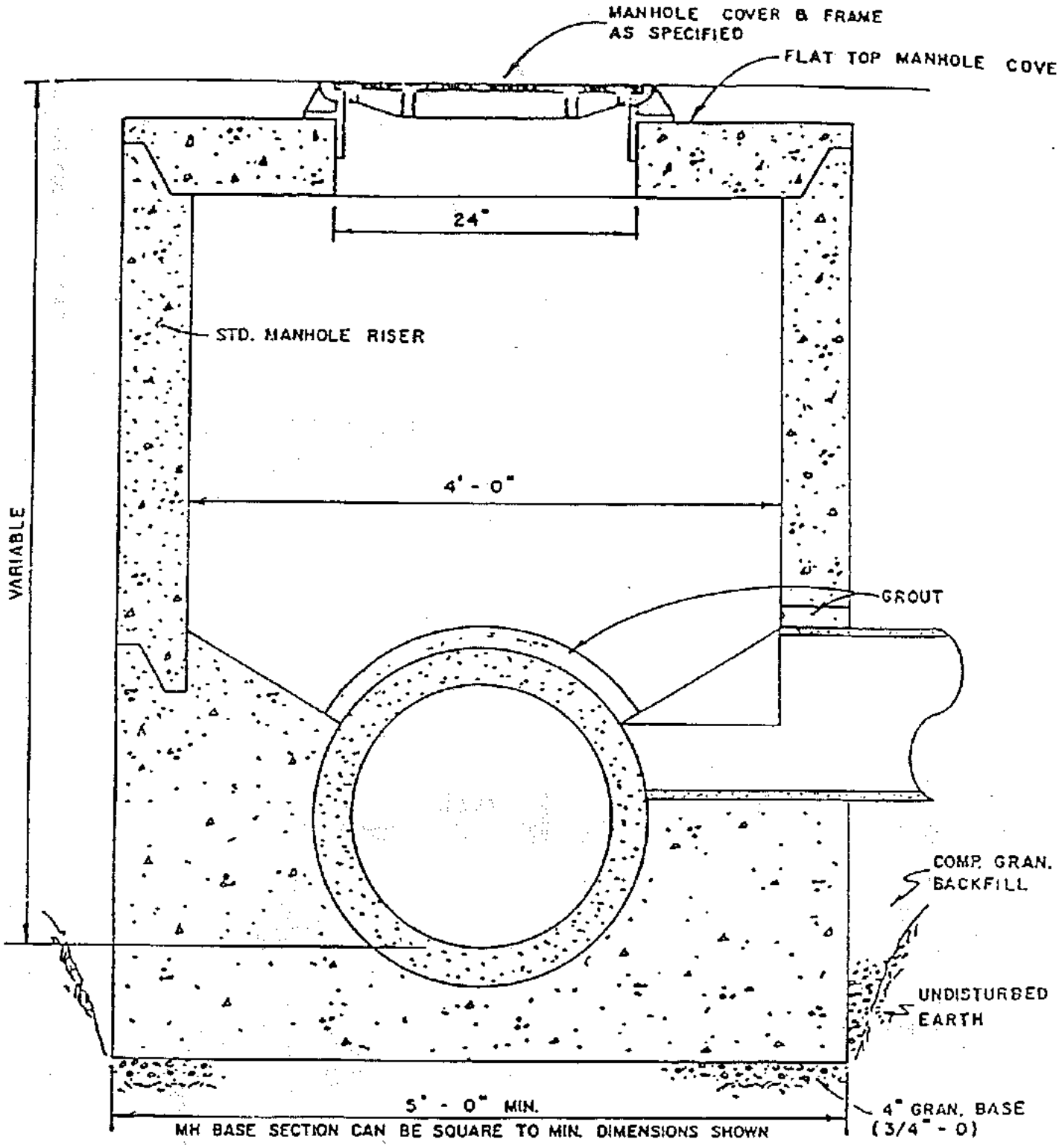




FLAT-TOP MANHOLE ACCEPTABLE ALTERNATE

STANDARD MANHOLE

DETAIL II-21

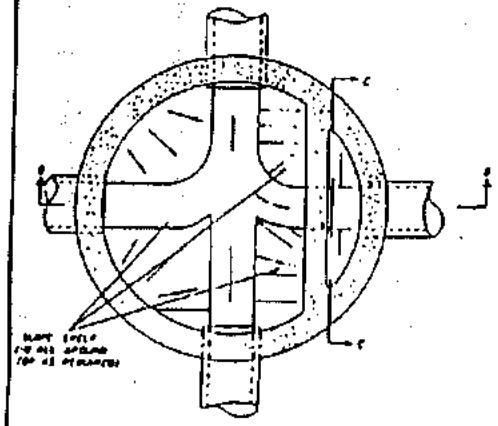


NOTES:

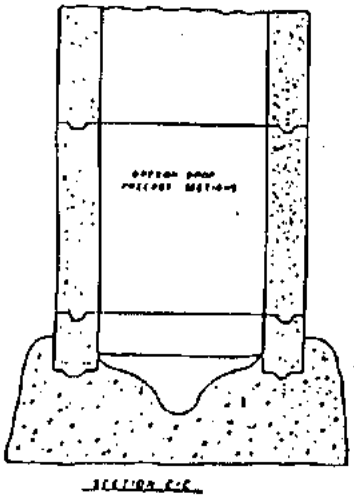
1. CONCRETE TO BE 3000 PSI, CLASS "A" FOR BASE AND 4000 PSI FOR RISERS & TOP SECTIONS.
2. PRECAST MANHOLES SHALL CONFORM TO ASTM C478.
3. USE WHERE SHALLOW HEADROOM PREVENTS USE OF STANDARD CONES.

FLAT TOP STORM MANHOLE

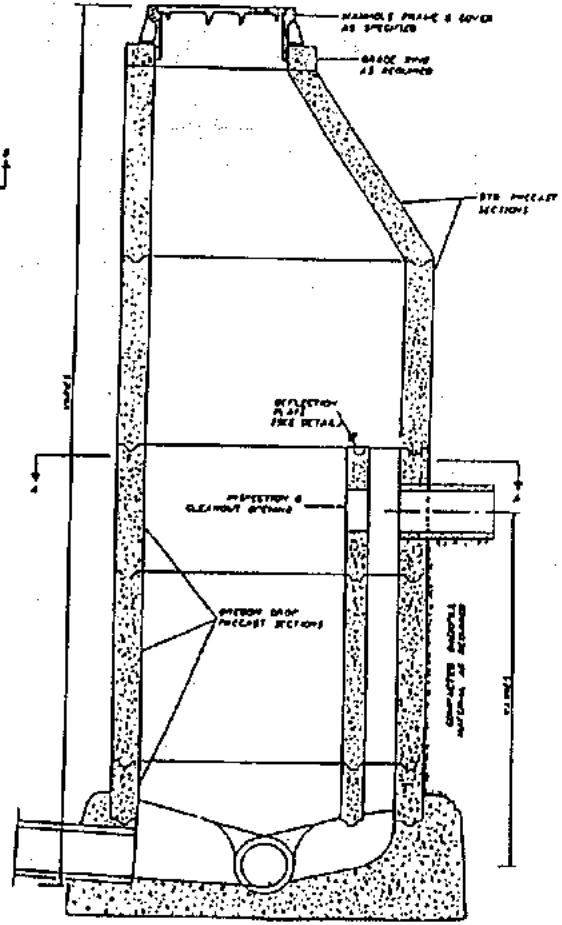
DETAIL II-22



SECTION A-A

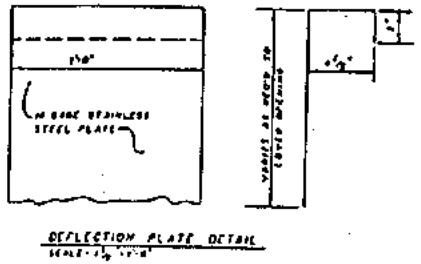


SECTION C-C

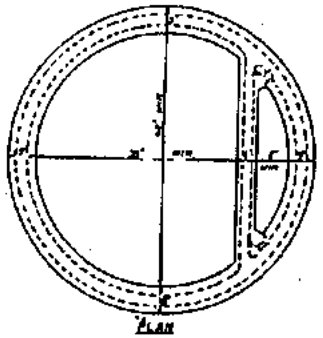


SECTION B-B

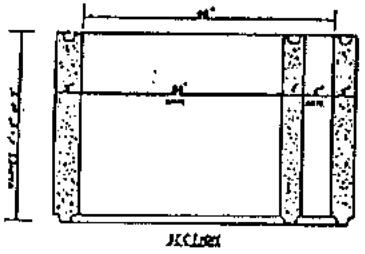
OREGON DROP
TYPICAL INSTALLATION DETAIL



DEFLECTION PLATE DETAIL



PLAN



SECTION

OREGON DROP 48"
PRECAST CONCRETE SECTION DETAIL

GENERAL NOTES

THE USE OF OREGON DROP SECTIONS IN MANHOLE CONSTRUCTION ELIMINATES THE NEED FOR OUTSIDE DROPS AT MANHOLES WHERE IT IS DESIRABLE OR NECESSARY TO PROVIDE A GRADE DIFFERENTIAL BETWEEN THE INVERT OF THE MANHOLE AND AN INCOMING LINE.

THE USE SHOULD BE LIMITED TO INSTALLATIONS WHERE ONLY ONE INSIDE DROP WILL EVER BE REQUIRED SO THAT WORKING ROOM WILL BE MAINTAINED.

SOME OF THE ADVANTAGES OF OREGON DROP OVER THE CONVENTIONAL OUTSIDE DROP ARE AS FOLLOWS:

(a) EASIER INSTALLATION
(b) LESS COSTLY (in most cases)
(c) PROVIDES A MORE TROUBLE FREE & TRUE MORE MAINTENANCE FREE MANHOLE
(d) PROVIDES EASY TOP ACCESS TO DROP PORTION FOR MAINTENANCE.

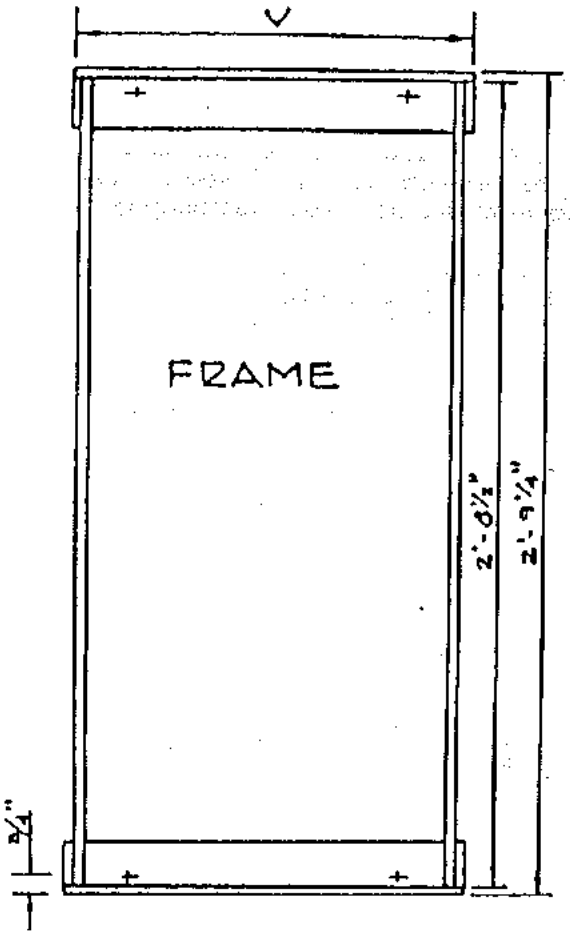
CONSTRUCTION NOTES

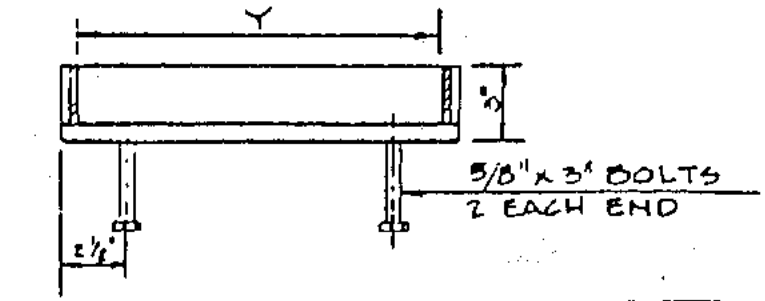
1. OREGON DROP PRECAST CONCRETE MANHOLE SECTIONS SHALL CONFORM TO ASTM SPECIFICATIONS C-478.
2. MANHOLE DIAMETER, JOINT SEALANT, JOINT CONFIGURATION BASE CONSTRUCTION, STEPS AND OTHER MANHOLE CONSTRUCTION DETAILS SHALL COMPLY WITH THE CONTROLLING AGENCY STANDARDS.
3. IT IS RECOMMENDED THAT THE FIRST OREGON DROP SECTION SET IN THE BASE BE A 48" SECTION FOR EASE IN SHAPING THE CHANNEL IN THE DROP PORTION.

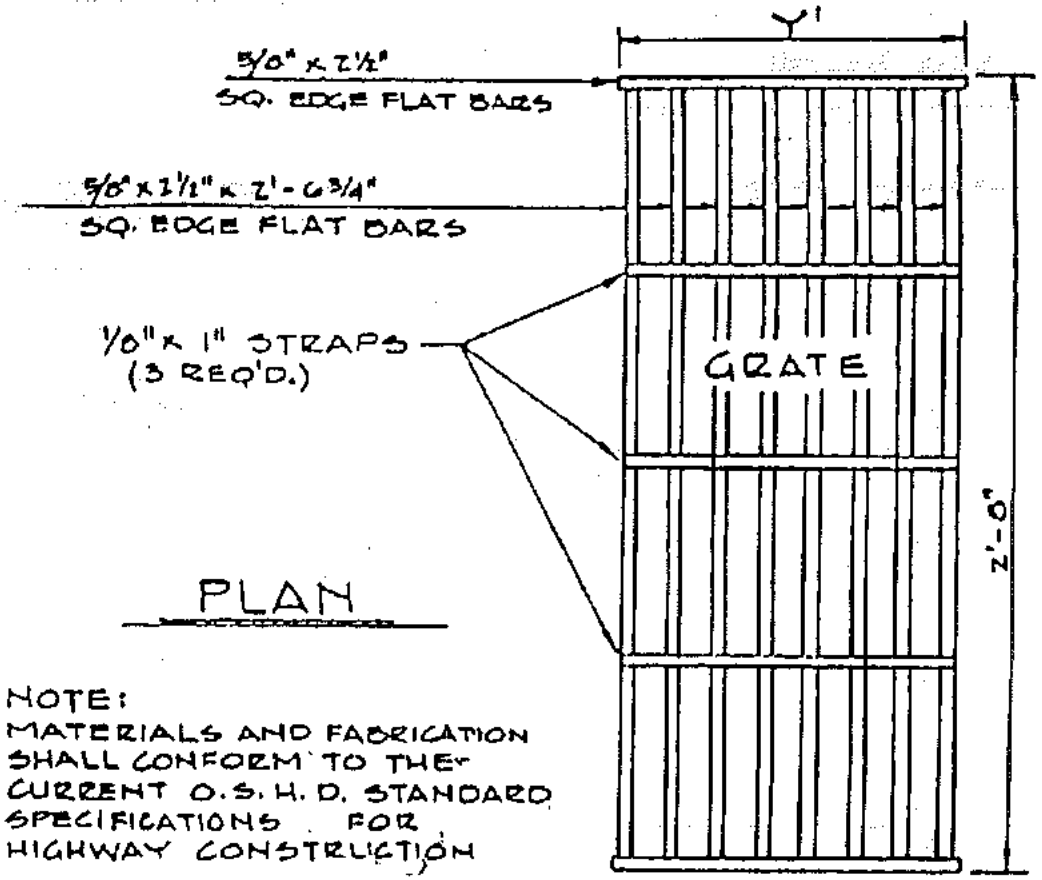
REV 6-10-75
REV 6-12-78
REV 6-13-78
DATE: 3-10-79

OREGON DROP MANHOLE

STANDARD DETAIL II-23

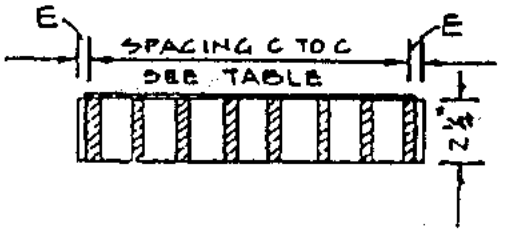






PLAN

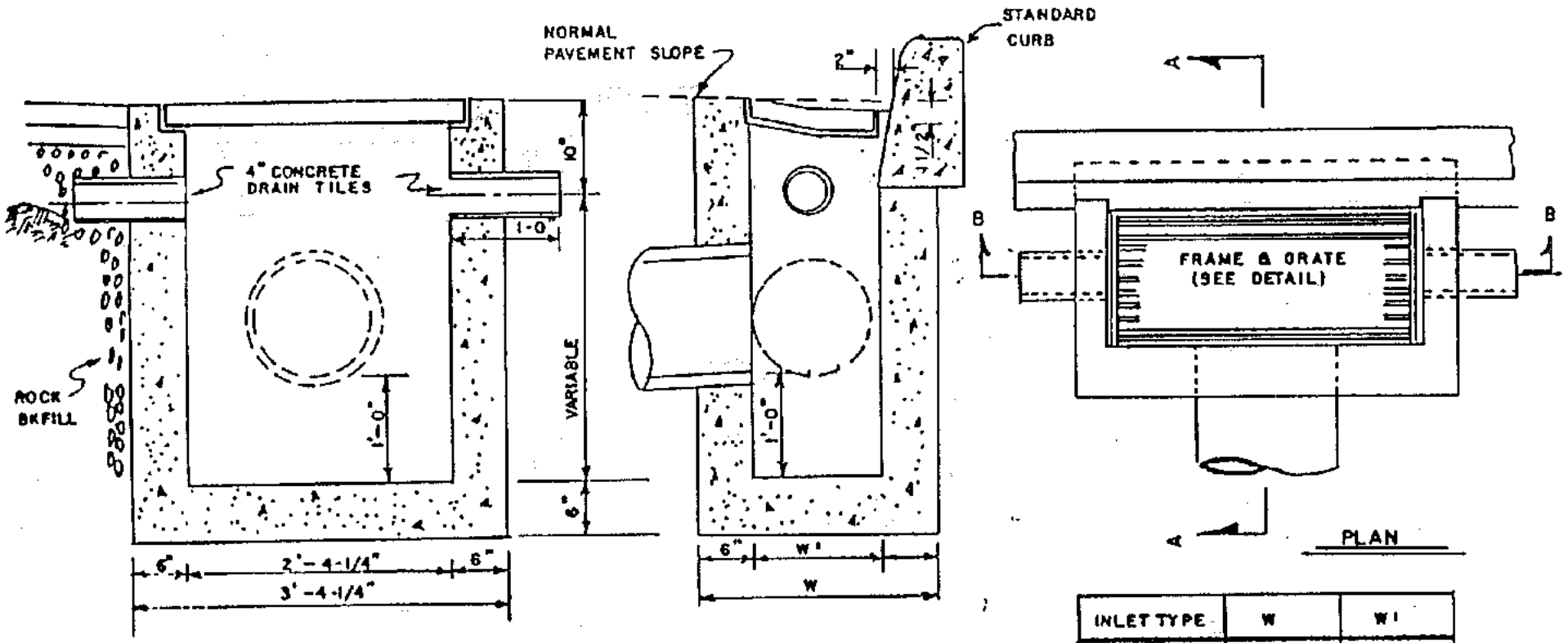
NOTE:
MATERIALS AND FABRICATION SHALL CONFORM TO THE CURRENT O.S.H.D. STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION



INLET TYPE	V	Y	Y'	E	SPACING C TO C	NO. OF BARS	REMARKS
G -1	1'-10¼"	1'-5⅜"	1'-5½"	⅝"	1¾"	12	
G -2	2'-4¾"	2'-5⅜"	2'-3"	⅝"	1¾"	8	2 GRATES

FRAME AND GRATE DETAILS

STANDARD DETAIL II-24



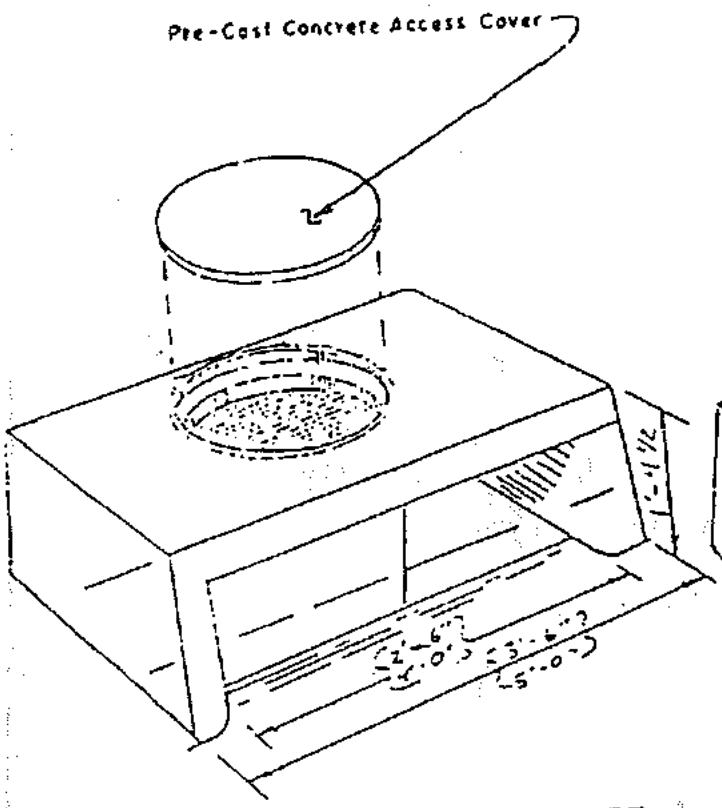
INLET TYPE	W	W'
G 1	2'-8-7/8"	1'-8-7/8"
G 2	3'-3-3/8"	2'-3-3/8"

TYPES G-1 & G-2

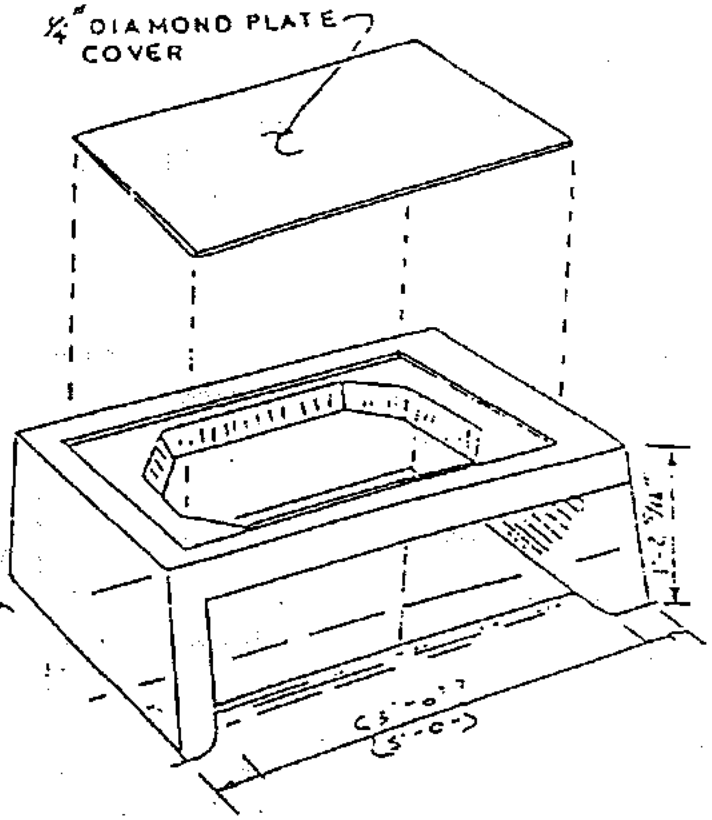
NOTE: A MAXIMUM DEVIATION FROM THE PLAN DIMENSIONS OF ONE INCH, AT THE INLET FLOOR, SHALL BE ALLOWED FOR THE TAPERING OF FORMS USED IN CONSTRUCTION OF CONCRETE INLETS..

CURB INLET DETAILS

DETAIL II-25

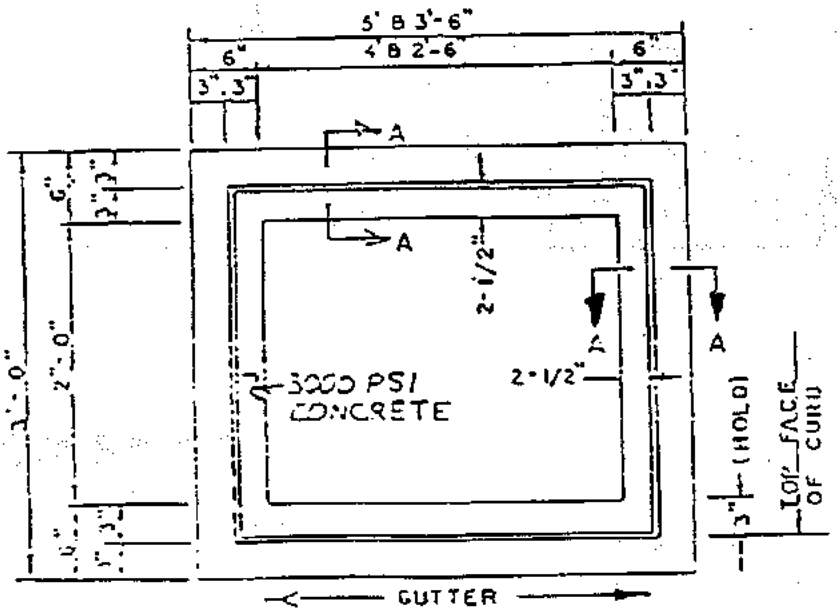


CONCRETE CURB INLET
TYPE "CG"- 2½ & 4 A

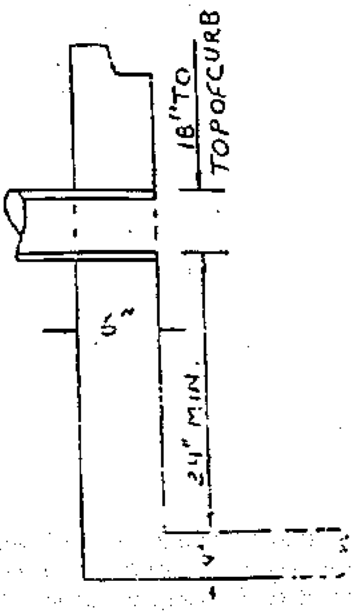


PRECAST CURB INLET
TYPE 2½ & 4 A

NOTE:
WHERE PRE-CAST BASES ARE USED 5" WALL THICKNESS CAN BE USED



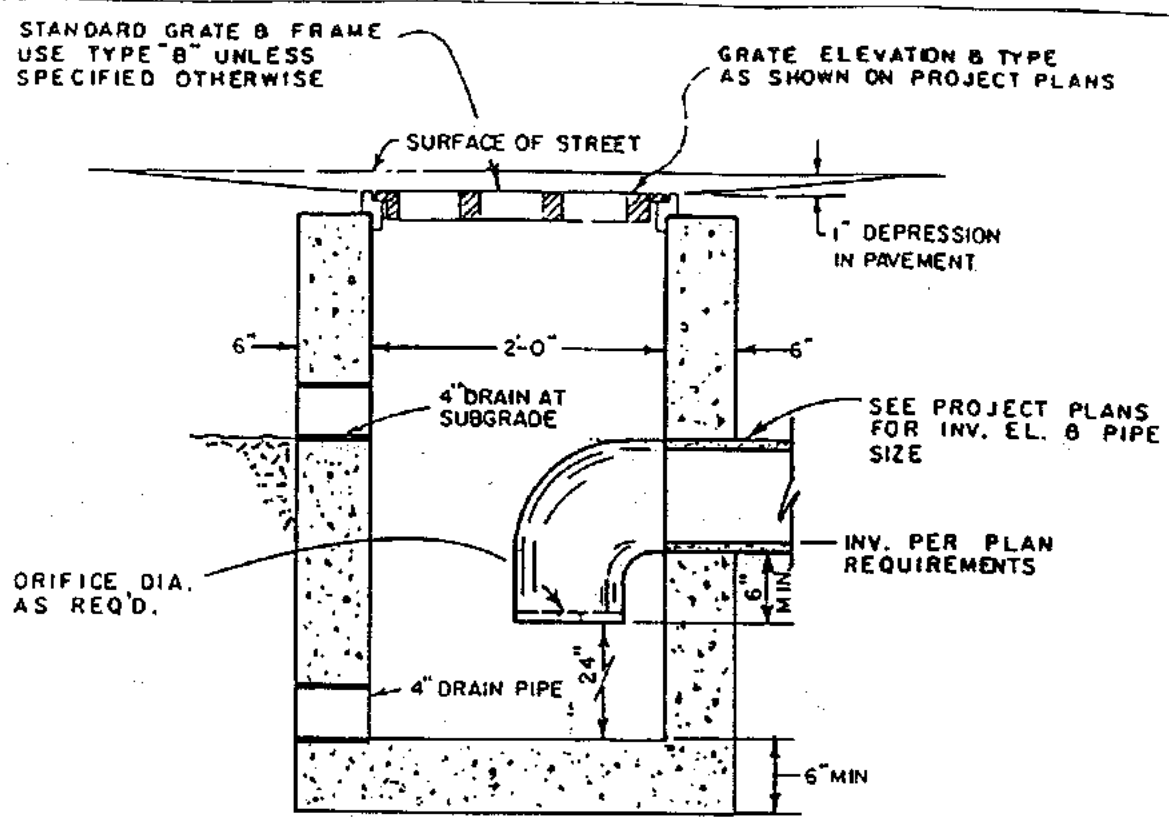
PLAN
CAST IN PLACE
BASE



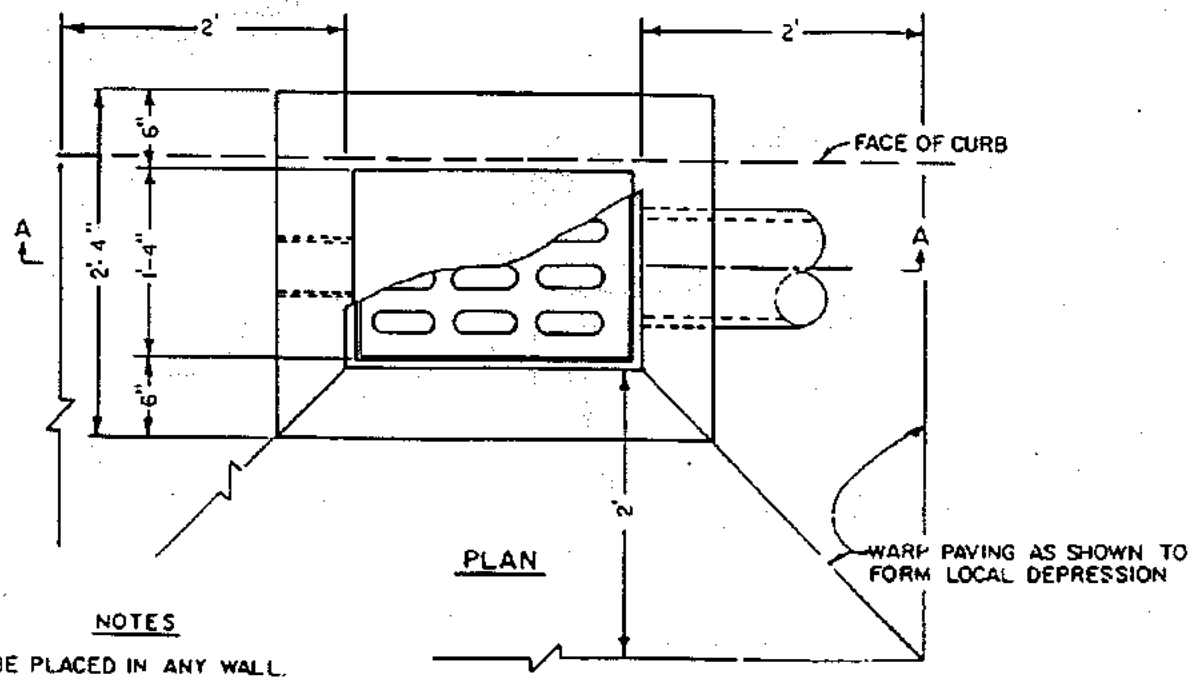
SECTION A-A"

CURB INLETS

DETAIL II-26



SECTION A-A



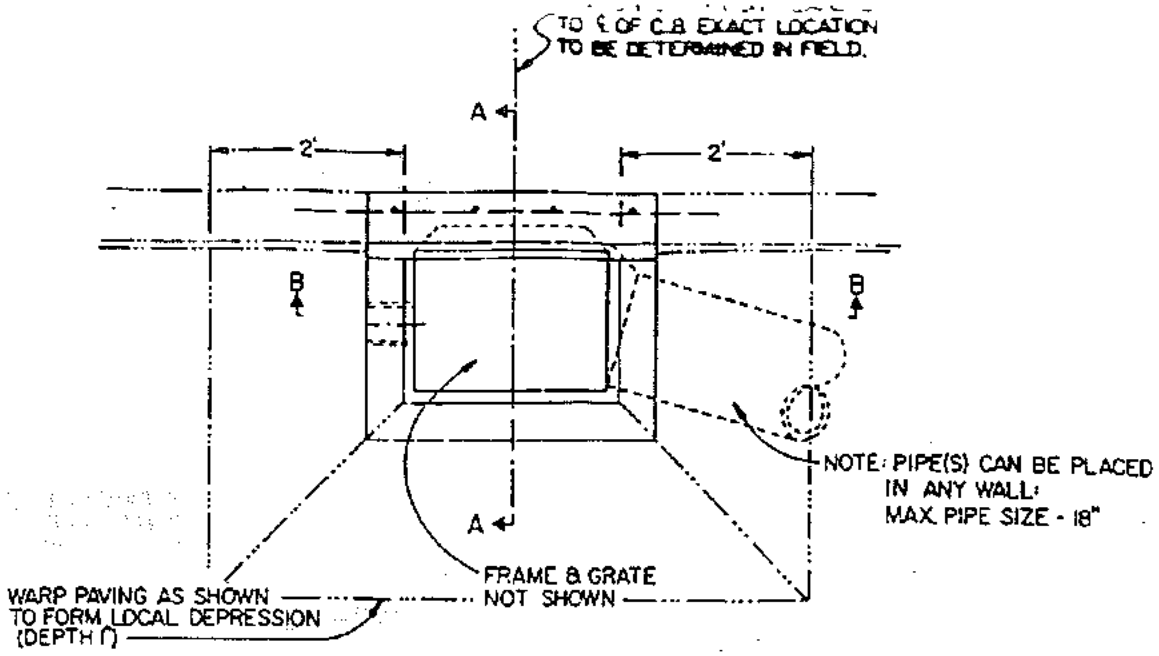
PLAN

NOTES

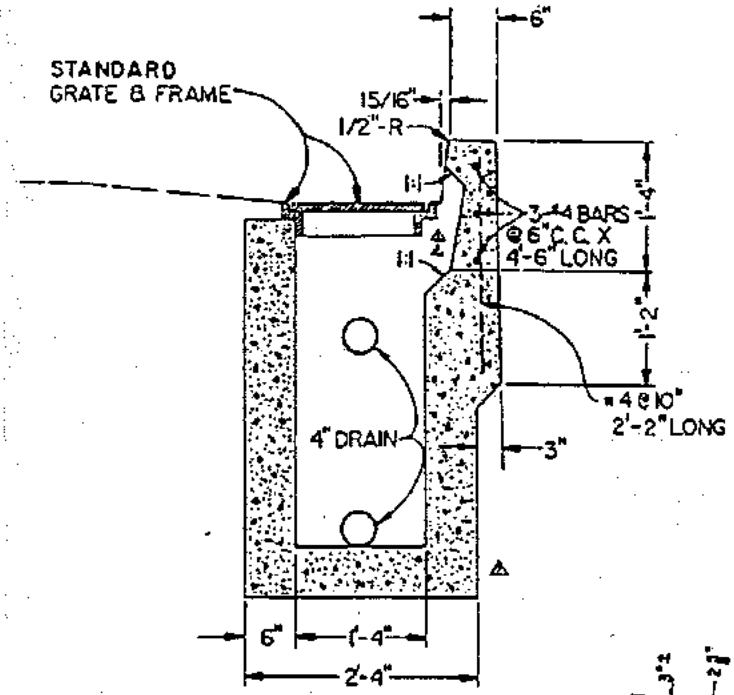
1. PIPE(S) CAN BE PLACED IN ANY WALL.
2. STATION SHOWN ON PROJECT PLANS IS TO CENTERLINE OF C.B.
3. ALL CONCRETE SHALL BE CLASS A/3300 PSI.
4. DRAINS SHALL BE 4" INCH CONC. DRAIN TILE.
5. TO CONSTRUCT CLEANOUT REPLACE GRATE WITH 1'-3½"X1'-11½" STEEL PLATE ¾" THICK. DRILL ONE, 1" DIA. LIFT HOLE NEAR ONE END OF PLATE.

C.B. WITH ORIFICE

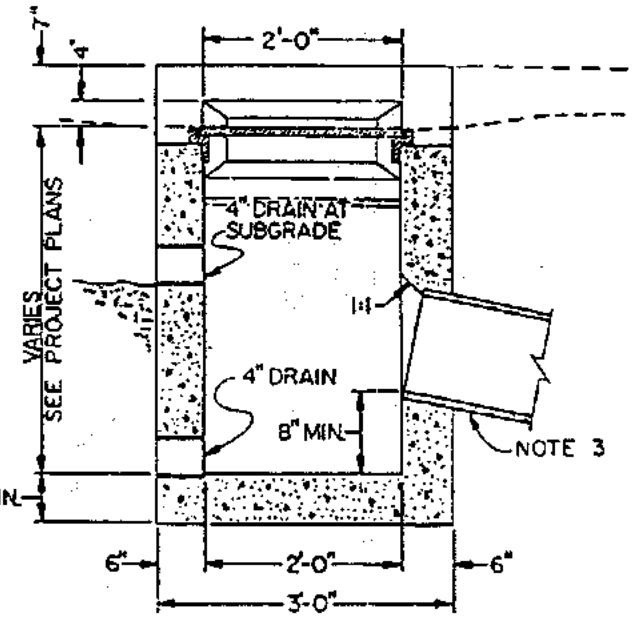
DETAIL II-27



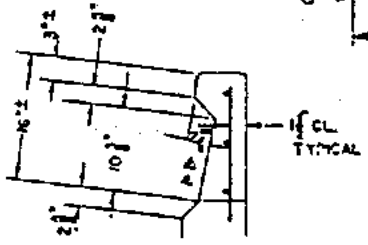
PLAN



SECTION A-A



SECTION B-B



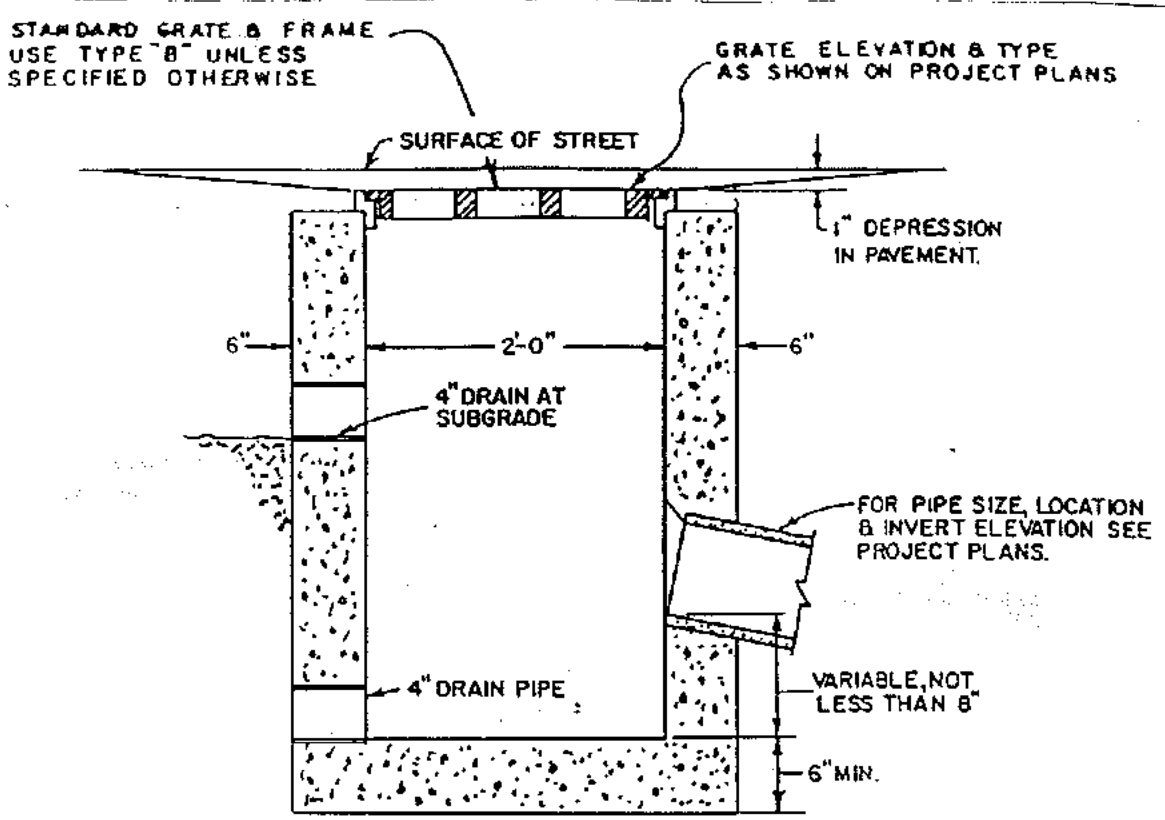
CURB OPENING DETAIL

NOTES

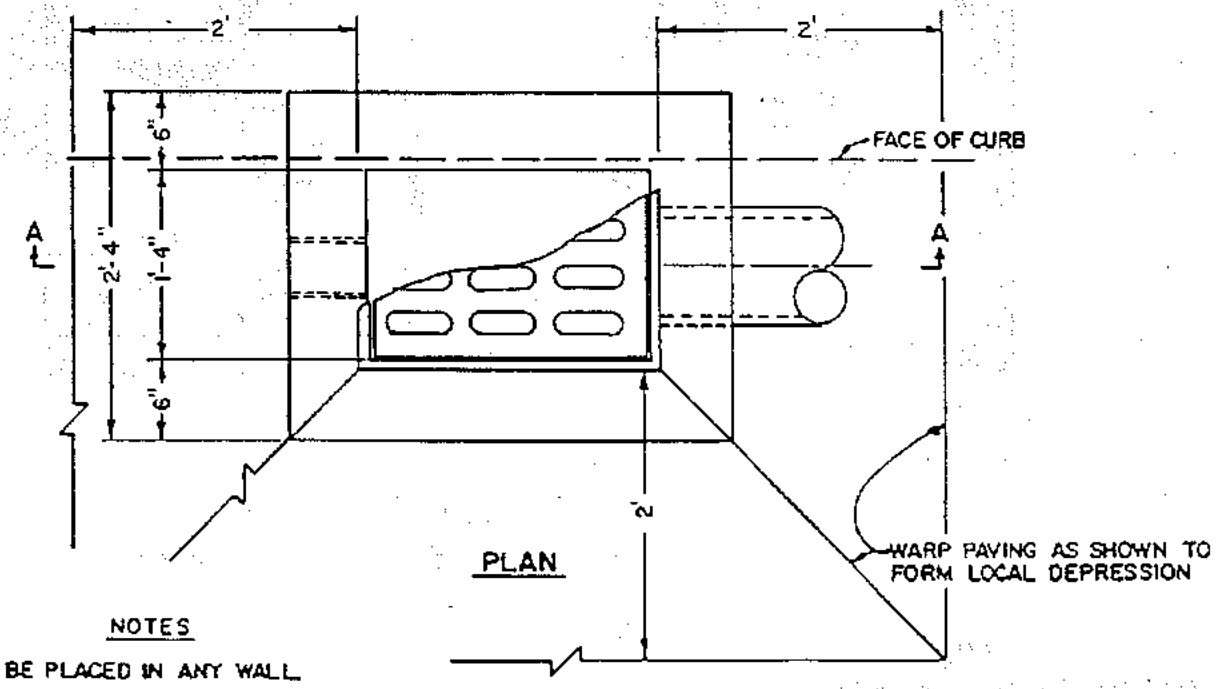
1. ALL CONCRETE SHALL BE CLASS A/3300PSI.
2. DRAINS SHALL BE 4-INCH CONC. DRAIN TILE.
3. FOR OUTLET PIPE SIZE, LOCATION, AND INVERT ELEVATION SEE PROJECT PLANS.

STANDARD CATCHBASIN DETAIL
TYPE 2 (SIDE INLET) CATCH BASIN

DETAIL II-28



SECTION A-A

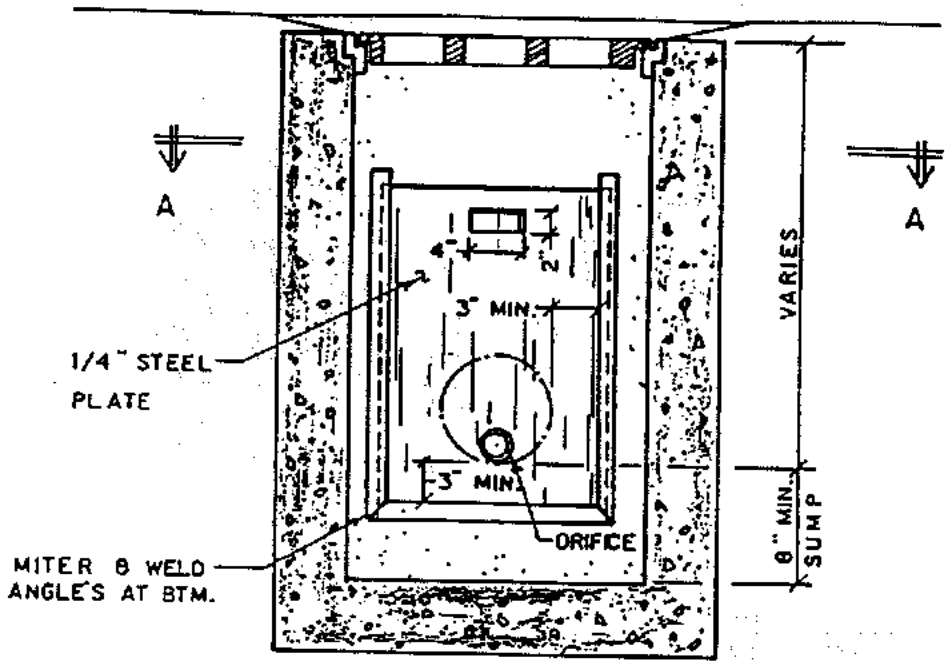


NOTES

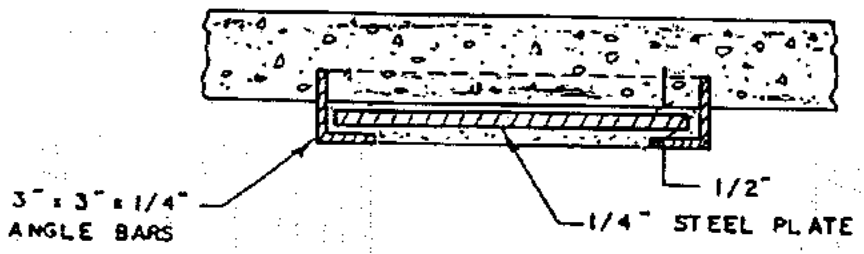
1. PIPE(S) CAN BE PLACED IN ANY WALL.
2. STATION SHOWN ON PROJECT PLANS IS TO CENTERLINE OF C.B.
3. ALL CONCRETE SHALL BE CLASS A/3300 PSI.
4. DRAINS SHALL BE 4" INCH CONC. DRAIN TILE.
5. TO CONSTRUCT CLEANOUT REPLACE GRATE WITH $1'-3\frac{1}{2}" \times 1'-11\frac{1}{2}"$ STEEL PLATE $\frac{3}{4}"$ THICK. DRILL ONE, 1" DIA. LIFT HOLE NEAR ONE END OF PLATE.

STANDARD CATCHBASIN
DETAILS
TYPE I CATCH BASIN & CLEAN OUT

DETAIL II-29



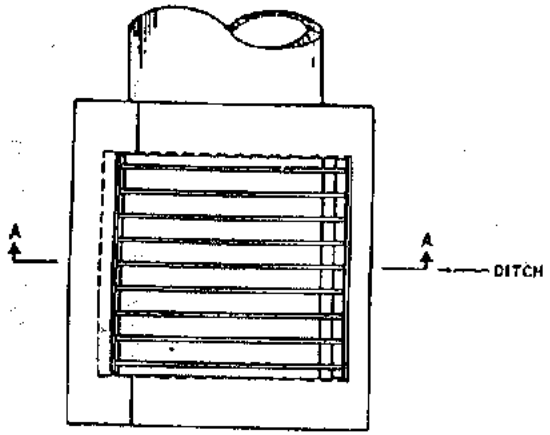
FRONT SECTION — ELEVATION



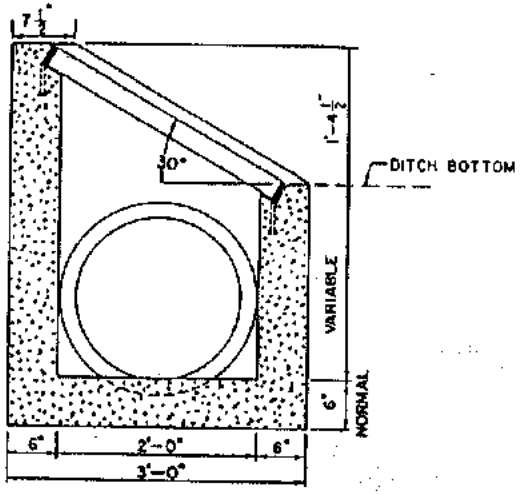
PLAN - SECTION A-A

CATCH BASIN ORIFICE DETAIL

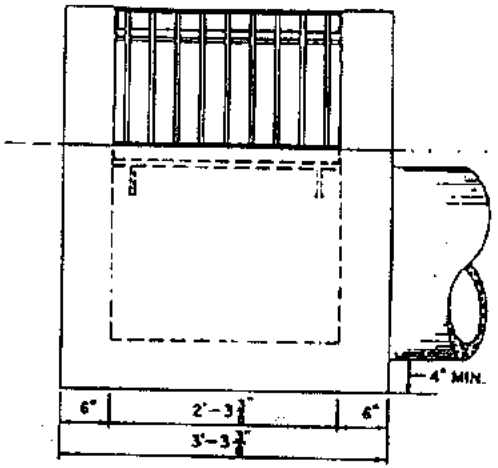
DETAIL II-30



PLAN

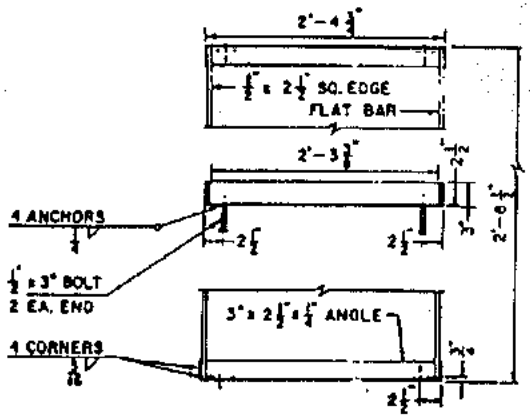


SECTION A–A

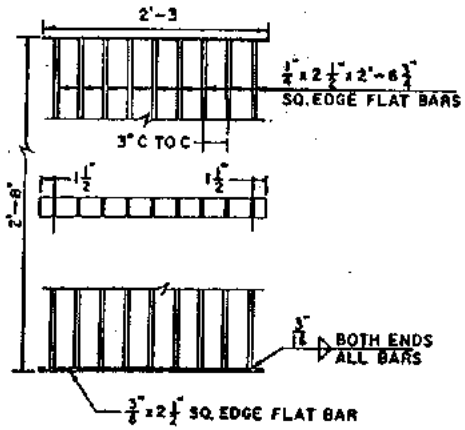


ELEVATION

1. FOR PIPE SIZE, INVERT ELEVATION AND LOCATION SEE PROJECT PLANS.
2. ALL CONCRETE SHALL BE MIXED AND PLACED IN ACCORDANCE WITH THE SPECIFICATIONS FOR 3000 P.S.I., 1½" MAX. SIZE COARSE AGGREGATE.
3. CATCH BASIN MAY BE BUILT WITH OR WITHOUT A SUMP AS THE ENGINEER MAY DIRECT.
4. FRAME AND GRATE MATERIAL SHALL BE STEEL (A.S.T.M. A-36) AND BE GALVANIZED IN ACCORDANCE WITH (A.S.T.M. A-123).



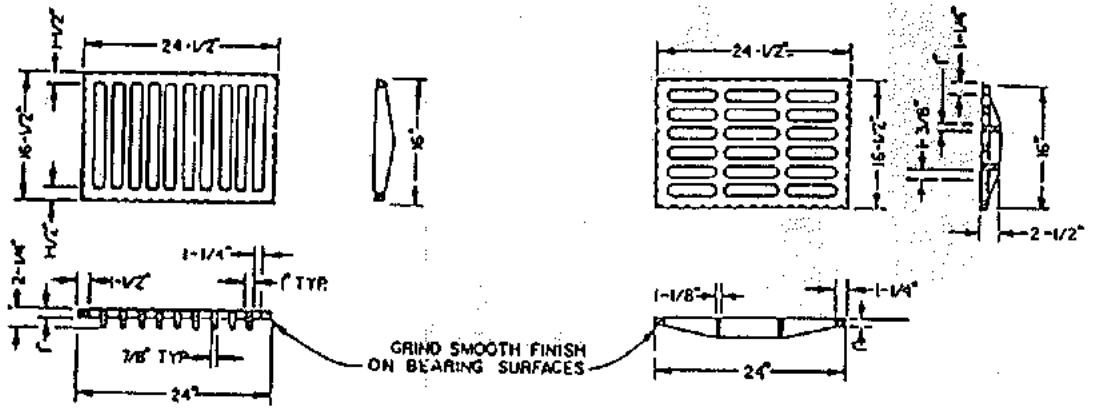
FRAME



GRATE

TYPE 3 CATCHBASIN
SIDE INLET

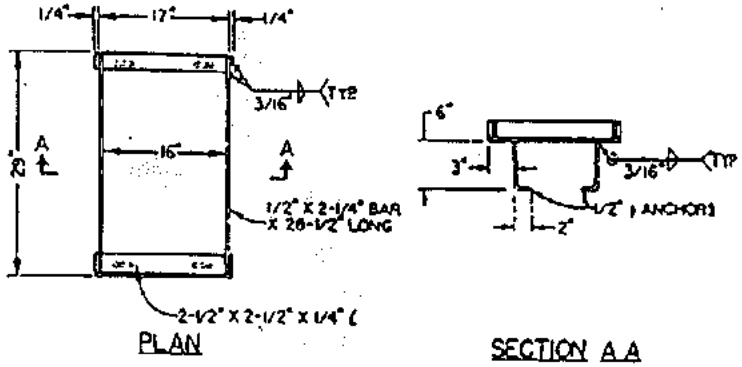
DETAIL II-31



TYPE A GRATE
1-1/4" CLEAR SPACING

TYPE B GRATE
1-3/8" CLEAR SPACING

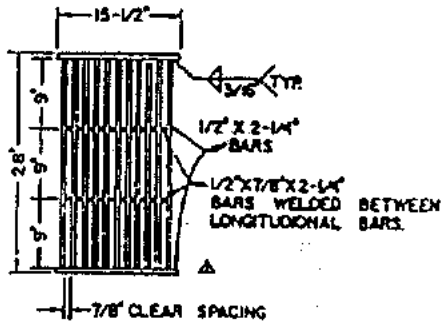
GRATE DETAILS
(CAST IRON OR CAST STEEL)



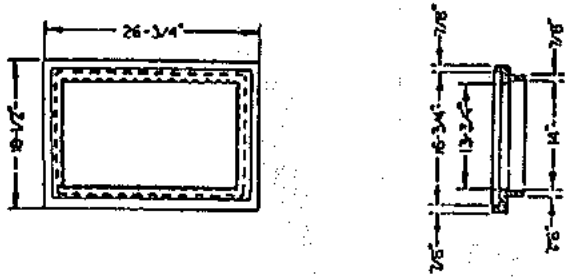
PLAN

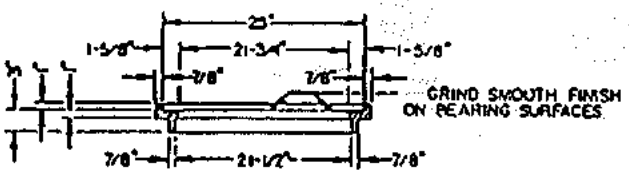
SECTION A A

ALTERNATIVE WELDED GRATE FRAME
(FOR USE WITH WELDED GRATE)



TYPE B WELDED GRATE





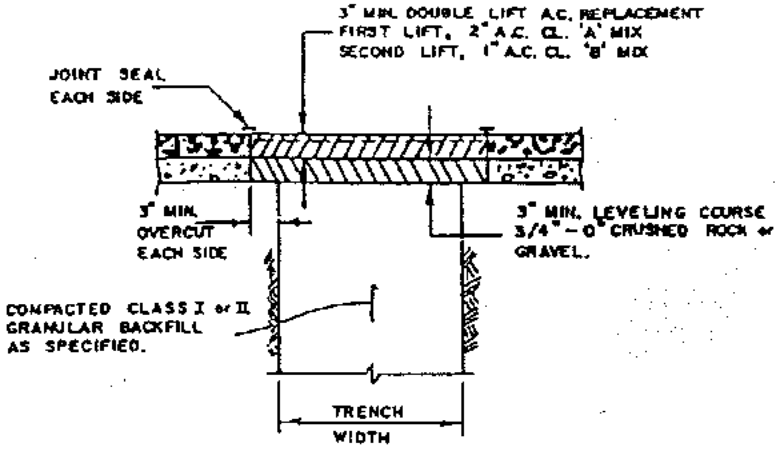
GRATE FRAME DETAILS
(CAST IRON OR CAST STEEL)

NOTES

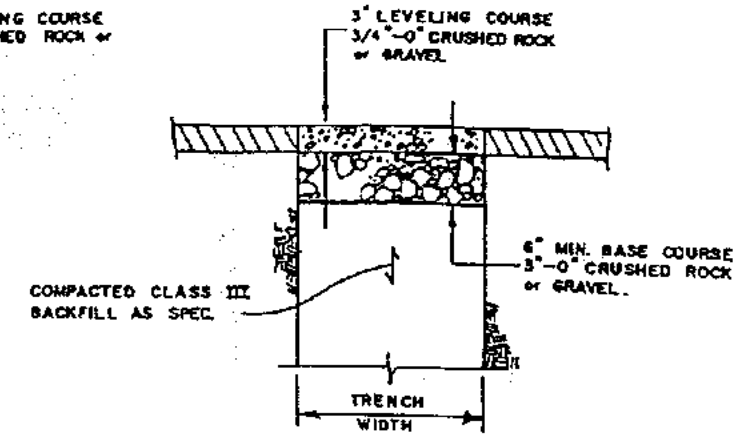
1. ALL CASTINGS SHALL CONFORM TO ASTM A 48(AASHO M 105) FOR GRAY IRON CASTINGS, CLASS 30, OR AASHO M 192(CLASS 70) FOR CAST STEEL.
2. ROUNDS, FILLETS, TAPERS AND OTHER MINOR MODIFICATIONS TO THE DIMENSIONS SHOWN FOR CASTINGS MAY BE MADE TO CONFORM TO COMMON SHOP PRACTICES.
3. GRATES AND FRAMES MAY BE OF CAST OR WELDED CONSTRUCTION, AT THE CONTRACTOR'S OPTION
4. STEEL FOR WELDED GRATE & FRAME SHALL BE ASTM A-7 OR ASTM A-373.

CATCH BASIN FRAMES & GRATES
TYPE A AND B

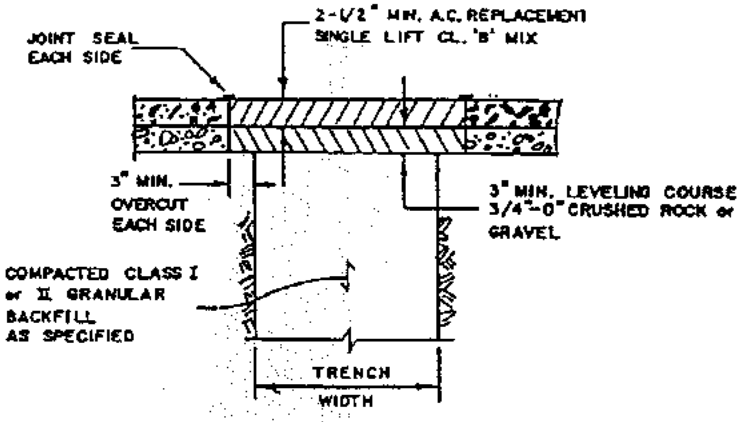
DETAIL II-32



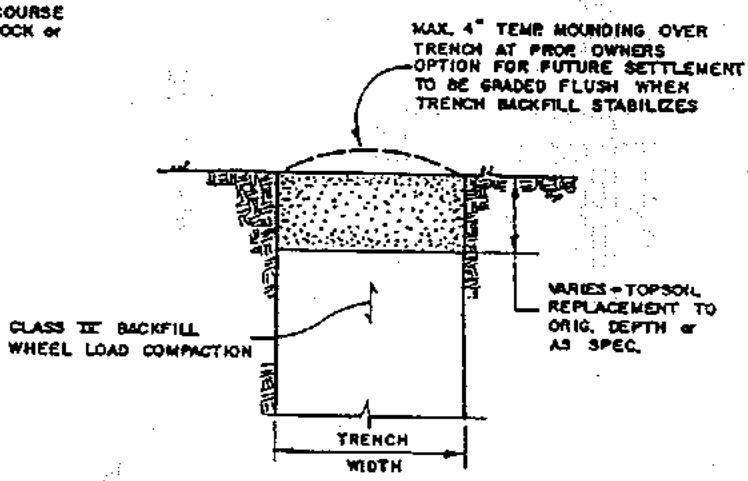
CLASS A
PAVED STREET
REPLACEMENT
(MAJOR STREETS & ARTERIALS)



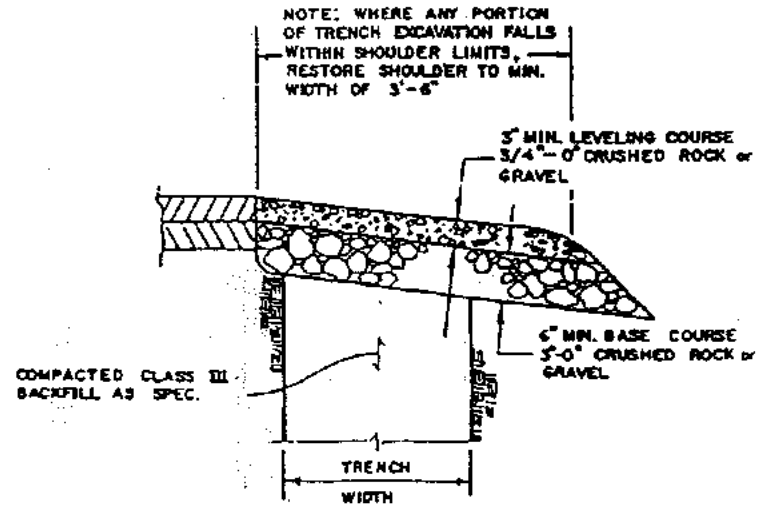
CLASS D
GRAVELED ROAD
or STREET



CLASS B
PAVED STREET
(MINOR STREETS)



CLASS E
UNIMPROVED
& OPEN AREAS



CLASS C
GRAVEL SHOULDER

SURFACE RESTORATION DETAILS

DETAIL II-33

PUBLIC WORKS CONSTRUCTION STANDARDS

TABLE OF CONTENTS - SECTION III

SECTION III - SANITARY SEWERS

A. DESIGN STANDARDS

1. Sanitary Sewers. All sanitary sewers shall be designed for gravity flow of sewage only.

2. DEQ Requirements. All sanitary sewers and appurtenances shall conform to the State of Oregon, Department of Environmental Quality (DEQ) regulations and to these standards. In the event of a difference between DEQ regulations and these standards, the more stringent specification shall be followed.

3. Gravity Flow. Where possible, sanitary sewers shall be designed to flow by gravity to an existing sewer without sewage lift stations.

4. Design Period. In general, sewer systems shall be designed for the estimated ultimate tributary population. Similarly, consideration shall be given to the maximum anticipated capacity of institutions, industrial parks, etc.

5. Design Factors. In determining the required capacities of sanitary sewers, the following factors shall be considered:

   a. Maximum hourly sewage flow.

   b. Additional maximum sewage or wastewater flow from industrial plants.

   c. Groundwater infiltration.

   d. Inflow

   e. Topography of area.

   f. Location of wastewater treatment plant.

   g. Depth of excavation.

   h. Pumping requirements.

6. Design Basis. Per Capita Flow: Generally, the sewers should be designed to carry the peak domestic, commercial and industrial contributions, plus infiltration/inflow from the individual gravity service laterals, sewer mains and manholes.

New sewer systems within the City shall be designed on the basis of the following average daily per capita flows:

Per Capita Resident Domestic Sewage	90 gal/day
Schools: Non-resident Students & Staff	20 gal/day
Commercial/Industrial: Non-resident Employees	25 gal/day
Restaurants: Non-resident Customers	
Cafes	40 gal/day/seat
Taverns	50 gal/day/seat
Infiltration/Inflow (Peak daily flow)	1200 gal/acre/day
Peaking Factor	Not less than 3.0

7. Details of Design and Construction. Minimum Size -- No sewer main shall be less than 8-inches in diameter except as provided by in the DEQ regulations and accepted by the City.

8. Depth. In general, sewers shall be sufficiently deep so as to receive sewage from basements and to prevent freezing. No sewer should be less than 2.5 feet deep.

9. Slope:

Sewer Size	Minimum Slope in Feet per 100 Feet
6"	0.60
8"	0.40
10"	0.28
12"	0.22
14"	0.17
15"	0.15
16"	0.14
18"	0.12
21"	0.10
24"	0.08
27"	0.07

10. Alignments. All sewers shall be laid straight.

11. Increasing Size. When a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 80% depth point of both sewers at the same elevation.

12. High Velocity Protection. Where velocities greater than 15 feet per second are attained, special provisions shall be made to protect against displacement, erosion and shock.

13. Manholes:

a. Location - Manholes shall be installed at the end of each line; at all changes in grade, size, or alignment, at all intersections; and at distances not greater than 500 feet. Clean outs may be used only at the end of laterals no greater than 250 feet in length.

b. A drop pipe should be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert should be filleted to prevent solids deposition.

c. Diameter - The minimum diameter of manholes shall be 48 inches. For pipe greater than 24 inches in diameter, the diameter shall be a minimum of 60 inches.

d. Flow Channel - The flow channel through manholes shall be made to conform in shape and slope to that of the inlet and outlet sewer pipes.

e. Watertightness - Watertight manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water. All manholes shall be watertight.

f. Steps - All manholes shall be equipped with permanent steps.

g. A flexible pipe joint shall be provided within 24 inches of the manhole for all pipes.

14. Protection of Water Supplies:

a. Water Supply Interconnections - There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenant thereto, which would permit the passage of any sewage or polluted water into the potable water supply. Placement of sewers shall meet the Oregon Health Division requirements for separation between water and sewer facilities.

b. Horizontal Separation - Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main.

c. Vertical Separation - Whenever it is necessary for sewer and water lines to cross each other, the sanitary sewer shall either be located 18 inches or more below the water pipe or be constructed of one 18 foot section of ductile iron water pipe centered at the point of crossing.

15. Location of Service Laterals:

a. Service laterals shall be extended to the edge of the property to be served and shall be sufficiently deep to provide gravity service to that property.

b. Ends of all unused service laterals to be capped and marked by a painted white 2" x 4".

B. MATERIALS

1. Trench Backfill

a. Trench Backfill Zones - Trench backfill is segregated into the following zones. See standard detail on plans.

1) Pipe embedment.

2) Backfill in pipe zone.

3) Classified backfill above pipe zone.

b. Pipe Embedment Material - To be 3/4"-0" or 1"-0" crushed rock conforming to Section 703 of the OSHD Standard Specification.

c. Backfill Material in Pipe Zone - Same as embedment material.

d. Classes of Backfill Material Above Pipe Zone

1) Class I granular backfill: Imported crushed rock, meeting the following minimum requirements:

a) Same as pipe embedment material.

b) Use under all paved roadways or paved driveways.

2) Class II Select Backfill

a) Well graded pit run, pea gravel, sand, or crusher screenings, meeting the following minimum requirements:

1. One hundred percent (100%) passing 6" sieve (U.S.) and 5 to 15 percent passing #200 mesh (U.S.).

2. To be free of deleterious matter.

b) All Material to be approved by the Engineer prior to use.

3) Class III and IV Native Backfill

a) Native excavated material free of vegetable matter and debris.

b) Individual particles shall be less than 1/3 trench width in greater dimension.

c) Class III and IV used in unimproved areas or as directed by the Engineer.

2. Sewer Pipe (including service laterals)

a. Polyvinyl-Chloride (PVC) Gravity Sewer Pipe

1) Pipes 15 inches and smaller shall conform to ASTM D-3034 SDR 35 bell and spigot with rubber gasket joints. Joints shall conform to ASTM D-3312/

2) Pipe 18 inches and larger shall conform to ASTM F679.

3) Fittings shall include wyes, bends, caps, plugs, tees, etc. Fittings shall be of same material, type, class and grade as sewer pipe.

4) Manhole adaptors shall be used at all manhole base penetrations and shall be as manufactured by JM Pipe or approved equal.

b. Ductile Iron Pipe

1) Ductile iron conforming to AWWA C151-76, Class 50.

2) Cement mortar lining and bituminous seal coat conforming to AWWA C104-74.

3) Joints to be push-on or mechanical conforming to AWWA C111-72.

c. Rubber Couplings

1) To be Fernco or approved equal.

d. Saddles

1) To be used to tap into existing PVC sewers. To be Inserta Tees as manufactured by Fowler Manufacturing Co., Hillsboro, Oregon, or approved equal.

3. Manholes

a. Riser and Tops - Pre-cast reinforced concrete conforming to ASTM C-478.

1) Risers to be 48" diameter.

2) Tops to be eccentric cone except where insufficient headroom necessitates the use of flat tops.

3) Manhole steps provided - where pre-cast riser sections are holed through for insertion of steps. Upon installation of steps, thoroughly fill and compact hole with non-shrink grout inside and out, so as to provide a non-leaking connection.

b. Concrete Base - Cast-in-place monolithic concrete conforming to the following specifications:

1) Cement content minimum six (6) sacks per cubic yard and minimum 28 day compressive strength of 3000 psi.

2) Aggregate - Conform to ASTM C-33, maximum size 1-1/2 inch.

3) Portland cement - Conform to ASTM C-150, Type II.

4) Water - Fresh, clean, free of deleterious matter.

5) Proportioning, mixing, and placing concrete; conform to ASTM C-94.

6) Maximum water - Cement ratios, 6 gallons per sack, slump not to exceed 4-inches.

7) Admixtures - Conform to ASTM C-260 or C-494, do not use calcium chloride or any admixture not approved by the Engineer.

8) Precast manhole bases will be accepted as an alternate upon review and approval by the Engineer.

c. Mortar for Joints of Manholes

1) Proportions - One (1) part Portland cement (Type II) and two (2) parts clean, well graded, concrete sand of which 100% passes a #8 (U.S.) mesh sieve.

2) Use not more than 10% by weight cement hydrate lime of consistency to be readily applied.

3) Use no mortar mixed longer than 30 minutes.

d. Pre-cast Ring Extensions - Use standard pre-cast concrete rings.

e. Manhole Frames and Covers

1) As shown on plan details or as approved by the Engineer.

2) All castings shall be true to size, weight and tolerances shown on the Standard Plans. Delivered weight shall be ±5 percent of the specified weight. the bearing seat shall not rock when checked by the test jig. The foundry shall supply all test gauges and shall not subcontract any of the work other than testing procedure, patterns, machining and cartage. The casting shall not be made by the open mold method and shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted. All castings shall be shot or sandblasted, and the application of paint or other coating will not be permitted. Each casting shall have distinctly cast upon it the initials of the manufacturer and the year of the cast. These characters shall be minimum 1-1/4" in height and 1/8-inch in relief.

3) Casting material shall conform to ASTM A-48, Class 30B.

4) Castings to be planed and ground to ensure flat and true surfaces at contact between cover and frame.

5) Covers to be true and rest within frame at all points.

f. Manhole Steps

1) Hot rolled-bar steel, ASTM A-107, Grade 5, or ASTM A-15 intermediate grade.

2) Hot galvanized after fabrication conforming to ASTM A-123.

4. Clean Outs

a. Pipe, fittings, and joints same as specifications for pipe.

b. All castings shall be true to size, weight and tolerances shown on the Standard Plans. Delivered weight shall be ±5 percent of the specified weight. the bearing seat shall not rock when checked by the test jig. The foundry shall supply all test gauges and shall not subcontract any of the work other than testing procedure, patterns, machining and cartage. The casting shall not be made by the open mold method and shall be free of porosity, shrink cavities, cold shuts, or cracks, or any defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material will not be permitted. All castings shall be shot or sandblasted, and the application of paint or other coating will not be permitted. Each casting shall have distinctly cast upon it the initials of the manufacturer and the year of the cast. These characters shall be minimum 1-1/4" in height and 1/8-inch in relief.

c. Casting material shall conform to ASTM A 48, Class 30B.

C. WORKMANSHIP

1. Excavation and Backfill

a. General

1) Confine operations to right-of-way provided. Avoid encroachment on or damage to private property or existing utilities unless prior arrangements have been made.

2) All streets, structures, and utilities to be left in the condition equal to or better than original condition.

3) Where damage occurs and cannot be repaired or replaced, Contractor shall purchase and install new material which is satisfactory to the Owner.

b. Excavation

1) Locate Existing Utilities - Before digging, notify appropriate utility companies, locate all existing

buried utilities to avoid damage during trench excavation.

2) Opening Trenches

a) Excavate to depth required for alignment and grade.

b) Line to be provided with stakes at not more than 50 foot intervals.

c) Excavate to allow a minimum of 4" of bedding beneath pipe.

3) Shoring and Bracing

a) Provide shoring and bracing where needed to protect work, property, utilities, pavements, etc., and to provide safe working conditions.

b) Shoring and bracing shall be the Contractor's design and comply with local and State safety codes.

c) Failure of shoring, sheeting and bracing resulting in damages shall be the Contractor's responsibility.

4) Disposal of Excavated Materials

a) Remove and dispose of all excess materials.

b) Remove excavated materials unsuitable for backfill.

c) Store material suitable for backfill in a neat pile adjacent to excavation where space allows.

d) Interfere with traffic and land use as little as possible.

e) Where trench is adjacent to the road shoulder, place excavated materials on the side of the ditch away from the road.

d. Pipe Embedment

1) Embedment material shall extend across the width of the trench and 4" below the bottom of pipe barrel, as shown on the detailed plans.

2) Where in the Engineer's opinion or as required by these standards, unsuitable native embedment materials exist, imported embedment material to be hauled to the site.

3) Pipe shall be laid directly on embedment materials.

a) Place embedment material in trench, compacting and shaping to provide continuous support for pipe between couplings.

b) Dig coupling holes to permit assembly.

c) After pipe is in place, place embedment materials to 1/6 pipe height and thoroughly compact by spading, tamping and walking material into place.

h. Trench Backfill in Pipe Zone

1) Place selected material to limits shown on detail plans.

2) Backfill simultaneously on both sides of pipe.

3) Take care that compaction is sufficient to prevent lateral movement of pipe.

i. Trench Backfill Above Pipe Zone

1) Class I and II Granular Backfill

a) Use under paved and graveled roadways, paved drives, sidewalks and curbs.

b) Place imported material in trench; do not let material fall directly into pipe.

c) Compact by mechanical compaction in 6" lifts to 95 percent maximum dry density per AASHTO T-99 test method.

2) Class III and IV Native Backfill

a) Use in unimproved areas.

b) Place native material in trench; do not let material fall directly into trench.

c) Compact by mechanical compaction to 90 percent maximum dry density per AASHTO T-99 test method.

d) Refill trench with remaining material and compact as above.

e) Grade to a neat appearing surface.

3) Maintenance of Trench Surface

a) Restore ground surfaces to original condition and elevation.

b) Cold mix shall be used to patch paved drive areas until hot asphalt concrete mix is used to permanently patch trench. Cold mix shall be used on all areas not to be paved within 48 hours of original pavement removal.

c) Maintain such surfaces for one year following acceptance of work.

d) In unimproved land, where landowner permits, backfill may be mounded over trench to accommodate subsequent settlement and later graded flat.

j. Clean Up

1) Clean up and remove all excess materials, construction materials, debris from construction, etc.

2) Replace or repair any fences, mailboxes, signs, landscaping, or other facilities removed or damaged during construction.

3) Replace all lawns, topsoil, shrubbery, flowers, etc. damaged or removed during construction. Contractor shall be responsible for seeing that lawns, shrubs, etc., remain alive.

2. <u>Pipe Work</u>

a. Handling Pipe and Accessories

1) Handle with care to avoid damage. Do not drop or bump pipe and accessories.

2) Unload at site or near the place pipe is to be laid.

3) Public Works Superintendent to reject any damaged pipe. Rejected pipe shall be removed from the construction site during the presence of the Public Works Superintendent.

b. Line and Grade

1) Engineer to set grade stakes on offset line at a maximum spacing of 50 feet.

2) Engineer to furnish Contractor with elevations and cuts from offset stakes.

3) Tolerances variance from established line and grade is 1/2" for line and 1/4" for grade providing a level or reversed slope does not occur.

c. Laying Sewer Pipe

1) Lay no pipe before Engineer examines and passes it for use.

2) Remove rejected pipe from site promptly.

3) Place embedment material where required prior to laying pipe.

4) Lower all pipe and fittings into the trench in a manner to prevent damage to pipe.

5) Shape and grade trench to established line and grade.

6) Form bell holes properly in trench bottom so that pipe bears solidly upon entire length of barrel.

7) Lay pipe to uniform line and grade, bell ends up-grade.

8) Clean exterior of pipe of foreign material before laying next pipe section.

9) Do not lay pipe in water, on frozen trench bottom, or when weather or trench conditions are unfavorable in the opinion of the Engineer.

10) Pipe floated out of place shall be removed and re-laid as Engineer directs.

11) Plug all pipe openings when work is suspended for the day.

12) Place pipe coupling not more than 2 feet out from base of any manhole.

d. Jointing - Comply with pipe and joint manufacturer's recommendations.

e. Sewer Service Laterals

1) Protect pipe and fittings during backfilling operations.

2) Engineer to establish depths and locations for service extension.

3) Lay pipe with minimum grade of 1/4" per foot unless otherwise ordered by the Engineer.

4) Install service at not more than a 45 degree angle from the horizontal from the main (see detail). Stove pipe services not permitted.

5) Plug the upper end of the service extension with a watertight plug.

6) Plug to be removable without breaking pipe.

7) Mark end of service extension with a 2" x 4" wood pole set as shown.

f. Leakage Testing

1) All pipe and manholes to be leak tested.

2) Contractor to use approved low-pressure air test. Air loss not to exceed 0.0015 cubic feet per minute per square foot of internal pipe surface. Test in accordance with standard APWA test found herein, except test times are twice that shown in the APWA test.

3) Temporarily plug pipes as required for air test.

4) Manholes to have no visible leakage under high ground water conditions.

5) If pipe section being tested fails required air test, the Contractor shall do the following:

a) Eliminate leakage problem by replacing broke, damage or leaking pipe. There shall be no chemical grouting of leaking pipe on sanitary sewer lines accepted by the City.

b) Retest pipe section using required air test.

c) If pipe section fails second air test, the Contractor/Developer will be responsible to TV inspection and air testing joint by joint of

pipe section which failed. The cost for TV inspection and air testing shall be the responsibility of the Contractor/Developer. A copy of the TV and air test reports shall be sent to the Public Works Superintendent. A copy of the field inspection report to be sent to the Public Works Superintendent.

d) Public Works Superintendent to review TV inspection report. Contractor to replace any leaking or damage pipe located during TV inspection and air testing of pipe section. Public Works Superintendent or representative to inspect prior to backfilling ditch.

e) Third air test to be required on pipe section after repair.

f) No less than 20% of the posted bond will be retained and shall not be returned until the submittal of a satisfactory TV inspection.

g. Sewer Cleaning - Following construction, flush and clean all sewers; remove all foreign matter prior to final acceptance.

3. Manholes

a. Concrete Bases

1) Conform to dimension shown on plans for the specific type of manhole.

2) Minimum of 6 inches in thickness.

3) Minimum projection of 6 inches outside of outside diameter of riser.

4) Use walls of excavation covered with suitable waterproof membrane as form for base.

5) Keep Excavation dewatered at all times while working on manhole bases.

6) Keep fresh concrete from contact with ground water.

7) Forming with plywood or other forming material will be required if Contractor cannot demonstrate ability to construct consistently watertight manhole bases by normal means.

8) Allow not more than a 6 foot free fall in placement of concrete. Use elephant trunk or approved baffles.

9) Adequately vibrate, spade, rod, walk, etc., wet concrete to obtain a dense and compact base.

10) Allow concrete to cure a minimum of 24 hours in moist condition prior to backfilling.

11) Channels:

a) Conform accurately to sewer grade.

b) Bring to well rounded smooth junctions.

c) Carry sides of channels vertically to crown elevation of pipe and round lip.

d) Finish concrete shelf between channels smoothly and with sufficient slope to drain.

e) Lay pipe through manhole where grades permit, cut out top of pipe, mortar and finish smoothly.

b) Risers and Tops

1) Set first riser section in fresh base concrete and work concrete to obtain a watertight seal between riser and base.

2) Riser not to bear directly on any pipe.

3) Wet thoroughly all joints or connections between pre-cast elements, fill with mortar, and finish inside and out to ensure watertightness.

4) Place pre-cast sections vertically so ladder rungs are aligned.

5) Complete manhole; rigid, true to dimension, and watertight.

c. Extension Rings

1) Use pre-cast extension rings on all manholes in streets, roads, where surface grade may change, or as the Engineer directs.

2) Construct in accordance with standard manhole details as to height determined by the Engineer.

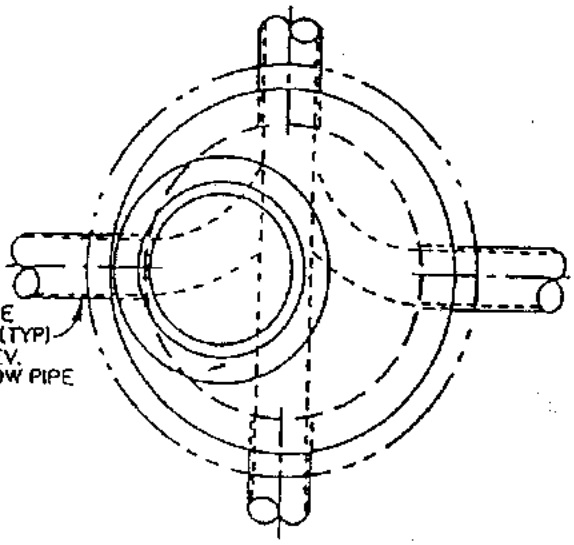
3) Not to exceed 12 inches in height.

d. Manhole Frames and Covers

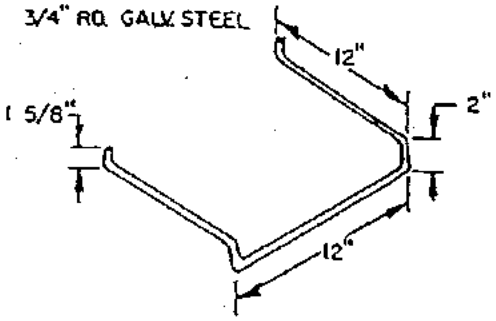
1) Set in bed of mortar. Mortar inside and outside of manhole.

2) Top of cover to conform accurately with surrounding grade unless otherwise directed by Engineer.

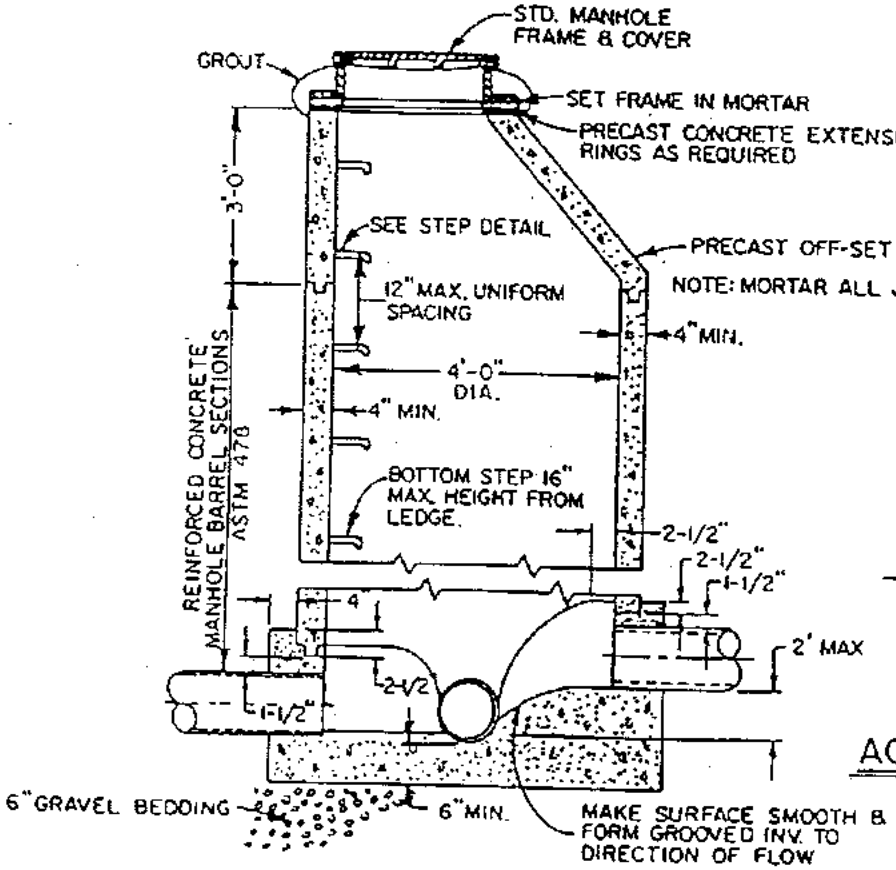
3) Covers in roadways to be set and adjusted just prior to paving of street.

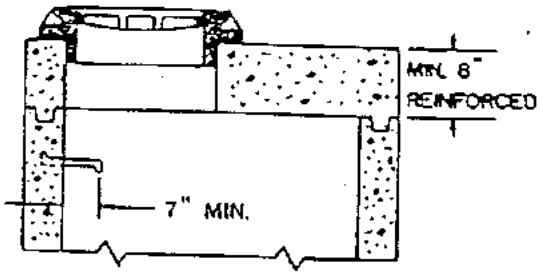


MANHOLE DETAILS FOR PIPE 21" & SMALLER



STEP DETAIL



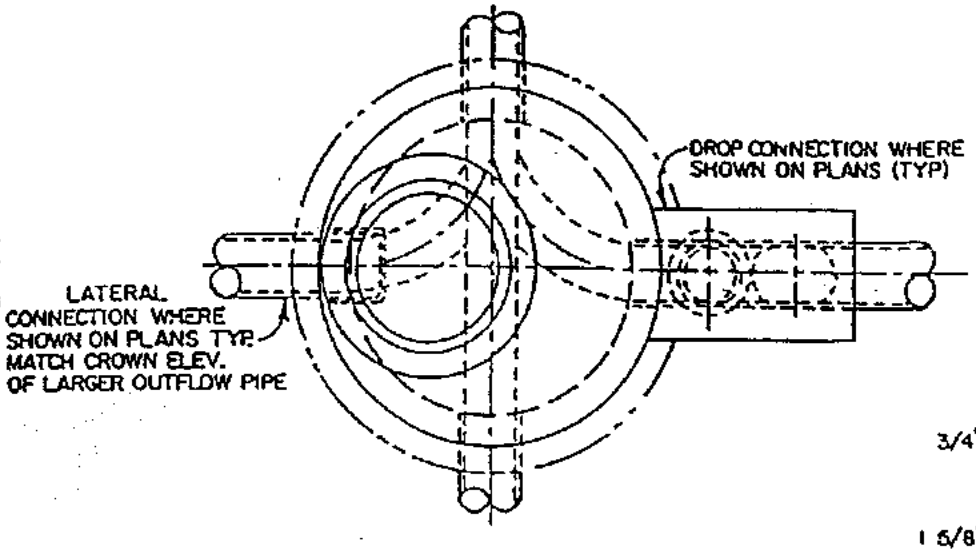


FLAT-TOP MANHOLE
ACCEPTABLE ALTERNATE

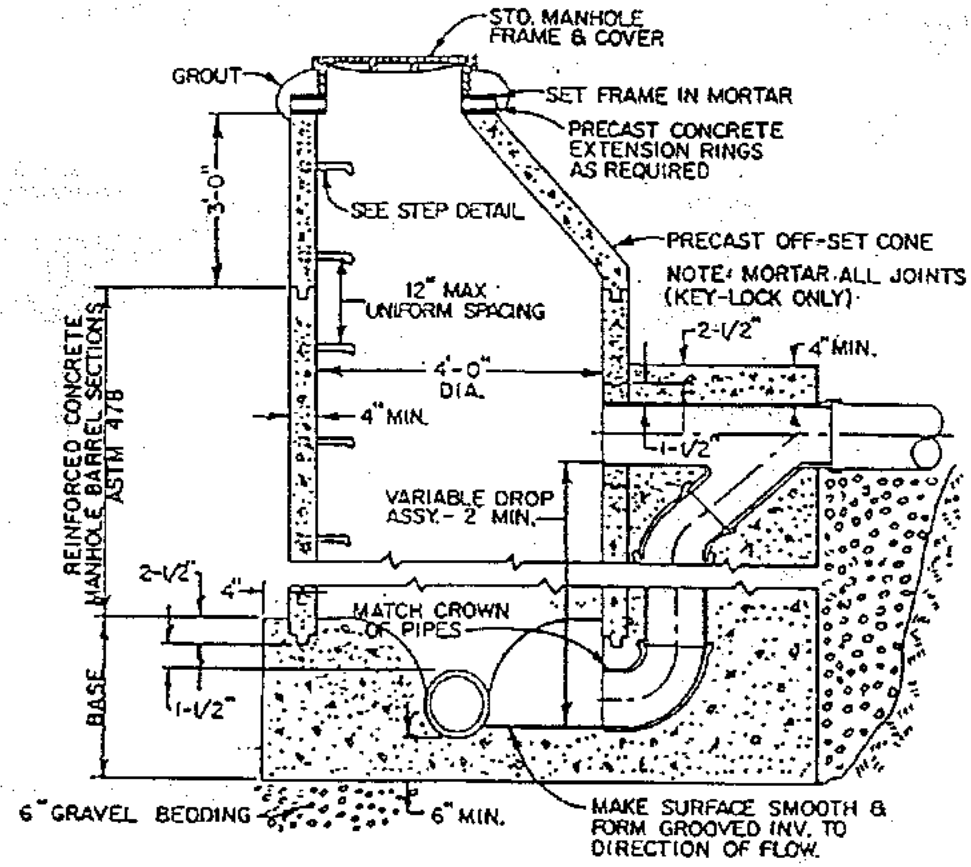
NOTE: PLYWOOD FORM ALL MANHOLE BASES.

STANDARD MANHOLE

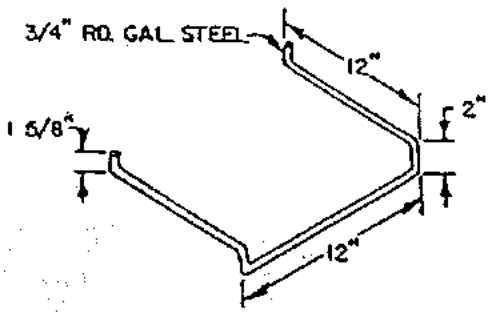
DETAIL III-1



MANHOLE DETAILS FOR PIPE 21" & SMALLER



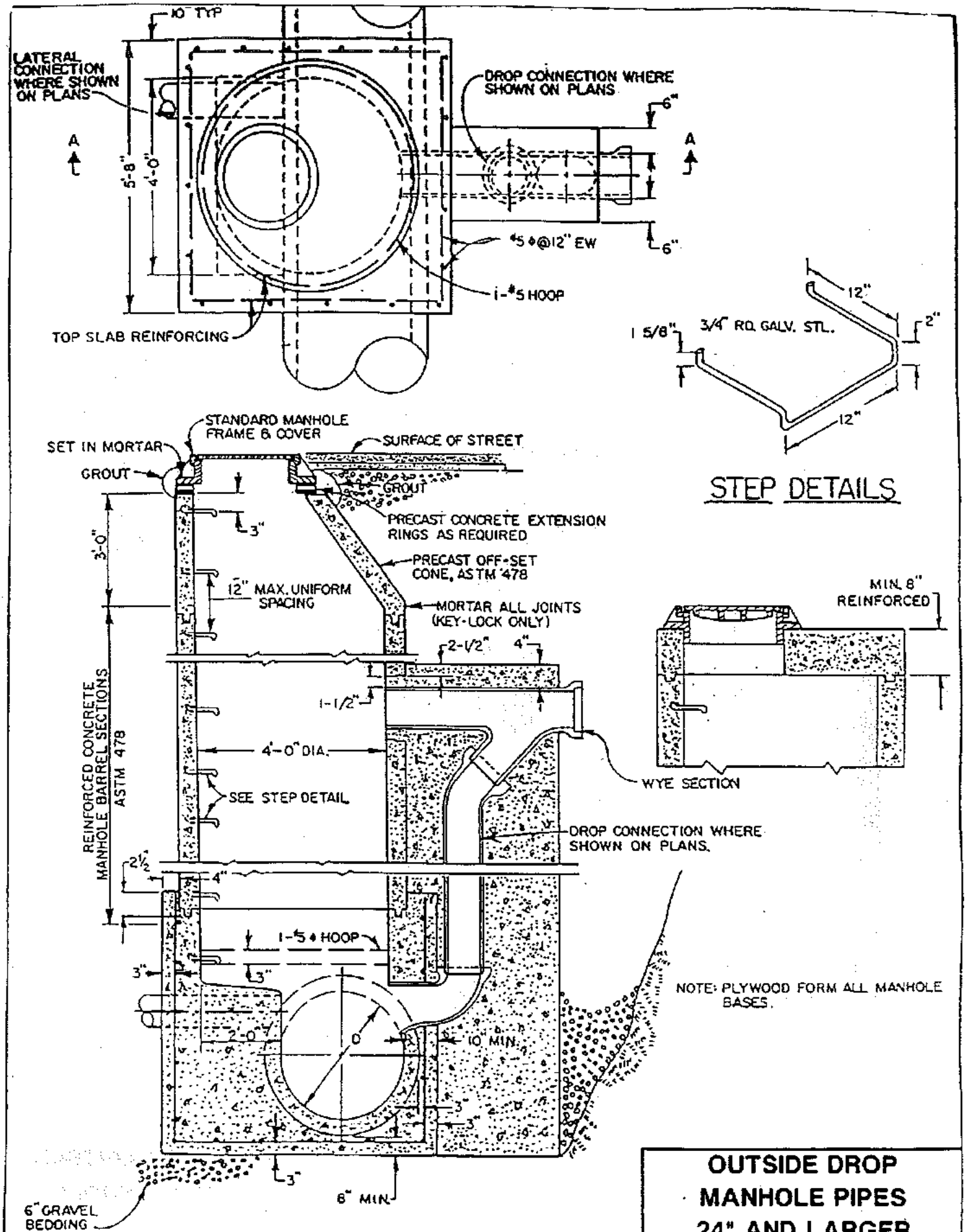
NOTE: PLYWOOD FORM ALL MANHOLE BASES



STEP DETAILS

STANDARD OUTSIDE DROP MANHOLE

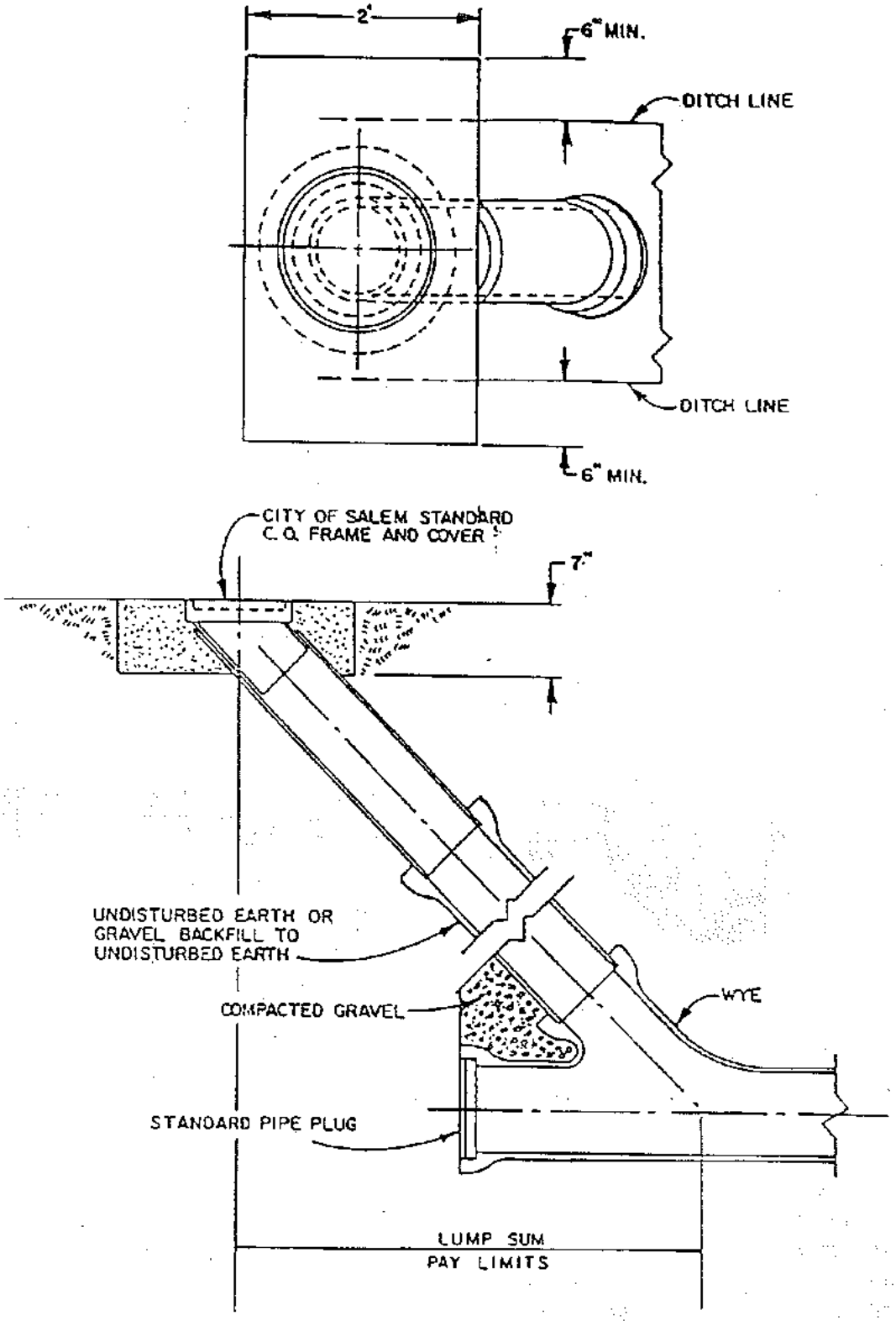
DETAIL III-2



SECTION AA

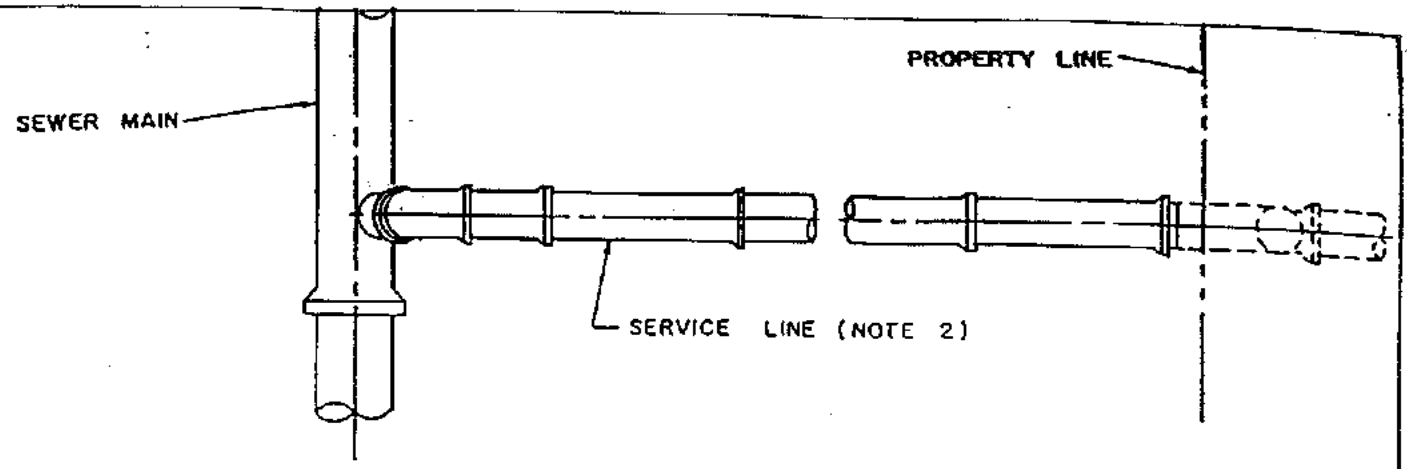
OUTSIDE DROP MANHOLE PIPES 24" AND LARGER

DETAIL III-3

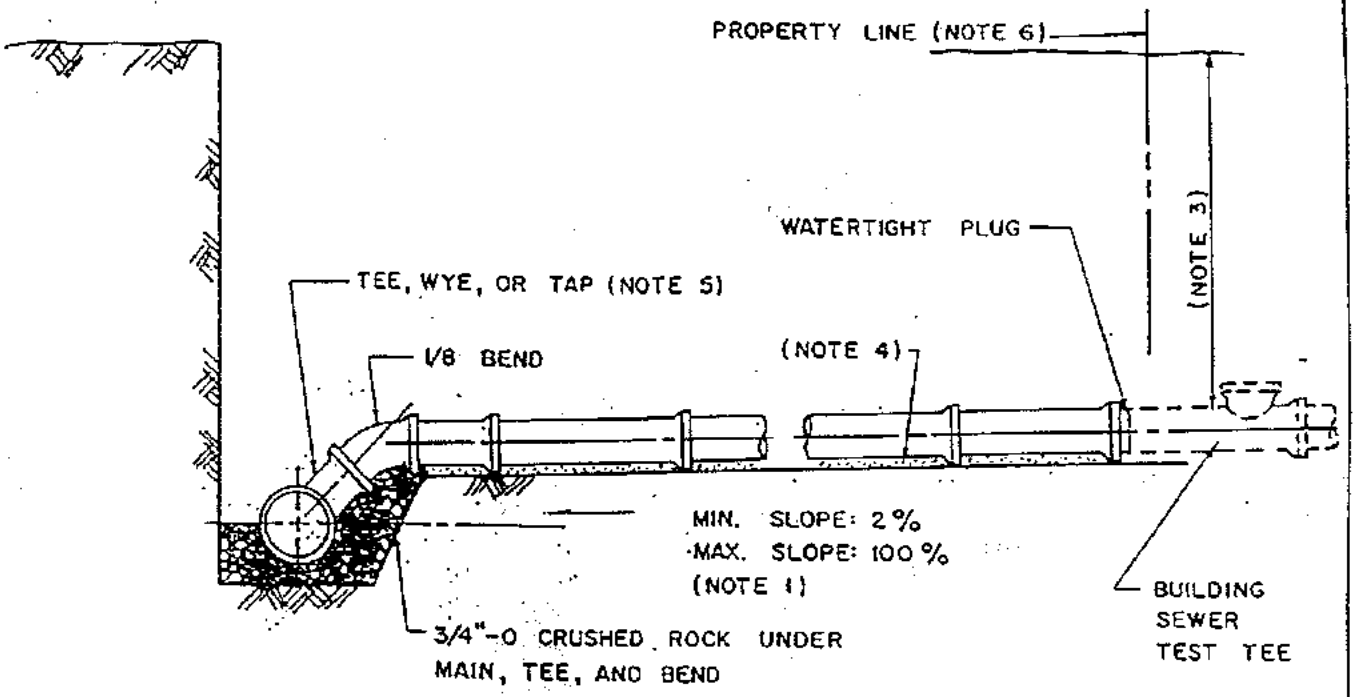


STANDARD CLEANOUT

DETAIL III-4



PLAN

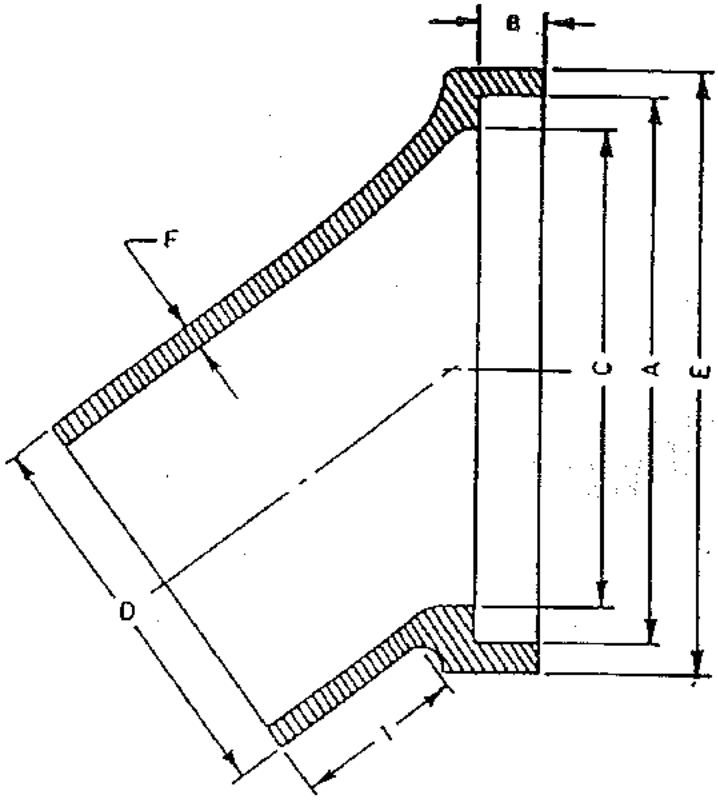


SECTION

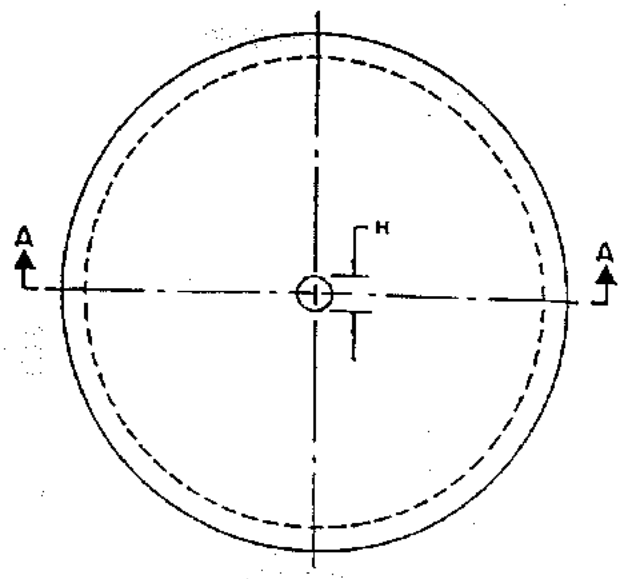
1. WHEN SLOPE EXCEEDS 20%, USE ANCHOR BLOCKS, SEE STND. DWG. UD113. IF SLOPE EXCEEDS 100% USE CHIMNEY, SEE STND. DWG. UD114.
2. FOR APPROVED MATERIALS SEE SPECIFICATIONS.
3. MINIMUM DEPTH AT PROPERTY LINE 3 FEET.
4. BEDDING MATERIAL FOR SERVICE LINES MAY BE 3/4"-0 CRUSHED ROCK, OR 3/8"-1/4" PEA GRAVEL.
5. TAPPING OF SEWER MAINS TO BE DONE BY CITY FORCES.
6. MARK END OF SERVICE WITH 2 x 4 STAKE, DRIVEN 2 FEET INTO GROUND AND WIRED TO SERVICE LINE.

TYPICAL SERVICE MAIN TO PROPERTY LINE

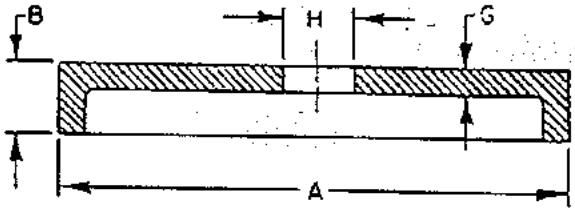
DETAIL III-5



FRAME



LID



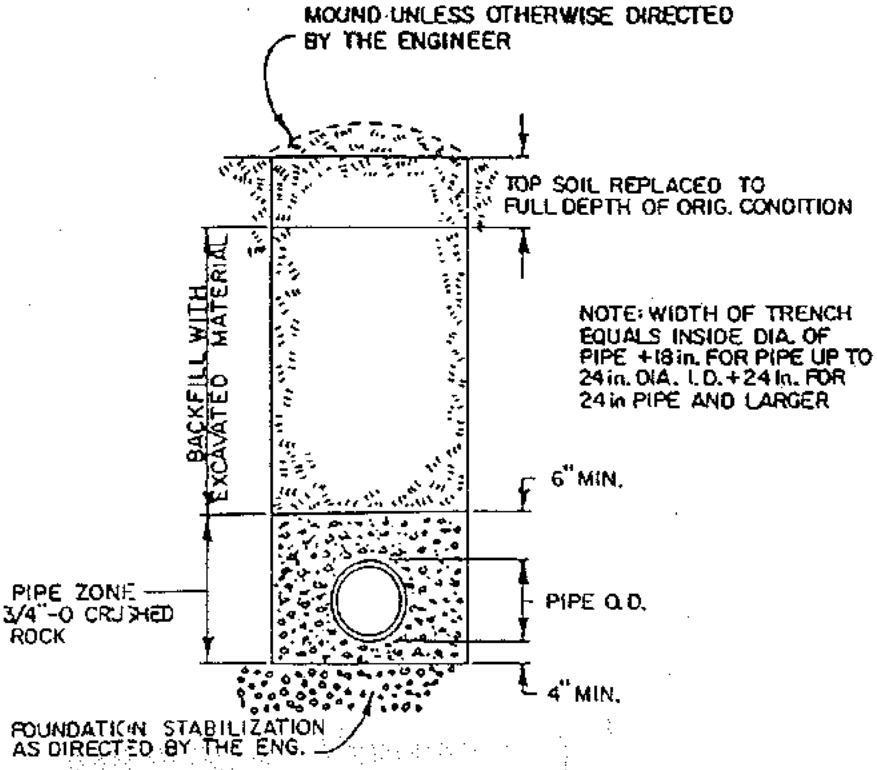
SECTION A-A

LID DIMENSIONS				
SIZE	A	B	G	H
6"	$8\frac{9}{16}$"	$1\frac{1}{2}$"	$\frac{1}{2}$"	$\frac{3}{4}$"
8"	$10\frac{11}{16}$"	$1\frac{1}{2}$"	$\frac{1}{2}$"	$\frac{3}{4}$"

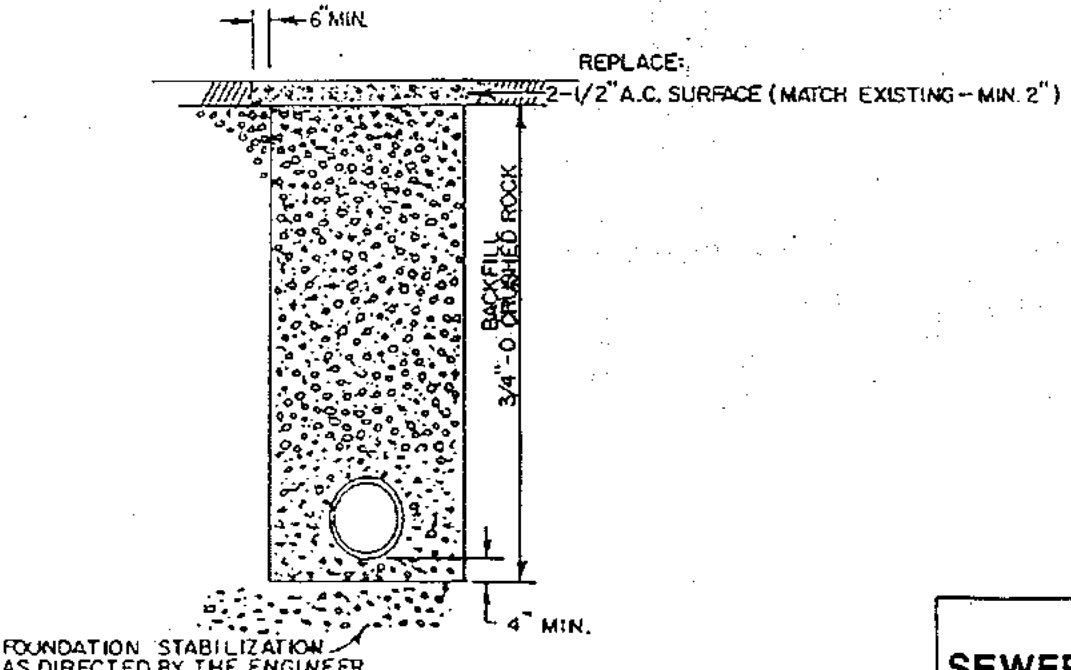
FRAME DIMENSIONS							
SIZE	A	B	C	D	E	F	I
6"	$8\frac{3}{4}$"	$1\frac{1}{2}$"	8"	$5\frac{7}{8}$"	$9\frac{5}{8}$"	$\frac{5}{16}$"	$3\frac{1}{4}$"
8"	$10\frac{7}{8}$"	$1\frac{1}{2}$"	$9\frac{5}{8}$"	$7\frac{7}{8}$"	$11\frac{3}{4}$"	$\frac{5}{16}$"	$3\frac{1}{4}$"

STANDARD 45
CLEANOUT FRAME
AND C.O.

DETAIL III-6



CLASS "III"

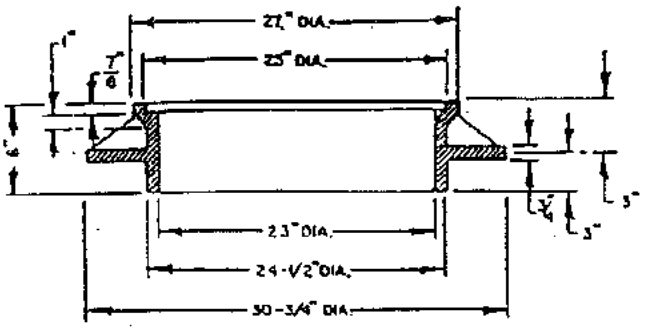


CLASS "I"

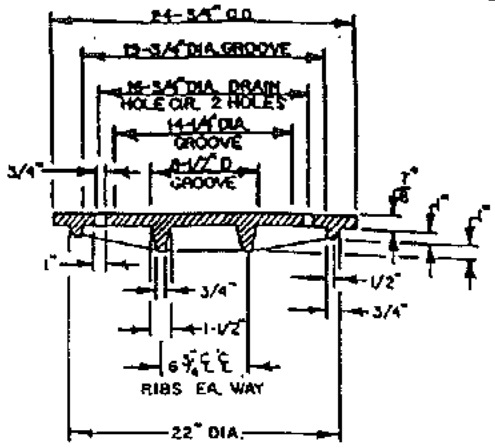
SEWER TRENCH DETAIL

DETAIL III-7

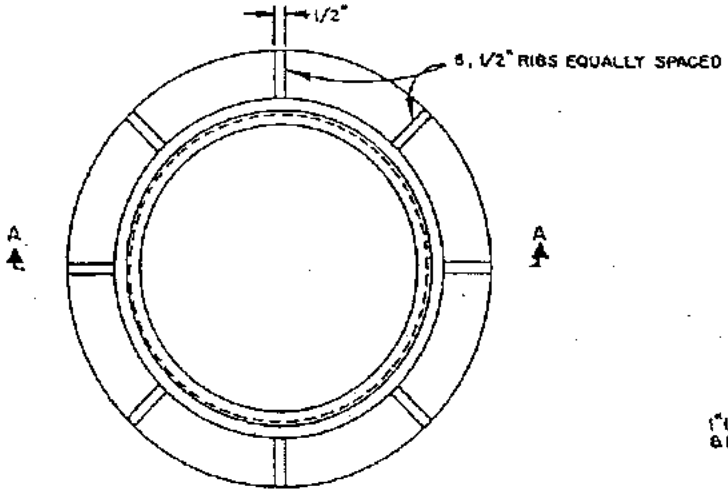
COVER & FRAME TO BE MACHINED FOR TRUE BEARING



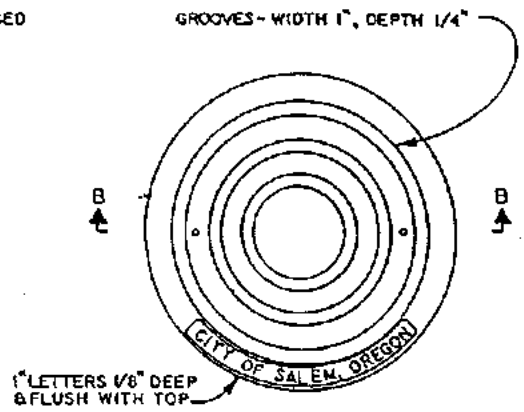
SECTION A-A



SECTION B-B



MANHOLE FRAME



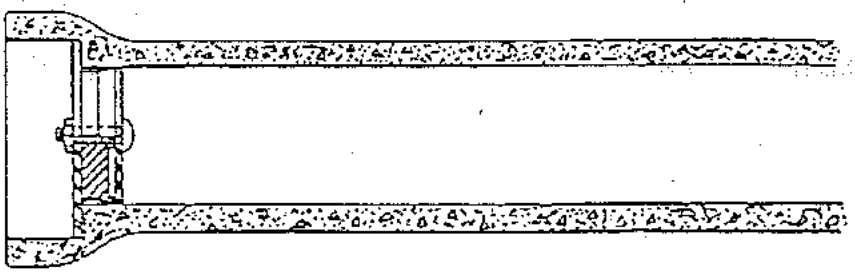
MANHOLE COVER

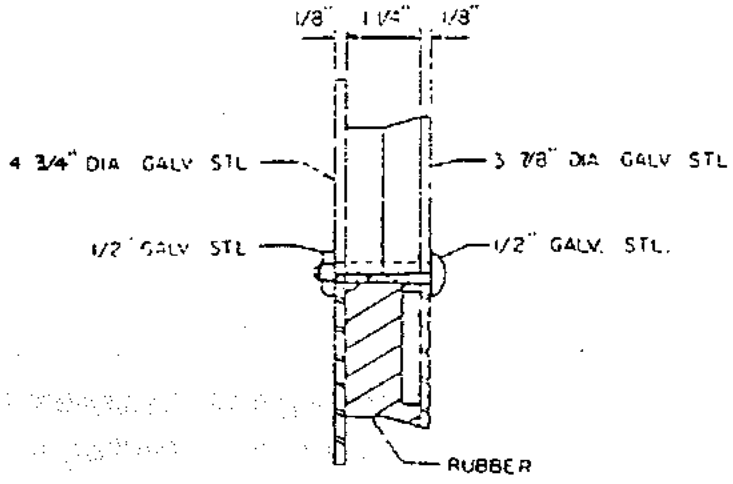
MATERIAL: ASTM A-48 CLASS 30 CAST IRON

STANDARD MANHOLE CASTING DETAILS

DETAIL III-8

MECHANICAL RUBBER PLUG

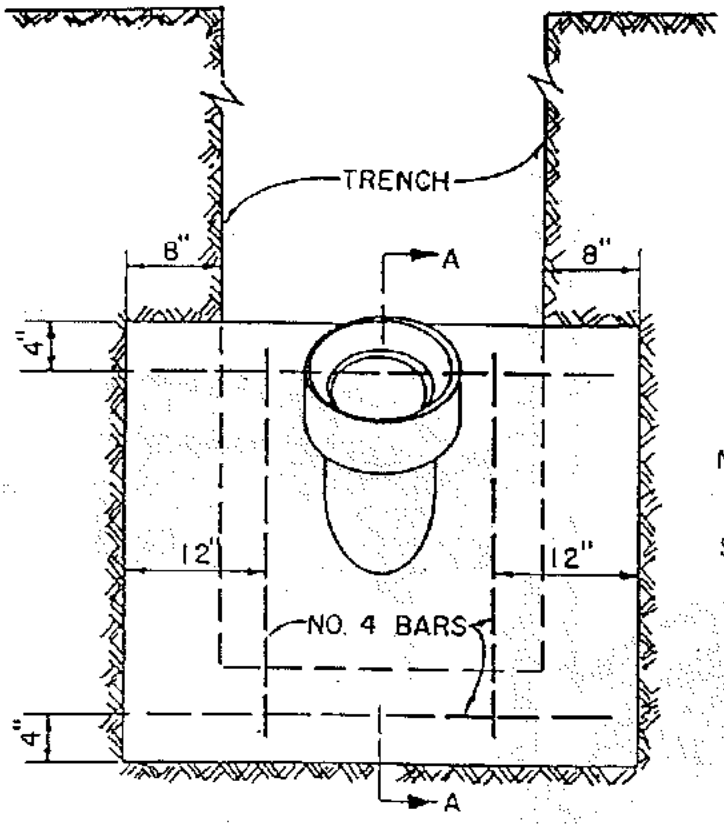




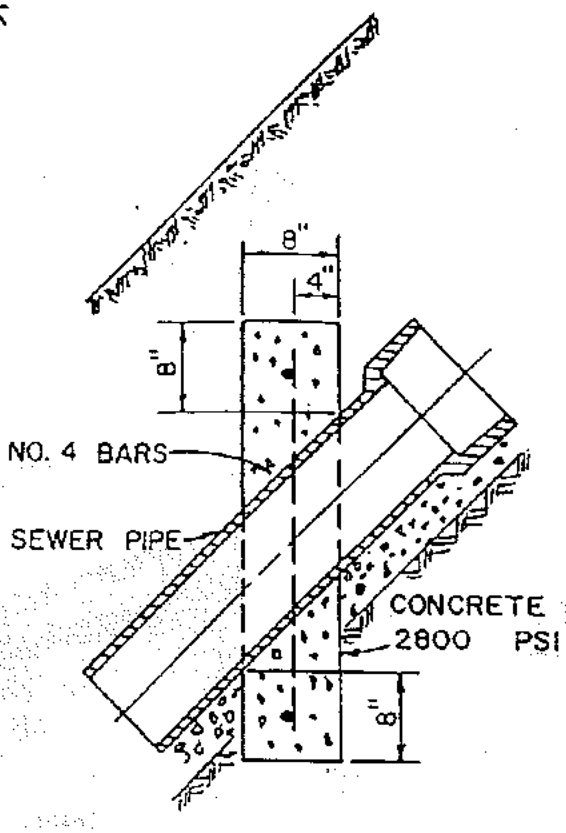
STANDARD PLUG FOR NEW SEWERS

DETAIL III-9

FOR SEWER PIPE 8"–12" DIAMETER



ELEVATION



SECTION A-A

SPACING FOR ANCHOR BLOCK FOR ALL SIZES

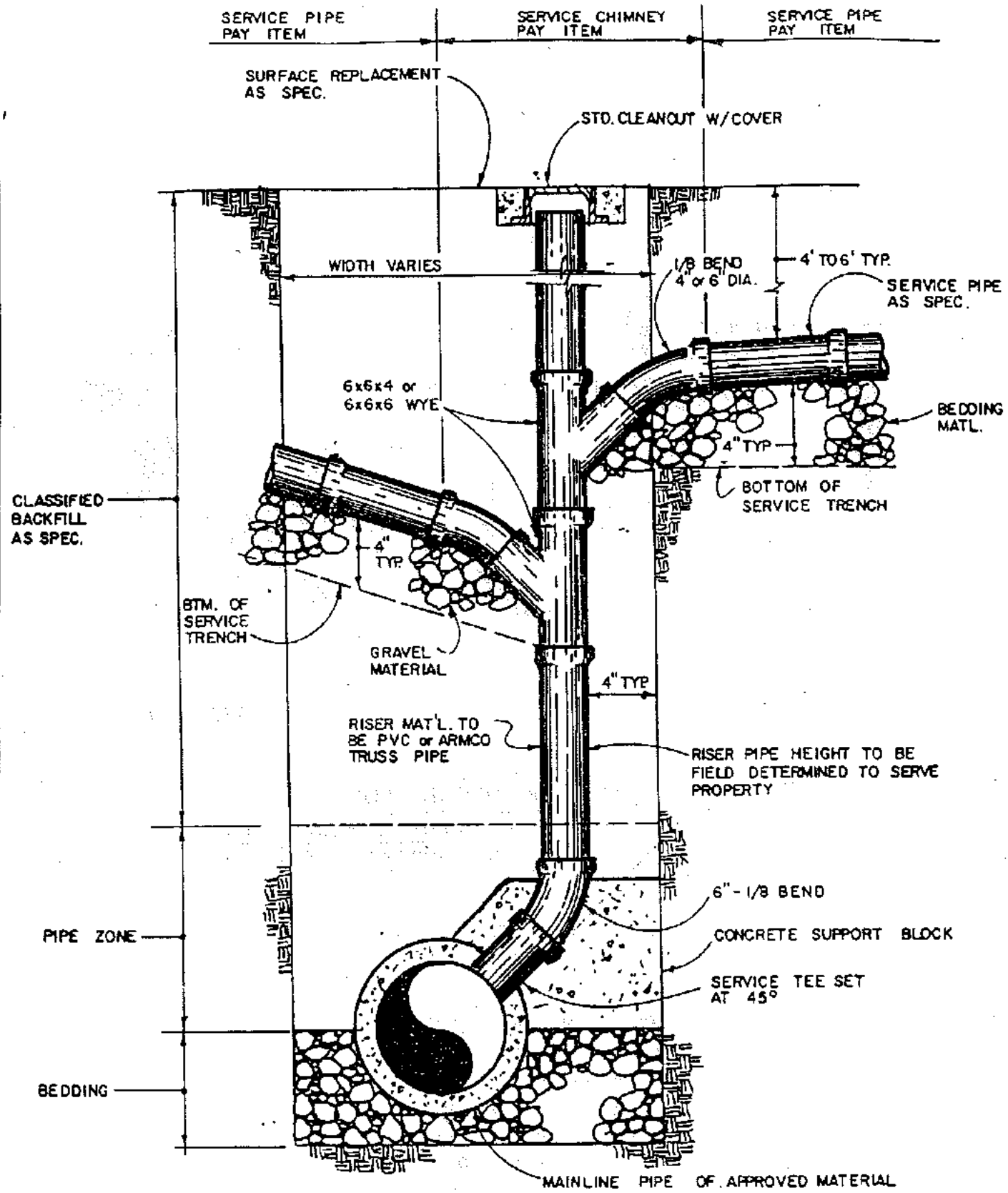
SLOPE %	MINIMUM SPACING (FT)
0 – 19	NO ANCHOR REQUIRED
20 – 34	35
35 – 50	25
51 – MORE	15' OR SPECIAL DESIGN

NOTE:

1. FOR 4" SEWER PIPE ANCHOR BLOCK IS REQUIRED AS SHOWN EXCEPT NO REINFORCEMENT IS REQUIRED.
2. FOR PIPE LARGER THAN 12" ANCHOR BLOCK SHALL BE OF SPECIAL DESIGN.
3. ANCHOR BLOCK SHALL ALWAYS BE LOCATED AT THE BARREL SECTION OF THE PIPE AND NOT AT THE JOINT.

ANCHOR BLOCK DETAILS

DETAIL III-10



DEEP TRENCH SERVICE EXTENSION

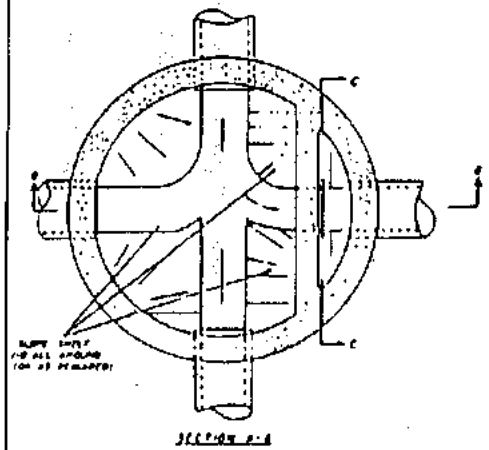
NOTE:

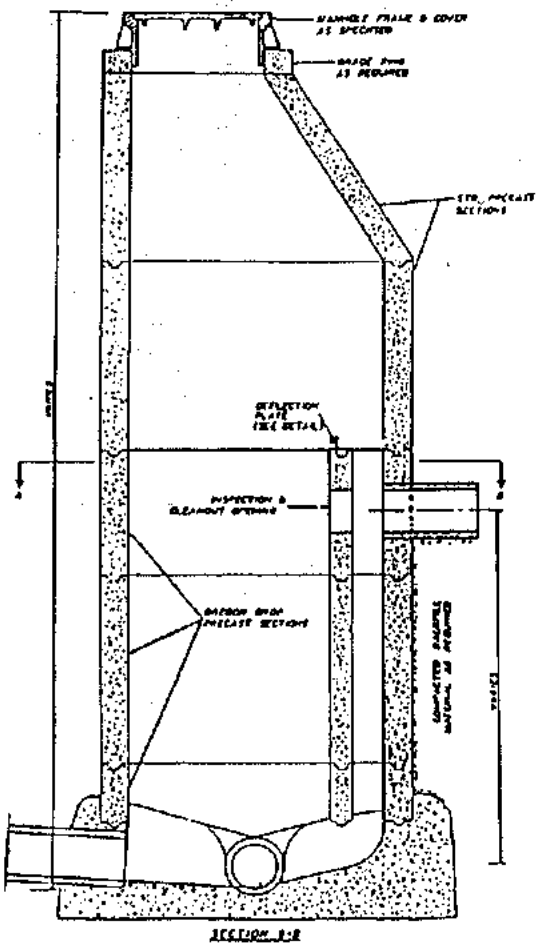
1. FOR SINGLE 4"Ø SERVICE USE 4" RISER, FOR MORE THAN ONE SERVICE USE 6" RISER W/ 6x6x4 or 6x6x6 WYE, MAX. 4 SERVICES.

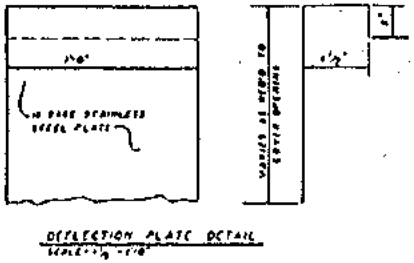
2. CONCRETE: 28 DAY STRENGTH 3000 PSI. SLOPE 2"-4" 1½" MAX. COARSE AGG.

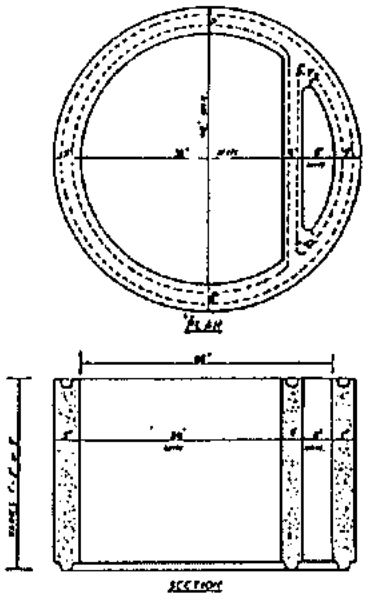
DEEP TRENCH SERVICE

DETAIL III-11









OREGON DROP
TYPICAL INSTALLATION DETAIL

GENERAL NOTES

THE USE OF OREGON DROP SECTIONS IN MANHOLE CONSTRUCTION ELIMINATES THE NEED FOR OUTSIDE DROPS AT MANHOLES WHERE IT IS DESIRABLE OR NECESSARY TO PROVIDE A GRADE DIFFERENTIAL BETWEEN THE INVERT OF THE MANHOLE AND AN INCOMING LINE.

THE USE SHOULD BE LIMITED TO INSTALLATIONS WHERE ONLY ONE INSIDE DROP WILL EVER BE REQUIRED SO THAT WORKING ROOM WILL BE MAINTAINED.

SOME OF THE ADVANTAGES OF OREGON DROP OVER THE CONVENTIONAL OUTSIDE DROP ARE AS FOLLOWS:

(a) EASIER INSTALLATION
(b) LESS COSTLY (in most cases)
(c) PROVIDES A MORE TROUBLE FREE & THUS MORE MAINTENANCE FREE MANHOLE
(d) PROVIDES EASY TOP ACCESS TO DROP PORTION FOR MAINTENANCE.

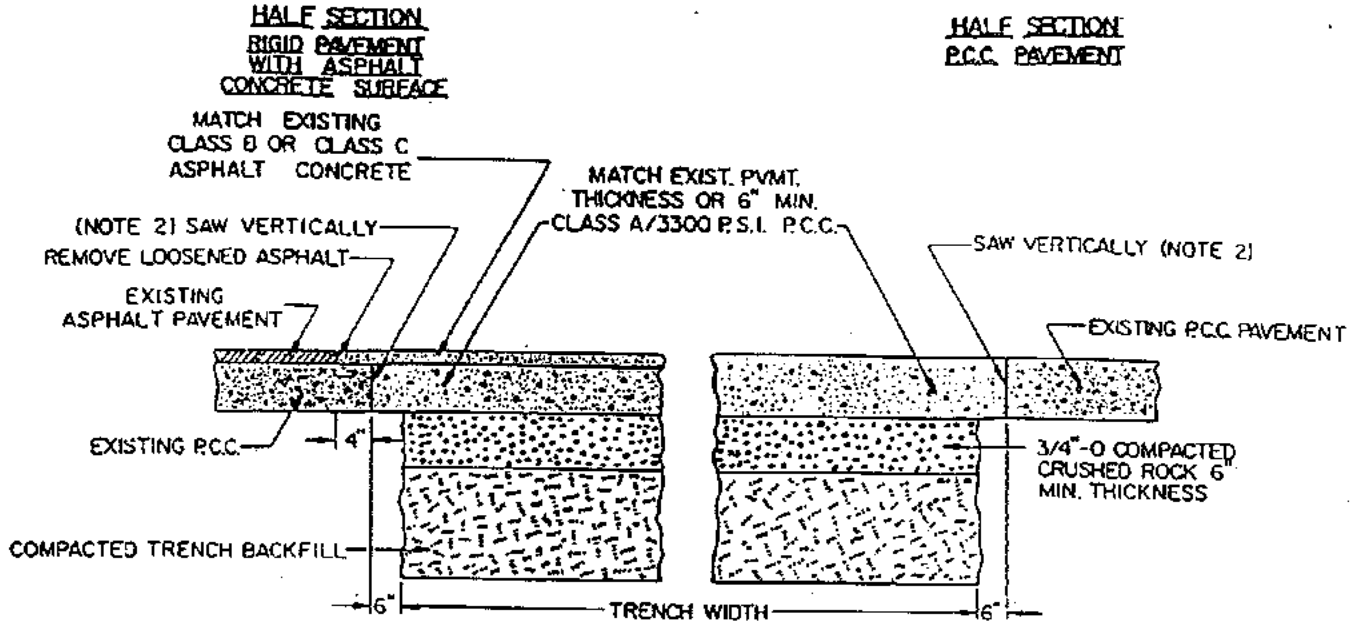
CONSTRUCTION NOTES

1. OREGON DROP PRECAST CONCRETE MANHOLE SECTIONS SHALL CONFORM TO ASTM SPECIFICATIONS C-478.
2. MANHOLE DIAMETER, JOINT SEALANT, JOINT CONFIGURATION BASE CONSTRUCTION, STEPS AND OTHER MANHOLE CONSTRUCTION DETAILS SHALL COMPLY WITH THE CONTROLLING AGENCY STANDARDS
3. IT IS RECOMMENDED THAT THE FIRST OREGON DROP SECTION SET IN THE BASE BE A 48" SECTION FOR EASE IN SHAPING THE CHANNEL IN THE DROP PORTION.

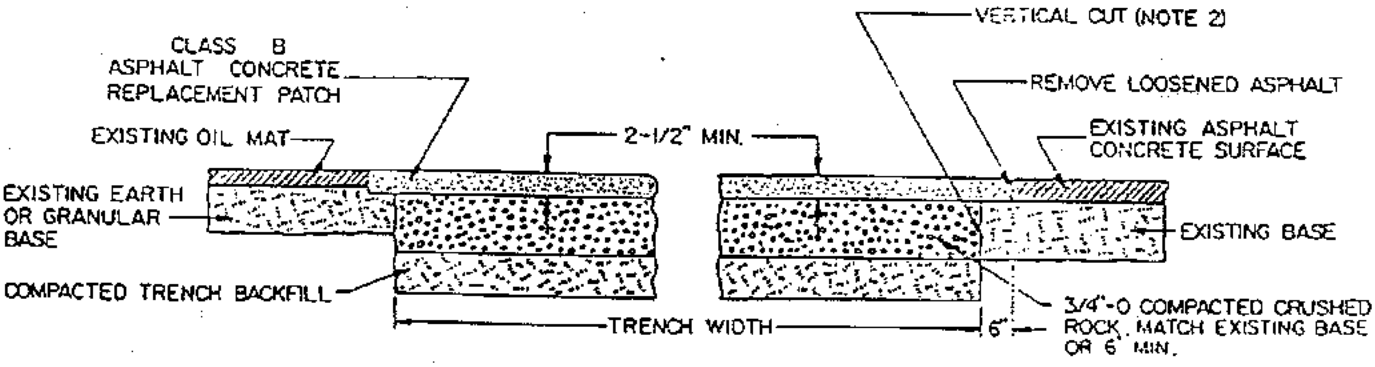
REV 9-10-75
REV 8-13-75
REV 6-15-75
DATE: 3-10-75

OREGON DROP MANHOLE

DETAIL III-12



TYPICAL PATCH FOR RIGID PAVEMENT



TYPICAL PATCH FOR FLEXIBLE PAVEMENT

NOTES

1. CUTS IN A.C. PAVEMENT SHALL BE MADE WITH SPADE TYPE PAVEMENT BREAKER, SPADE TIPPED DROP HAMMER, CUTTING WHEEL, CONCRETE SAW OR OTHER APPROVED METHOD. INTERMITTANT PUNCHING WITH A POINTED JACK HAMMER BIT WILL NOT BE PERMITTED.
2. CUTS IN P.C.C. PAVEMENT SHALL BE MADE WITH A CONCRETE SAW

PAVEMENT PATCHING DETAIL

DETAIL III-13

- DEPARTMENT OF UTILITIES

K & C FACTORS FOR SANITARY SEWER AIR TESTING

LENGTH (FT)	4-INCH		6-INCH		8-INCH		10-INCH	
	C	K	C	K	C	K	C	K
1	0.0015	0.18	0.0023	0.40	0.0031	0.70	0.0039	1.10
2	0.0030	0.35	0.0047	0.79	0.0062	1.41	0.0078	2.20
3	0.0046	0.53	0.0070	1.19	0.0093	2.11	0.0116	3.30
4	0.0061	0.70	0.0093	1.58	0.0124	2.82	0.0155	4.40
5	0.0076	0.88	0.0116	1.98	0.0155	3.52	0.0194	5.50
6	0.0092	1.06	0.0140	2.38	0.0186	4.22	0.0233	6.60
7	0.0107	1.23	0.0163	2.77	0.0217	4.93	0.0272	7.70
8	0.0122	1.41	0.0186	3.17	0.0249	5.63	0.0311	8.80
9	0.0138	1.58	0.0210	3.56	0.0280	6.34	0.0349	9.90
10	0.0153	1.76	0.0233	3.96	0.0311	7.04	0.0388	11.00
20	0.0306	3.52	0.0466	7.92	0.0621	14.08	0.0776	22.00
30	0.0458	5.28	0.0699	11.88	0.0932	21.12	0.1165	33.00
40	0.0611	7.04	0.0932	15.84	0.1242	28.16	0.1553	44.00
50	0.0764	8.80	0.1165	19.80	0.1553	35.20	0.1941	55.00
60	0.0917	10.56	0.1398	23.76	0.1864	42.24	0.2329	66.00
70	0.1070	12.32	0.1630	27.72	0.2174	49.28	0.2717	77.00
80	0.1222	14.08	0.1863	31.68	0.2485	56.32	0.3106	88.00
90	0.1375	15.80	0.2096	35.64	0.2795	63.36	0.3494	99.00
100	0.1528	17.60	0.2329	39.60	0.3106	70.40	0.3882	110.00
200	0.3056	35.20	0.4658	79.20	0.6212	140.80	0.7764	220.00
300	0.4584	52.80	0.6988	118.80	0.9318	211.20	1.1646	330.00
400	0.6112	70.40	0.9317	158.40	1.2424	281.60	1.5528	440.00
500	0.7640	88.00	1.1646	198.00	1.5530	352.00	1.9410	550.00
600	0.9168	105.60	1.3975	237.60	1.8636	422.40	2.3292	660.00
700	1.0696	123.20	1.6304	277.20	2.1742	492.80	2.7174	770.00
800	1.2224	140.80	1.8634	316.80	2.4848	563.20	3.1056	880.00
900	1.3752	158.40	2.0963	356.40	2.7954	633.60	3.4938	990.00
1000	1.5280	176.00	2.3292	396.00	3.1060	704.00	3.8820	1100.00

EXAMPLE # 1

To Air Test a system consisting of 435 feet of 8-inch and 100 feet of 4-inch:

		K	C
8-inch:	(400 feet)	281.60	1.2424
	(30 feet)	21.12	0.0932
	(5 feet)	3.52	0.0155
	435 feet	306.24	1.3511
4-inch:	100 feet	17.60	0.1528
	TOTAL	323.84	1.5039

$$\text{time allowed} = \frac{\text{K Total}}{\text{C Total}} = 323.84/1.5039$$

= 215.33 seconds ← answer

DEPARTMENT OF UTILITIES

AIR TEST REPORT

Location _____ W.O. _____

By _____ Date _____ J.O. _____

1. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.

2. After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

3. After the two minute period, disconnect air supply.

4. When pressure decreases to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig.

Station		Size	L	K	C	Elapsed Time (Sec.)			Remarks
From	To					Allow	4-3.5	3.5-2.5	

RECOMMENDED PROCEDURE FOR CONDUCTING ACCEPTANCE TEST

1. Clean pipe to be tested by propelling snug fitting inflated rubber ball through the pipe with water.

2. Plug all pipe outlets with suitable test plugs. Brace each plug securely.

3. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

4. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.

5. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any failures are observed, bleed off air and make necessary repairs.

6. After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

7. After the two minute period, disconnect air supply.

8. When pressure decreases to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. This time interval should then be compared with the time required by specification as computed below.

9. List size and length of all portions of pipe under test in table similar to one shown here.

Diameter Inches	Length Feet	$K = .011\ d^2L$	$C = .0003882\ dL$

Total K _____ Total C _____

Time required by specification _____

10. By use of nomograph (Fig. 13), compute K and C. Use scales d and L, read K and C, and enter these values in the table above.

11. Add all values of K and all values of C for pipe under test.

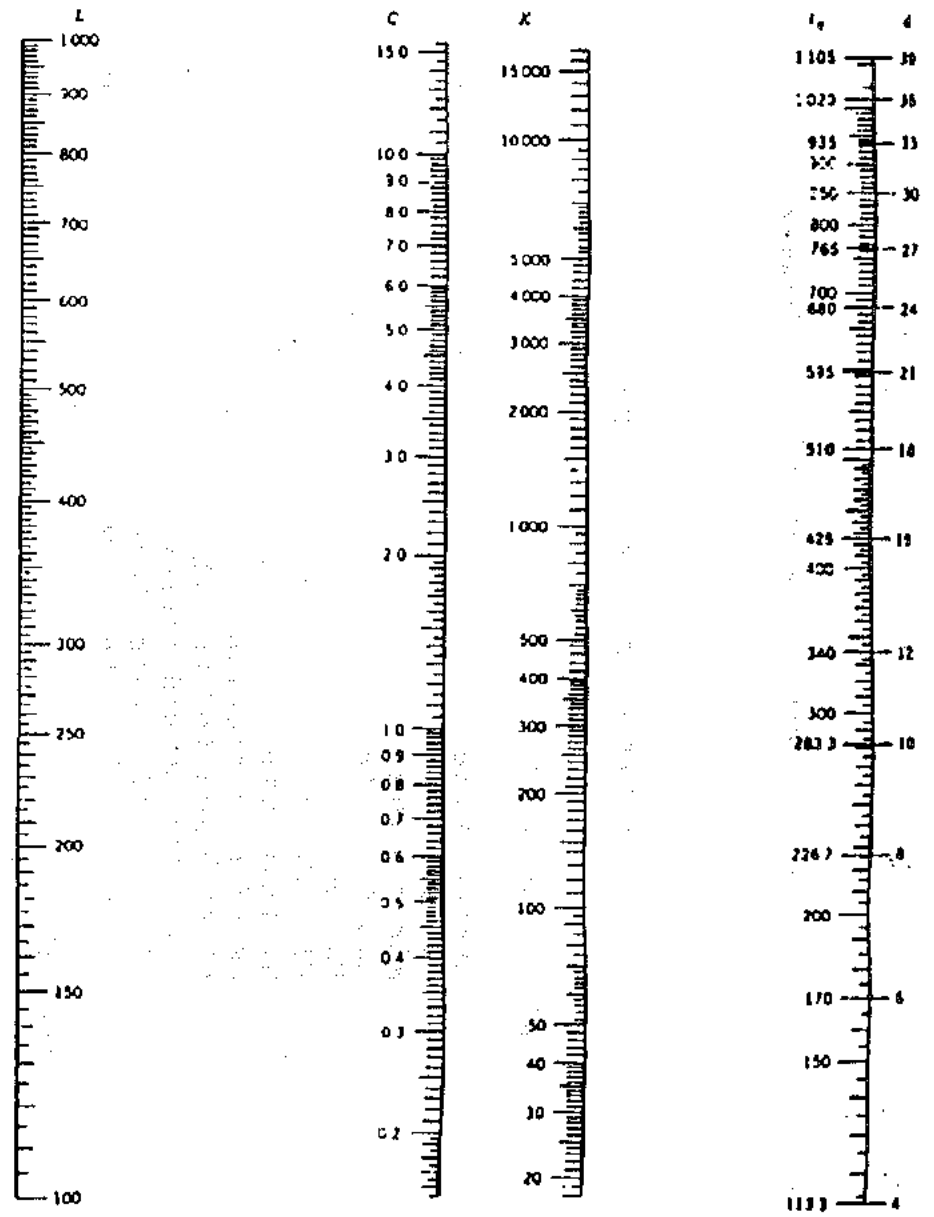


FIG. 13.—NOMOGRAPH FOR THE SOLUTION OF $K = .011d^2L$ $C = .0003882dL$, $q = K - C$

TABLE OF CONTENTS - SECTION IV

SECTION IV - WATER SYSTEM INSTALLATIONS

A. DESIGN STANDARDS

1. System Design shall be based upon the following usages:

   a. 5 gpm per residential house.

   b. 1 gpm per person.

   c. 1,000 gpm per fire hydrant.

2. Minimum Sizing

   a. 8-inch pipe shall be the minimum size for dead end runs over 60 feet that serve fire hydrants(s).

   b. 6-inch pipe shall be the minimum for runs that can be looped into future or existing 6 inch minimum water lines.

   c. 4-inch pipe shall be the minimum for cul-de-sacs or where no future extension is possible. Length shall not exceed 400 feet.

3. Minimum Pressure shall not be less than 20 psi at any curb stop during maximum flow conditions, including open hydrants.

4. Looped System

   a. Lines must be looped where the City so specifies.

   b. Hydrants or blow-offs 2" in diameter shall be provided at all dead ends.

5. Valves

   a. All valves shall be the same size as the associated pipeline.

   b. A maximum distance of two blocks shall be allowed between valves, but at no instance shall the distance between valves exceed 1000 feet.

   c. Three-way interconnection shall be valved two ways.

   d. Four-way interconnection shall be valved three ways.

e. A typical valve location shall be opposite the extension of property lines.

6. Fire Hydrant spacing shall not exceed 500 feet, unless approved otherwise by the City Engineer and shall conform to the uniform fire code or as required by the City Fire Department.

7. Minimum Cover for distribution pipes and service connections shall be 36 inches.

8. Service Connections

a. All services shall be individually metered.

b. All services shall have a corporation stop, meter stop, meter and meter box.

c. The minimum service line size shall be:

1) 1" diameter for one house.

2) 1-1/4" diameter for two houses.

3) Commercial and industrial users shall be determined by the City Engineer on a case-by-case basis.

d. Service meters shall be located adjacent to the property line of the property served.

9. Plans Submitted to the City Engineer for Review and Approval Shall Include:

a. Pipe locations and sizes.

b. Two foot interval contours of ground surface at a horizontal scale of 1" = 100'.

c. Location of all other existing or planned installations including roads, sidewalks, lots, sanitary sewer, gas lines, underground telephone, buried cable television, electricity and storm sewer.

d. Location and size of all service connections, valves, hydrants, and blow-off installations.

e. Detailed drawings of pipe, valve, service connection, hydrant, blow-off and any special installations.

f. Description of all materials to be used in the water system.

g. Description of work to be done and workmanship required.

10. Locations of Service Lines

a. Service lines shall be extended to the edge of the property to be served.

b. Ends of all unused service lines shall be marked by a wooden 2 x 4, painted white.

c. No service lines shall be placed in sidewalks or driveways.

11. Plans and Plan Check Fees. Plans and required plan check fees shall be submitted to the Oregon State Health Division by the developer for review and approval. Waterline construction shall not begin until the City receives a copy of the approval letter from the Health Division.

B. MATERIALS

1. Trench Backfill

a. Trench Backfill Zones - Trench backfill is segregated into three zones as shown by the Standard Pipe Trench Detail.

1) Pipe embedment

2) Backfill in pipe zone

3) Classified backfill above pipe zone

b. Pipe Embedment Material

1) Class I, II and III trench shall be 3/4"-0" or 1"-0" crushed rock conforming to Section 703 OSHD Specifications.

2) Class IV shall be unclassified native material free of large rocks, vegetable matter, and debris with no particles larger than 1-1/2".

c. Backfill Material in Pipe Zone

1) Class I, II and III trench shall be 3/4"-0" or 1"-0" crushed rock conforming to Section 703 OSHD Specifications.

2) Class IV shall be unclassified native material free of larger rocks, vegetable matter, and debris with no particles larger than 1-1/2".

d. Backfill Material Above Pipe Zone

1) Classes of Backfill

a) Class I granular backfill shall conform to the following:

1. 3/4"-0" or 1"-0" crushed rock; conforming to Section 703 OSHD Specifications.

2. All material shall be approved by City Engineer.

3. City Engineer may visually reject material until tests are made.

4. Use under paved roadways, paved or gravel driveways, or as directed by City Engineer.

b) Class II select backfill shall conform to the following:

1. Well graded pit run, pea gravel, sand or crusher screenings meeting the following minimum requirements:

a. One hundred percent (100%) passing 6" sieve (U.S.) and 5-15% passing #200 mesh (U.S.).

b. Shall be free of deleterious matter.

2. All material shall be approved by the City Engineer.

c) Class III and IV native backfill shall conform to the following:

1. Native excavated material, free of vegetable matter and debris.

2. Individual particles less than 1/3 trench width in greater dimension.

3. Class III and Class IV shall be used in unimproved areas.

e. Foundation Stabilization material shall be gravel or crushed aggregate or City Engineer approved clean, well graded granular material.

2. Distribution Pipe and Fittings

a. Ductile Iron Pipe shall conform to the following:

1) Ductile iron conforming to AWWA C-151-76, Class as determined by City Engineer.

2) Cement mortar lining and bituminous seal coat conforming to AWWA C-104-74.

3) Joints shall be push-on or mechanical conforming to AWWA C-111-72.

b. Fittings (including tees, bends, reducers, couplings, plugs, etc.) shall be cast iron conforming to AWWA C-110 or Class 350 ductile iron conforming to AWWA C-153, and cement lined conforming to AWWA C-104.

3. Resilient Wedge Valves shall conform to the following:

a. Valves shall conform to the latest revision of AWWA Standard C-509 covering resilient seated gate valves and be approved by ULFM.

b. Valves shall be either non-rising stem or rising stem, opening by turning stem counterclockwise and provided with 2 inch square operating nut or with the word "Open" and an arrow (←) cast in the metal to indicate direction to open.

c. The wedge shall be of cast iron completely encapsulated with urethane rubber.

e. The urethane sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D-429.

f. Stems for NRS assemblies shall be cast bronze with integral collars in full compliance with AWWA. OS & Y stems shall be bronze. The NRS stem stuffing box shall be the o-ring seal type with two rings located above thrust collar. The two rings shall be replaceable with valve fully open and subjected to full rated working pressure.

g. There shall be two low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of wedge and shall be made of solid bronze. There shall be a smooth, unobstructed waterway free of all pockets, cavities and depressions in the seat area.

h. The body and bonnet shall be coated with fusion bonded epoxy both interior and exterior. Each valve shall have maker's name, pressure rating and year in which manufactured cast on the body. Prior to shipment from factory, each valve shall be tested by hydrostatic pressure equal to requirement for both AWWA (twice the specified working pressure) and 400 PSI ULFM requirements.

i. Valve boxes shall be concrete with cast iron liner with formed top to receive insert type traffic model cover labeled "W" manufactured by Brooks Products Company or equal.

j. Valve box riser shall be cast iron.

4. Butterfly Valves shall conform to the following:

a. Class 150 B short body type valve in conformance with AWWA C-504.

b. Open counter-clockwise by a 2 inch square operating nut.

c. Valve Boxes: Concrete with cast iron liner with formed top to receive insert type traffic model cover labeled "W" manufactured by Brooks Products Company or equal.

5. Air Release Valves shall be 2" APCO model #200A or City Engineer approved equal.

6. Service Connections

a. All single water service pipelines shall be seamless Type "K" copper pipe, conforming to AWWA C-800, 160 psi rated. No single service pipe will be smaller than 3/4". Double service pipe shall be a minimum of 1 inch diameter.

b. Each individual residential water service connection shall be equipped with 3/4" lock-wing meter stop at the inlet to the meter, when a 5/8" x 3/4" meter is to be used.

c. All angle meter stops shall be bronze with plastic pipe connector and outlet for meter coupling, and have locking capability.

d. All corporation stops shall be bronze with full way bore and with inlets for Mueller threads and outlets to adopt type "K" copper pipe.

e. Water meters shall be 5/8" x 3/4" Rockwell seated register, magnetic drive, displacement type. Meters for non-

residential use shall be appropriately sized consistent with the projected water demand.

f. Except as allowed otherwise in these standards, all services shall be direct tapped or saddle using bronze saddles with bronze bolts specifically designed for use with PVC or ductile iron pipe.

g. All meter boxes shall be Brooks meter boxes, or approved equal, with reinforced concrete cover and cast iron reading lids. All meter boxes shall be set to grade and in line. A number 37 box shall be used on a 5/8 x 3/4" meter, a #38 box shall be used on a 1" meter, a #65 box on a 1-1/2" meter and a #66 box on a 2" meter.

h. Corporation taps can be made on the following cast iron and ductile iron pipe sizes. All other sizes and all PVC pipe shall be saddle or direct tapped.

	1"	1-1/2"	2"
6" D.I. Class 50	*	*	
8" D.I. Class 50	*	*	*
10" D.I. Class 50	*	*	*
12" D.I. Class 50	*	*	*

7. Blow-Offs shall conform to the following:

a. Pipe and Fittings shall be PVC AWWA C-900 per paragraph 2 above and Details IV-7 and IV-8.

b. Valves shall be 150 psi rated, bronze as specified in paragraph 3 above.

c. Valve Box shall be as specified in paragraph 3 above.

d. Anchor Rods - The number and size of anchor rods shall be specified by the City Engineer.

8. Fire Hydrants

a. Hydrants shall be improved, dry barrel, compression type valve, traffic model.

b. Fire hydrants shall be equipped with two 2-1/2" hose ports, one 4-1/2" pumper port, 1-1/2" pentagon nut and barrel drains.

c. Hydrants shall be Mueller improved Model 24015 or equal as approved by City Engineer.

9. Fittings. All adapters, couplings, or similar devices must be suitable for intended use, designed for at least 150 psi

working pressure, and not be susceptible to corrosion caused by dissimilar metals.

10. Thrust Blocking. Thrust blocking concrete shall be 2000 psi at 28 days, and conform to plan details.

11. Connecting Dissimilar Pipe Materials

    a. All adapters, couplings, or similar devices must be suitable for intended use, designed for at least 150 psi working pressure, and not be susceptible to corrosion caused by dissimilar metals.

    b. Use City Engineer approved Dresser style or similarly approved equal couplings or adapters.

C. WORKMANSHIP

1. Handling Pipe and Accessories

    a. Handle with care to avoid damage.

    b. Do not drop or bump.

    c. Unload at site or near place pipe is to be laid.

2. Line and Grade

    a. Contractor to set line stakes as approved by City Engineer.

    b. Lay pipe with 36" of cover unless otherwise shown on plans or directed by City Engineer.

    c. Lay pipe on even grade without high spots or dips.

    d. Conform to grades where established by City Engineer.

3. Installation of Pipe

    a. Lay no pipe before City Engineer examines and passes it for use.
    b. Remove rejected pipe from site promptly.

    c. Place embedment material where required prior to laying pipe.

    d. Lower all pipe and fittings into the trench in a manner to prevent damage to pipe.

    e. Do not drop or bump pipe or accessories into trench.

f. Shape and grade trench to established line and grade.

g. Form bell holes properly in trench bottom so that pipe bears solidly upon entire length of barrel.

h. Lay pipe to uniform line and grade, bell ends upgrade.

i. Clean interior of pipe of foreign material before laying next pipe.

j. Do not lay pipe in water, on frozen trench bottom, or when weather or trench conditions are unfavorable in the opinion of the City Engineer.

k. Pipe floated out of place shall be removed and relaid as City Engineer directs.

l. Block all pipe in accordance with plan details.

m. Lay continuous #12 copper wire adjacent to PVC pipe, and tied to all valves and fittings prior to backfilling.

4. Jointing shall comply with pipe and joint manufacturer's recommendations.

5. Trench Backfill Above Pipe Zone

a. Class I and II Granular Backfill

1) Use under paved roadways, paved/gravel drives and sidewalks or where directed by City Engineer.

2) Place imported material in trench; do not let material fall directly into trench.

3) Compact by mechanical compaction in 6" lifts or other City Engineer approved method to a 95% maximum dry density per AASHTO T-99 test method.

b. Class III and IV Backfill

1) Use under improved yard, road shoulders, etc., as approved by City Engineer.

2) Place native excavated material in ditch. Do not let materials fall directly on pipe.

3) Compact by mechanical compaction or other City Engineer approved method to a density greater than 90% of the in-place dry density of the surrounding undisturbed soil.

4) Refill trench with remaining material and compact as above.

5) Grade to a neat appearing surface.

c. Maintenance of Trench Surface

1) Restore ground surfaces to original condition and elevation.

2) Maintain such surfaces for one year following acceptance of work.

3) Conform to Standard Detail.

6. Prevention of Contamination

a. Plug all ends of pipe whenever work is stopped.

b. Exclude groundwater from pipe at all times.

c. Carefully remove all dirt and foreign material from pipe, valves, and fittings as they are placed.

7. Installation of Valves and Boxes

a. Set and joint in manner specified for cleaning, laying and jointing pipe.

b. Install valves in accordance with AWWA C600 and manufacturer's recommendations.

c. Locate valves as shown on plans or staked in field.

d. Provide box for each valve. Conform to plan requirements.

e. Install in truly vertical position.

f. Center valve box over valve. Cover flush with surface and as staked in the field. Set tiles so they do not transmit shock or stress to the valves.

g. Place backfill around the valve boxes and thoroughly compact to a density equal to that of the undisturbed ground and in such a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be excavated, plumbed, and backfilled at the Contractor's expense.

8. Installation of Fire Hydrants

   a. Set where indicated on plans or directed by City Engineer.

   b. Conform to plan details.

   c. Place all thrust blocking in accordance with these standards.

   d. Set vertical and at proper bury.

9. Service Pipe and Fittings

   a. Conform to Standard Details.

   b. Field verify exact locations of existing services.

   c. All taps shall be made at a position of 10 o'clock or 2 o'clock.

   d. Flush, test, disinfect then flush and obtain bacteriological test for the water main and service lines prior to connecting meter to residential services.

   e. Reuse existing meter boxes as directed. Set meter boxes to grade.

   f. Water service shall be maintained at all times except for final connection to the meter. Shut-off only one service at a time when making final connections.

   g. Contractor shall bore, jack, or pull service lines when other utilities do not conflict.

10. Testing

   a. Conduct the hydrostatic pressure test on all newly laid pipe in conformance with the applicable Sections of AWWA C600 specifications or as directed by the City Engineer.

   b. Correction of Leakage - Should any test of laid pipe disclose leakage greater than that allowed, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance.

   c. Pipe leakage shall be measured by a calibrated container and any leakage in excess of specified allowance will be cause for rejection of pipe installation.

   d. City Engineer shall witness test and certify results. Contractor shall pretest prior to the witness test.

11. Disinfection

a. Pipelines intended to carry potable water shall be disinfected before being placed in service in accordance with AWWA B-301, AWWA C-601 and AWWA technical manual M-20 "Water Chlorination Principles and Practices."

b. Contractor shall disinfect the system. Additional taps and open trenches at points of connection may be required. The Contractor shall bear the responsibility of making taps, and maintaining open trenches until a satisfactory laboratory analysis has been obtained.

c. The City Public Work staff must operate live valves. In all cases, the contractor shall be responsible to obtain quality samples after chlorination and forward them to an approved, independent testing laboratory for analysis.

12. Clean-up

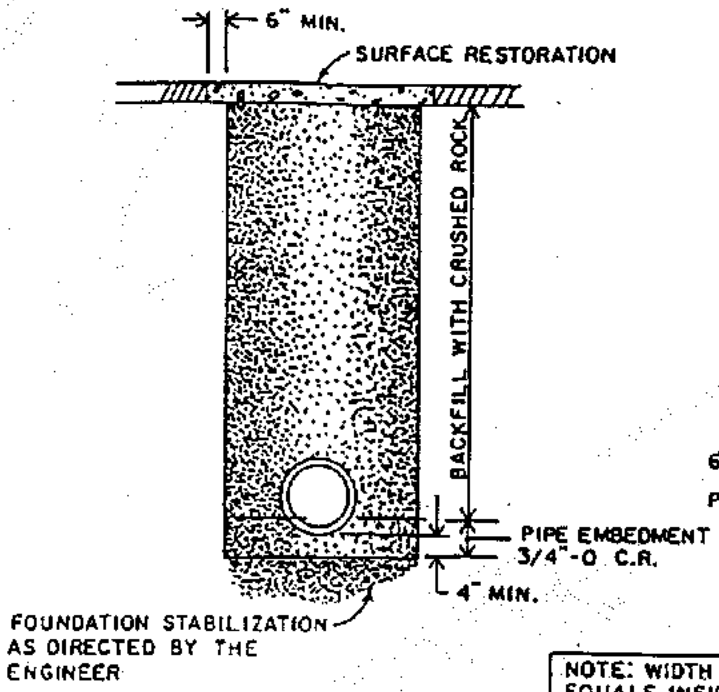
a. Clean-up, remove and properly dispose of all excess materials, construction materials, debris from construction, etc.

b. Replace or repair any fences, mailboxes, signs, landscaping, or other facilities removed or damaged during construction.

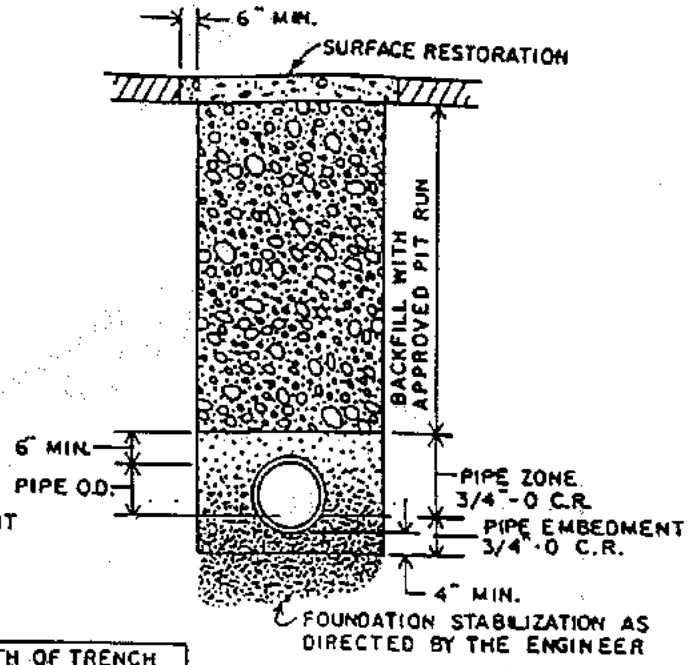
c. Replace all lawns, topsoil, shrubbery, flowers, etc., damaged or removed during construction. Contractor shall be responsible for seeing that lawns, shrubs, etc., remain alive.

d. Leave premises in condition equal to original condition before construction.

e. Repair road cuts and driveways to original or better condition.

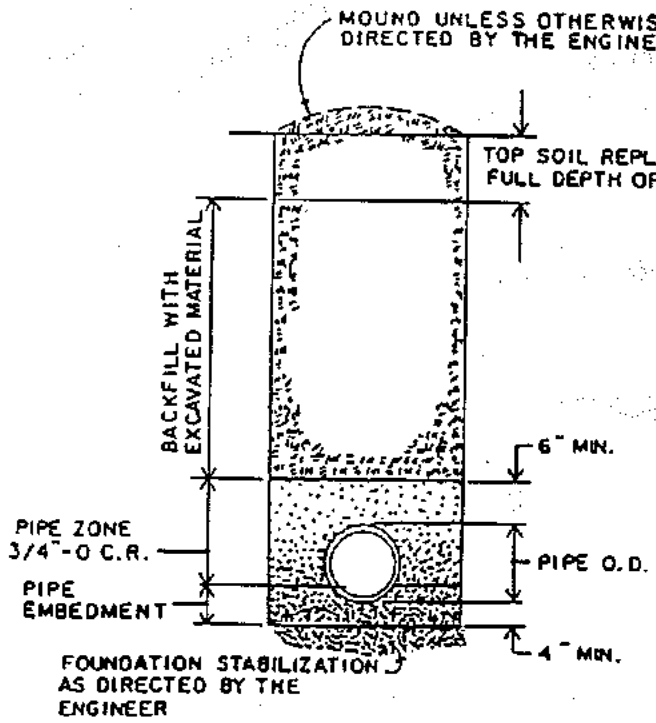


CLASS I

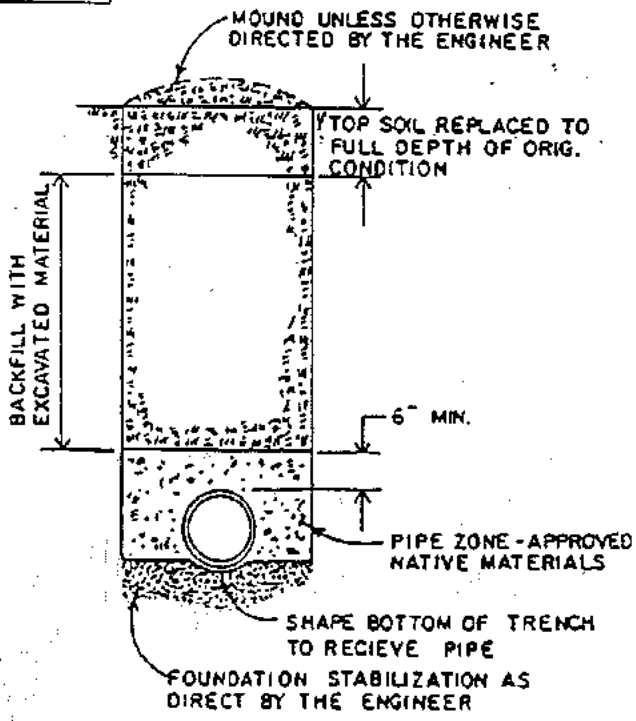


CLASS II

NOTE: WIDTH OF TRENCH EQUALS INSIDE DIA. OF PIPE + 18" FOR PIPE UP TO 24" DIA. I.D. + 24" FOR 24" PIPE AND LARGER



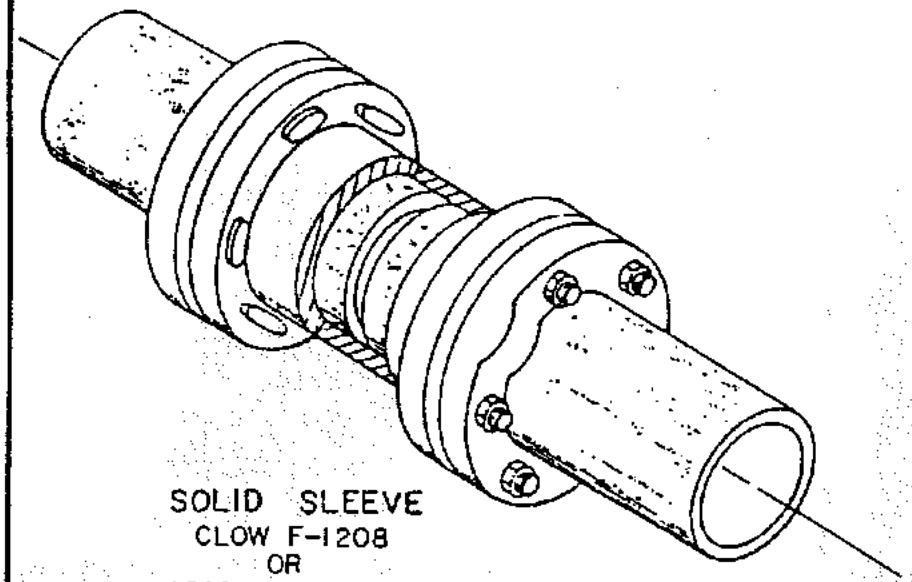
CLASS III



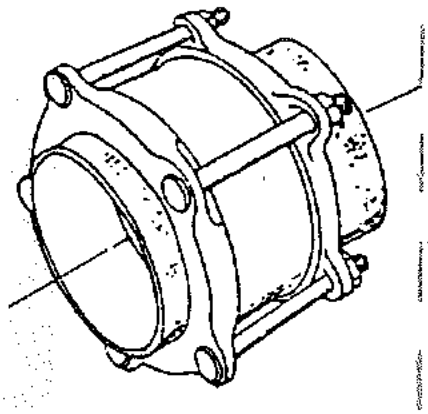
CLASS IV

STANDARD TRENCH DETAIL

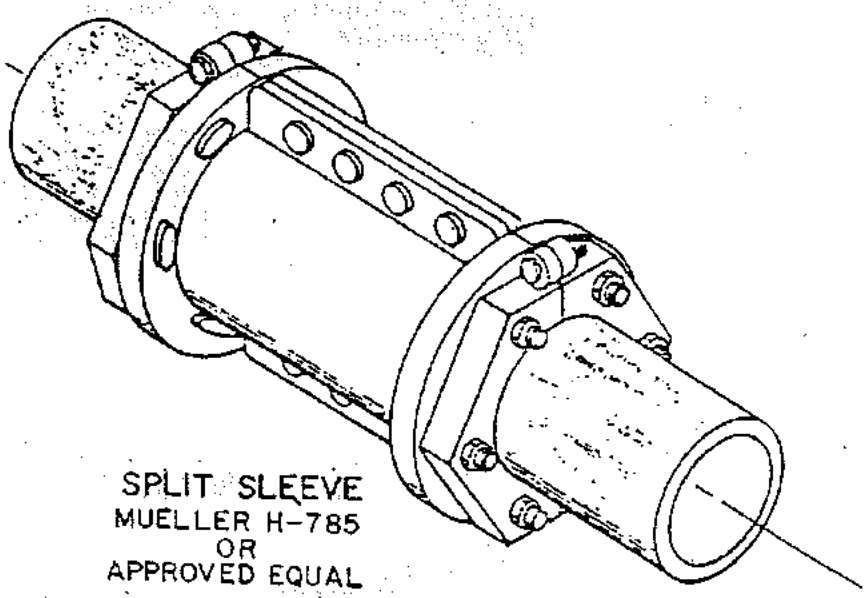
DETAIL IV - 1



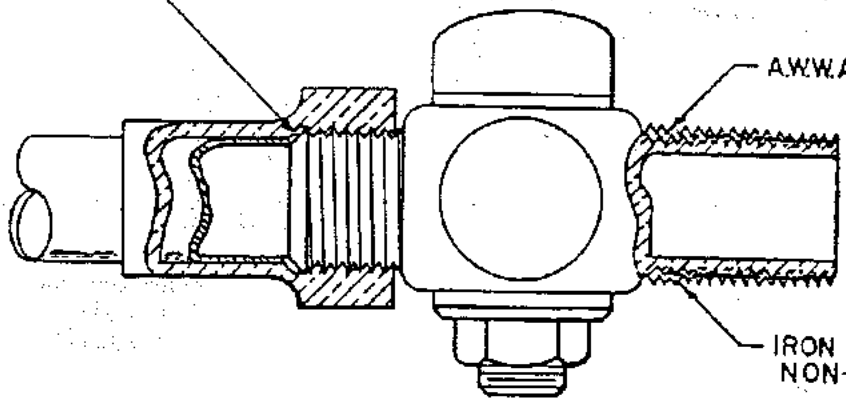
SOLID SLEEVE
CLOW F-1208
OR
APPROVED EQUAL



DRESSER TYPE COUPLING



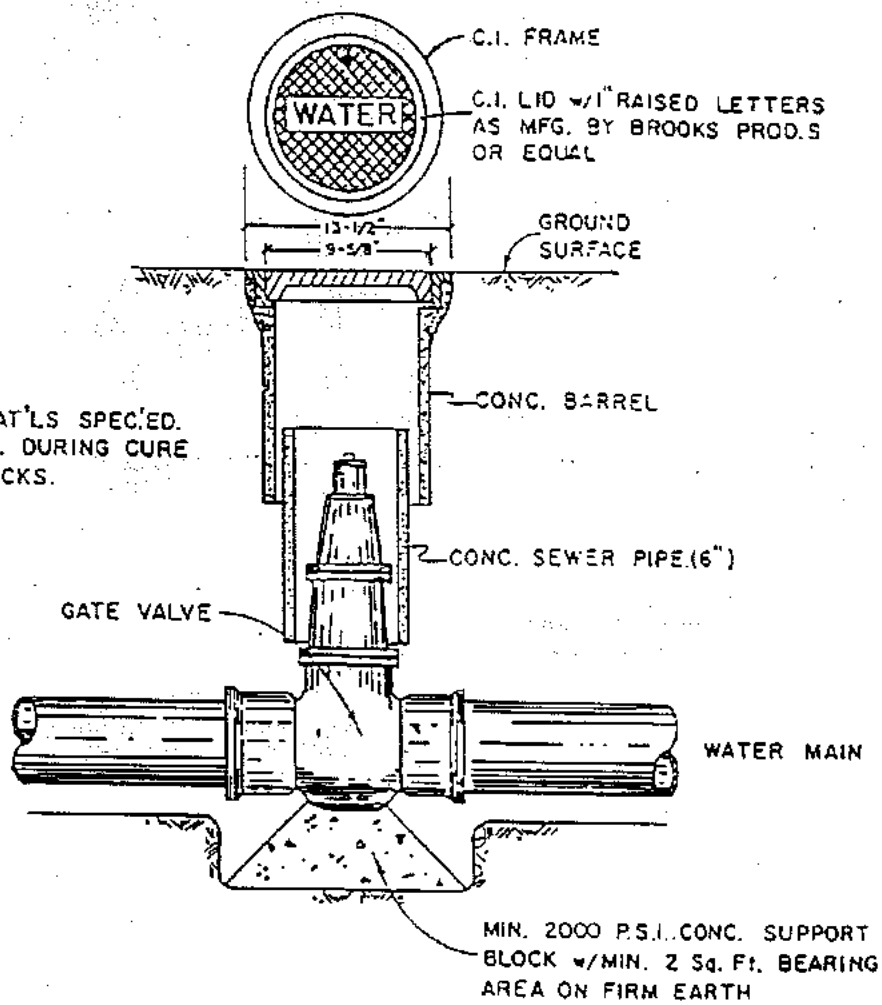
SPLIT SLEEVE
MUELLER H-785
OR
APPROVED EQUAL



3/4" CORPORATION STOP
MUELLER H-15000
OR
APPROVED EQUAL

STANDARD FITTINGS

DETAIL IV - 2

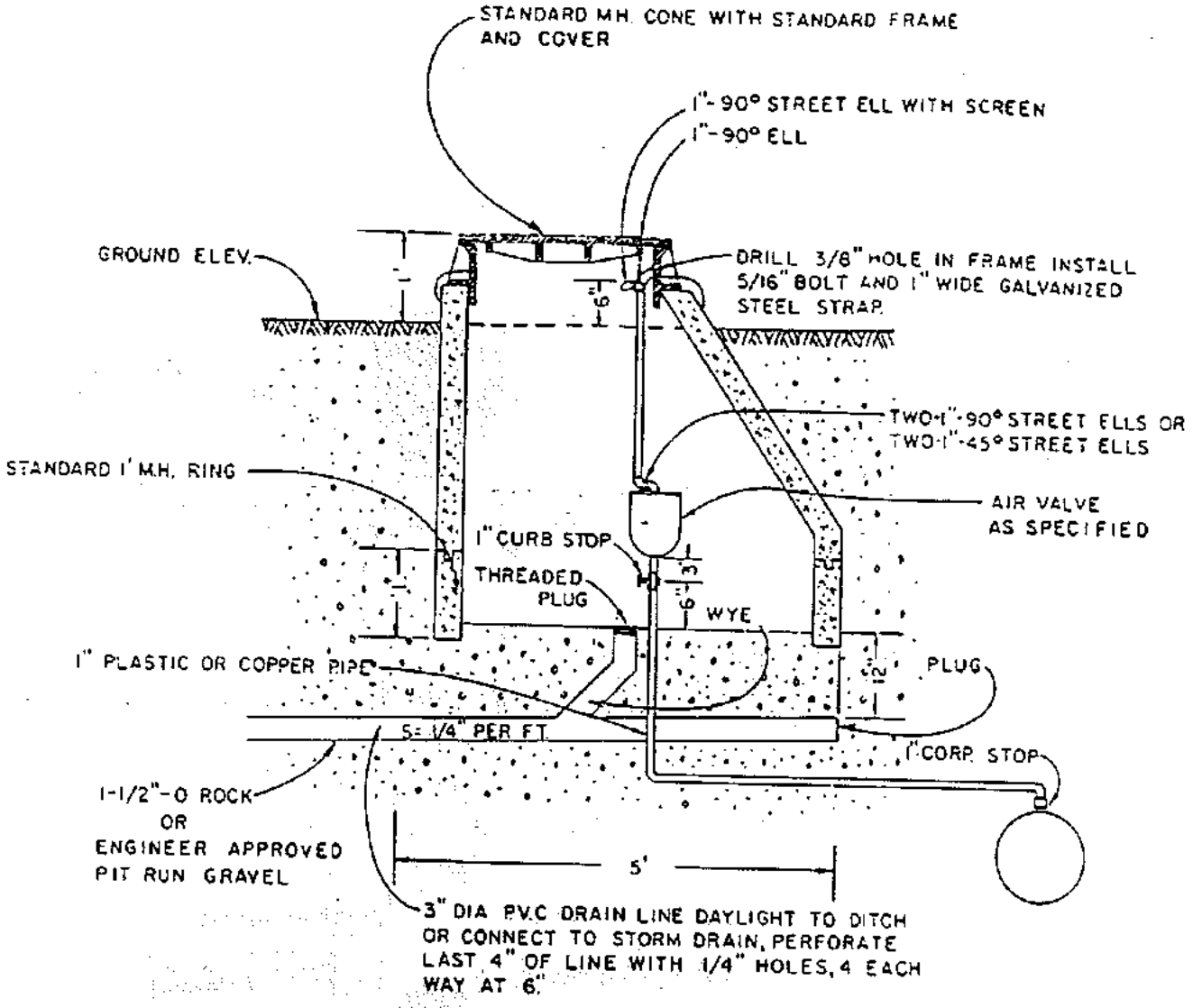


NOTE:

1. VALVE & VALVE BOX MAT'LS SPEC'ED.
2. PROVIDE TEMP. BL'KING. DURING CURE OF CONC. SUPPORT BLOCKS.

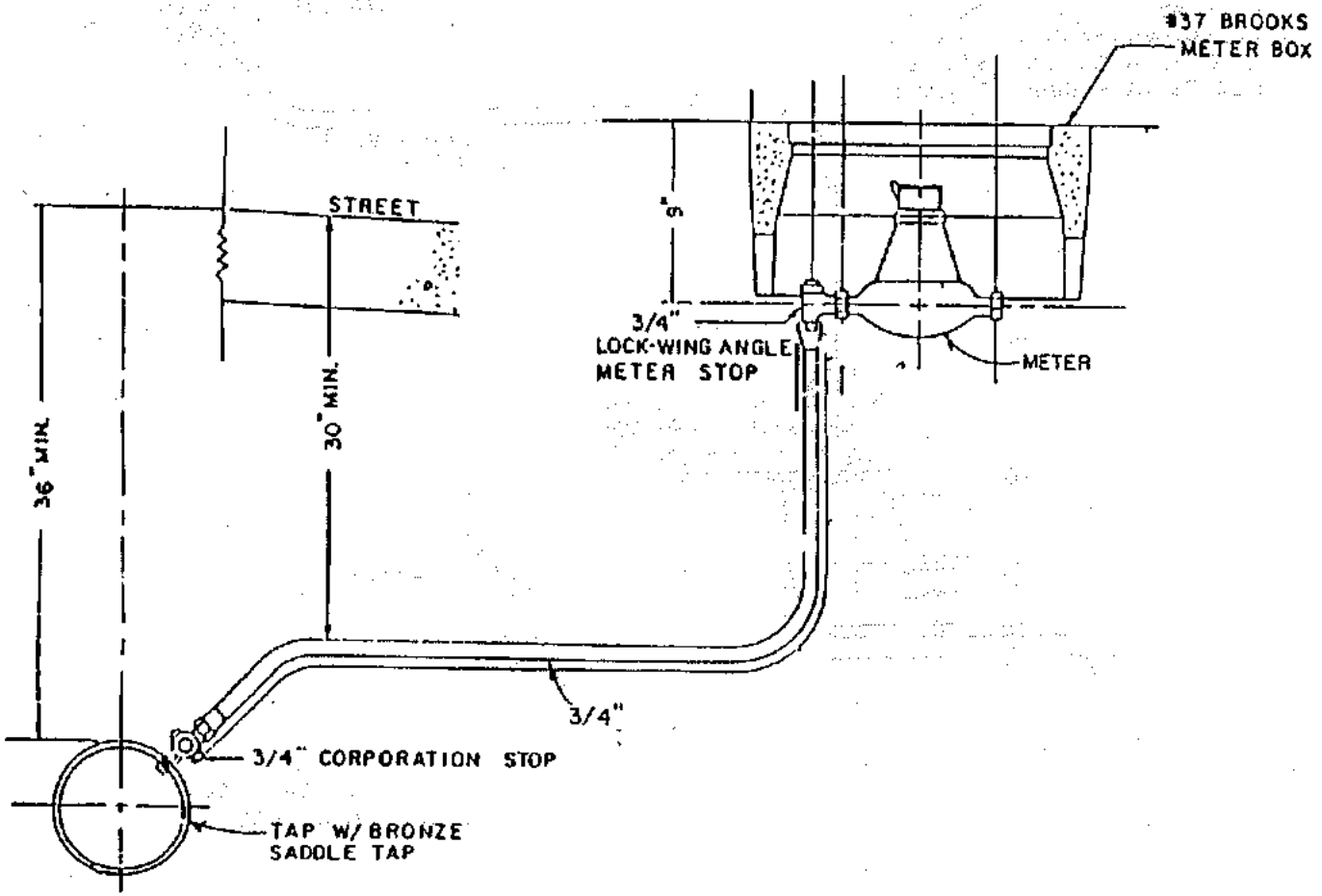
GATE VALVE & VALVE BOX DETAIL

DETAIL IV – 3



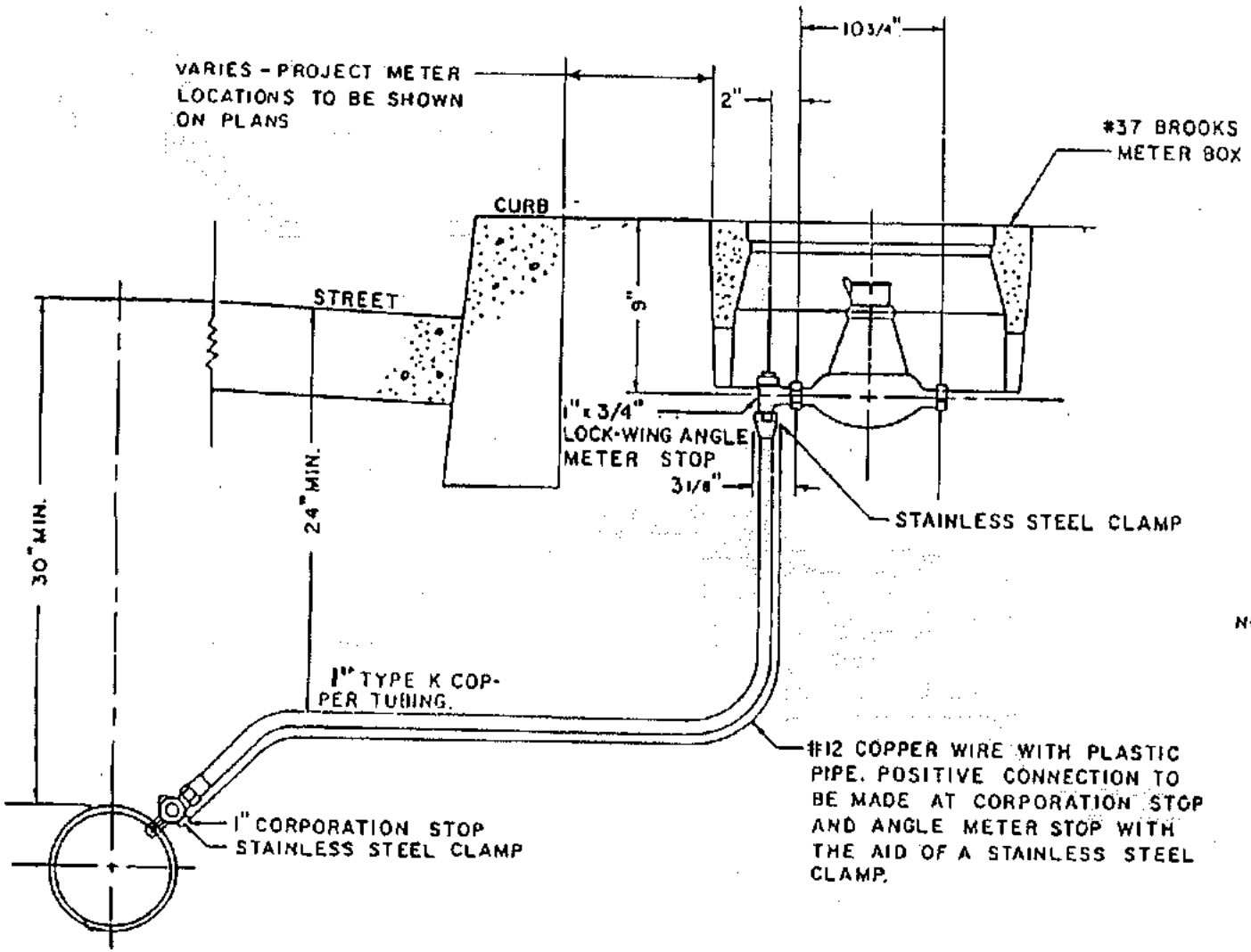
STANDARD MANHOLE AND 1" DIA. AIR RELEASE AND VACUUM VALVE INSTALLATION

DETAIL IV - 4



STANDARD 3/4" SERVICE INSTALLATION

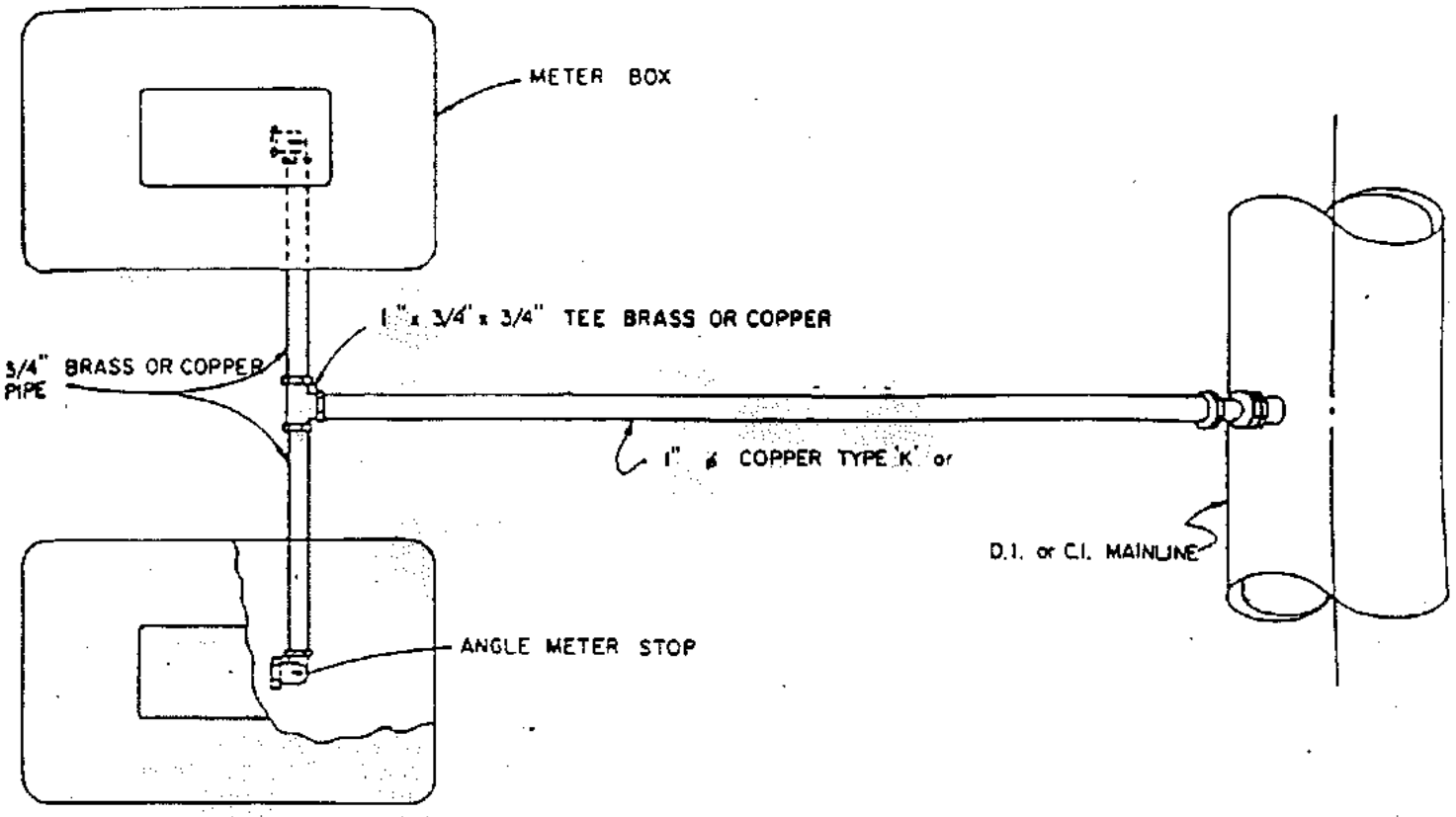
DETAIL IV - 5



NOTE: ON 4" D.I. PIPE USE A 3/4" MUELLER THREAD X 1" CORPORATION STOP.
NO METER ON PRIVATE PROPERTY WITHOUT EASEMENT.

STANDARD 1" SERVICE INSTALLATION

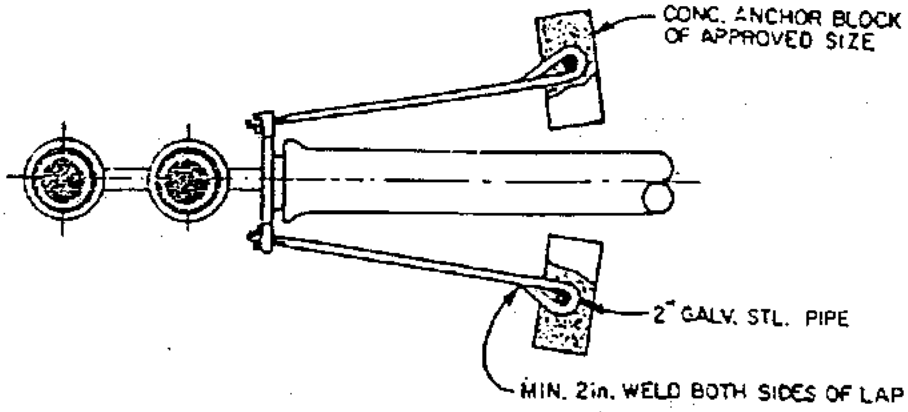
DETAIL IV - 6



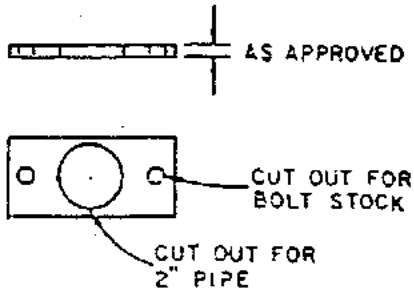
DOUBLE SERVICE CONNECTION

DOUBLE SERVICE CONNECTION

DETAIL IV-7



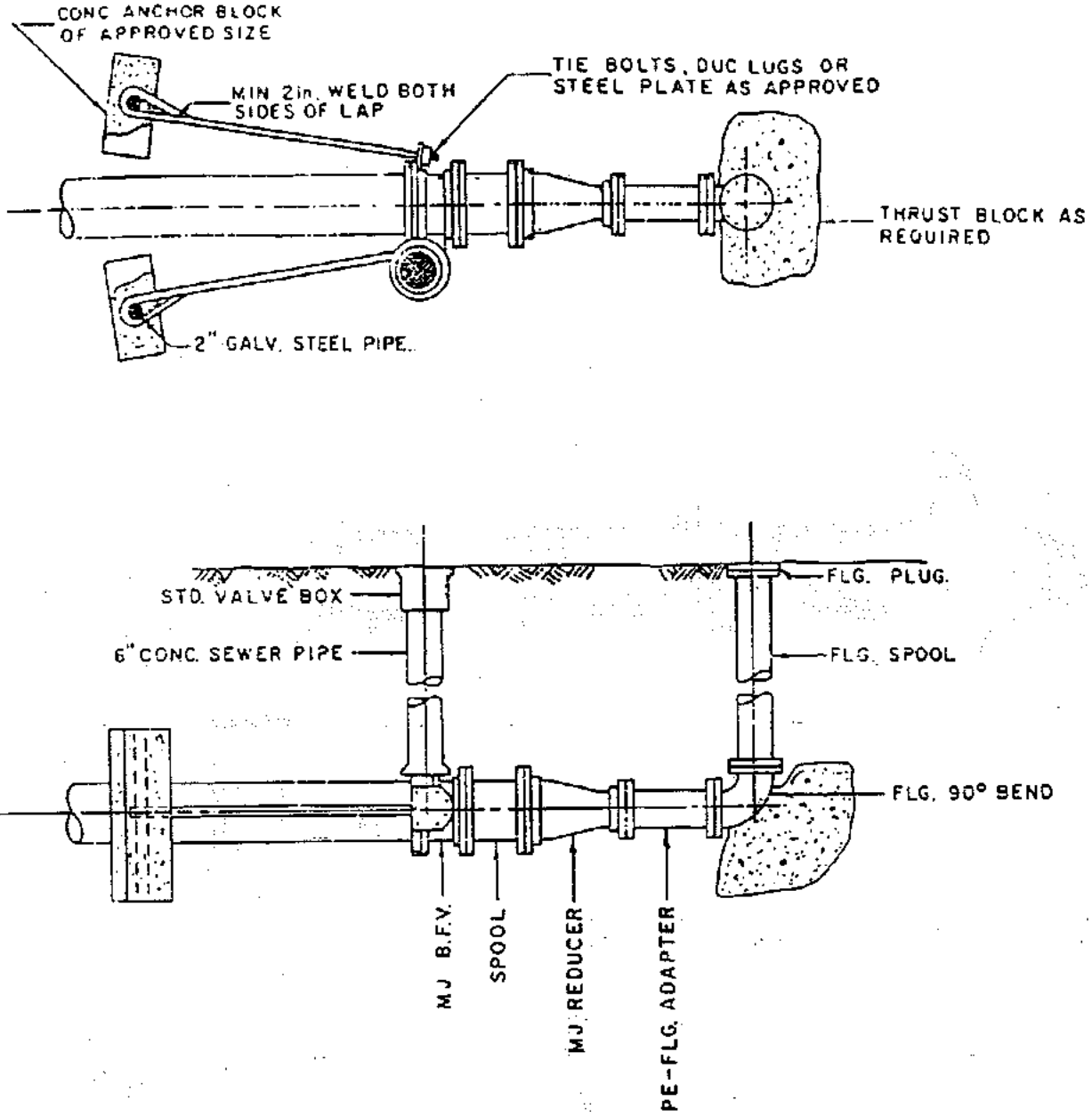
STEEL PLATE
ALTERNATE FOR T.J. PLUG
WITHOUT EARS



NOTES:
1. ANCHOR BLOCK SIZE TO BE SPECIFIED OR APPROVED BY THE ENGINEER.
2. TIE RODS TO BE A307 STEEL BOLT STOCK WITH 14,000 psi TENSILE STRENGTH OR APPROVED EQUAL, NUMBER OF RODS AND SIZE TO BE APPROVED BY THE ENGINEER.

STANDARD BLOWOFF WITH PLUGGED END

DETAIL IV - 8



B.F.V.	RED.	S.O. FTG. & PIPE SIZE
10"	10" X 4"	4"
12" & 14"	X 6"	6"
16" & 18"	X 8"	8"
20"	20" X 10"	10"
24"	24" X 12"	12"

NOTE:

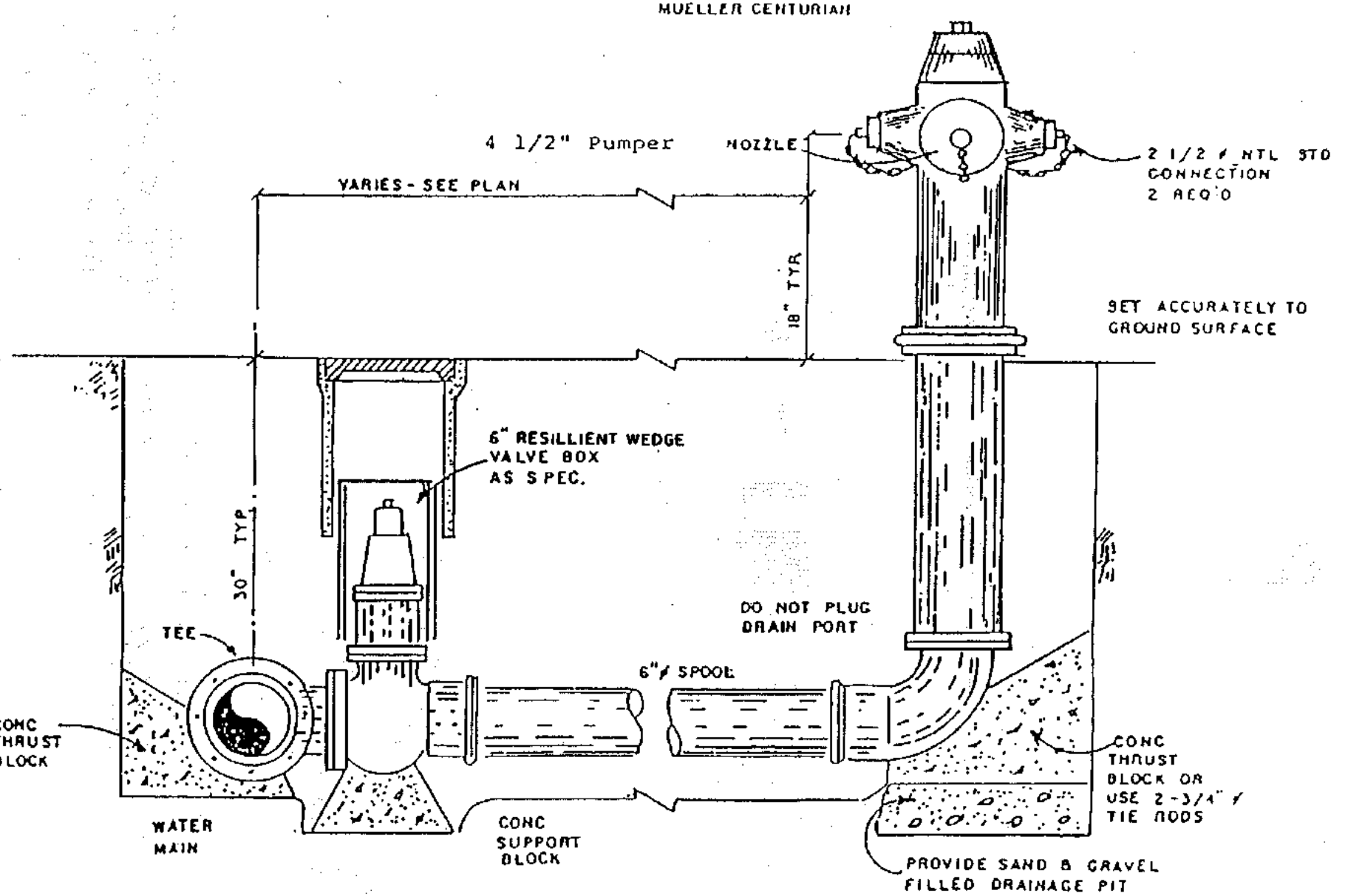
1. ANCHOR BLOCK SIZE TO BE SPECIFIED OR APPROVED BY THE ENGINEER.
2. TIE RODS TO BE A307 STEEL BOLT STOCK WITH 14,000psi TENSILE STRENGTH OR APPROVED EQUAL, NUMBER OF RODS AND SIZE TO BE APPROVED BY THE ENGINEER.

STANDARD BLOWOFF FOR 10" DIA. PIPE & LARGER WITH IN LINE VALVE

DETAIL IV - 9

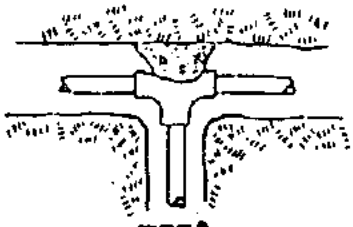
FIRE HYDRANT -

MUELLER CENTURIAN

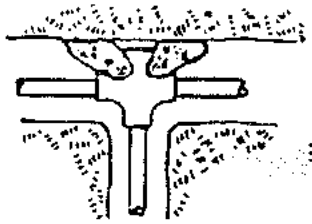


FIRE HYDRANT ASSEMBLY

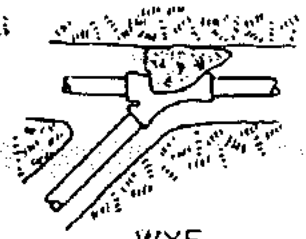
DETAIL IV - 10



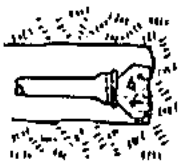
TEE



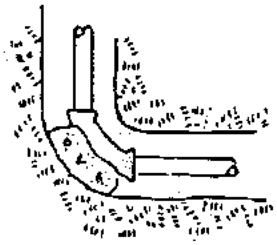
PLUGGED CROSS



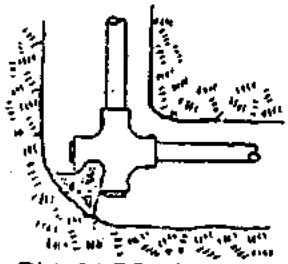
WYE



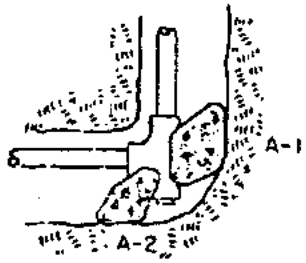
PLUG OR CAP



BEND



PLUGGED CROSS



TEE

NOTES:

1. Concrete thrust blocking to be poured against undisturbed earth.
2. Keep concrete clear of joint and accessories.
3. The required thrust bearing areas for special connections are shown encircled on the plans: e.g. (15) indicates 15 square feet bearing area required.
4. If not shown on plans required bearing areas at fitting shall be as indicated below, adjusted if necessary, to conform to the test pressure(s) and allowable soil bearing stress(es) stated in the special specifications.
5. Bearing areas and special blocking details shown on plans take precedence over bearing areas and blocking details shown on this standard detail.

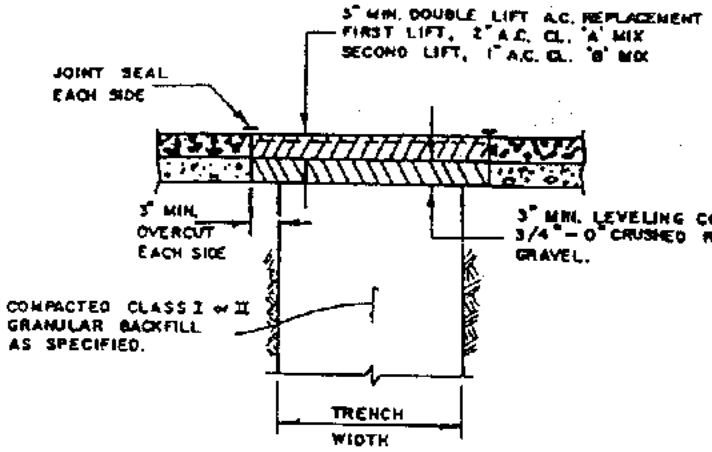
BEARING AREA OF THRUST BLOCKS IN SQ. FT.

Fitting Size	Tee, Wye Plug or Cap	90° Bend Plugged Cross	Tee Plugged on Run		45° Bend	22-1/2° Bend	11-1/4° Bend
			A_1	A_2			
4	1.0	1.4	1.9	1.4	1.0	--	--
6	2.1	3.0	4.3	3.0	1.6	1.0	--
8	3.8	5.3	7.6	5.4	2.9	1.5	1.0
10	5.9	8.4	11.8	8.4	4.6	2.4	1.2
12	8.5	12.0	17.0	12.0	6.6	3.4	1.7
14	11.5	16.3	23.0	16.3	8.9	4.6	2.3
16	15.0	21.3	30.0	21.3	11.6	6.0	3.0
18	19.0	27.0	38.0	27.0	14.6	7.6	3.8
20	23.5	33.3	47.0	33.3	18.1	9.4	4.7
24	34.0	48.0	68.0	48.0	26.2	13.6	6.8

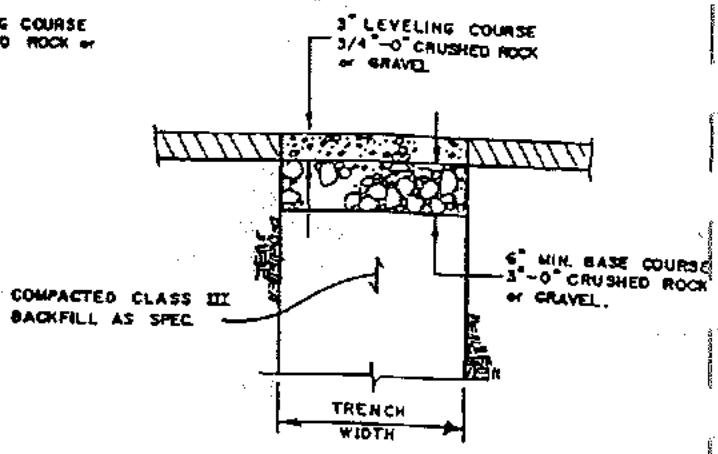
NOTE: Above bearing areas based on test pressure of 150 p.s.i. and an allowable soil bearing stress of 2,000 pounds per square foot. To compute bearing areas for different test pressures and soil bearing stresses, use the following equation: Bearing area = (Test Pressure/150)x(2000/Soil Bearing Stress)x(Table Value).

STANDARD THRUST BLOCKING DETAILS

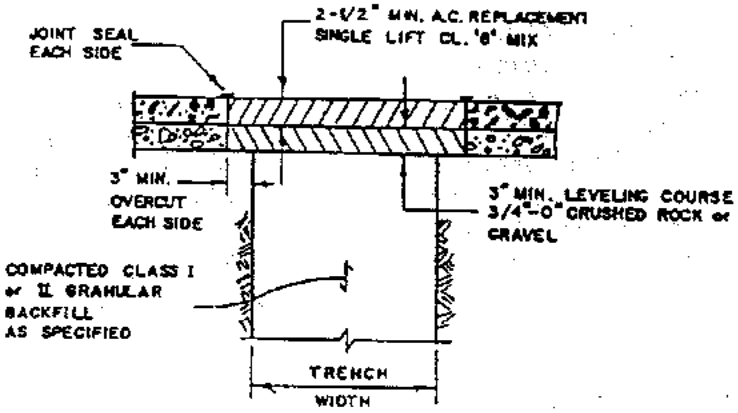
DETAIL IV - 11



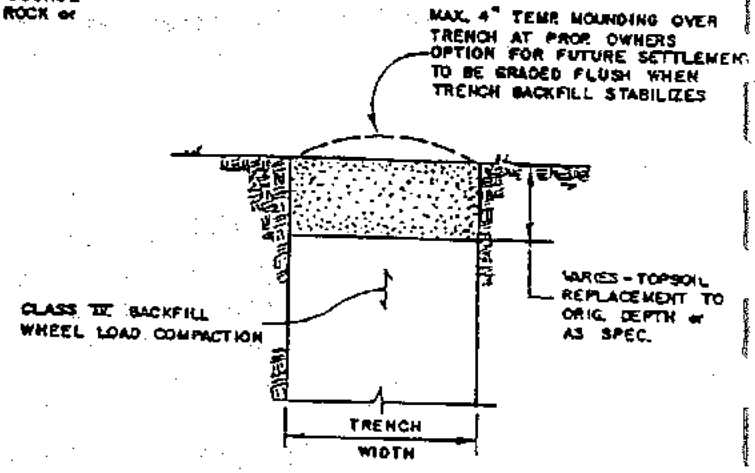
CLASS A
PAVED STREET
REPLACEMENT
(MAJOR STREETS & ARTERIALS)



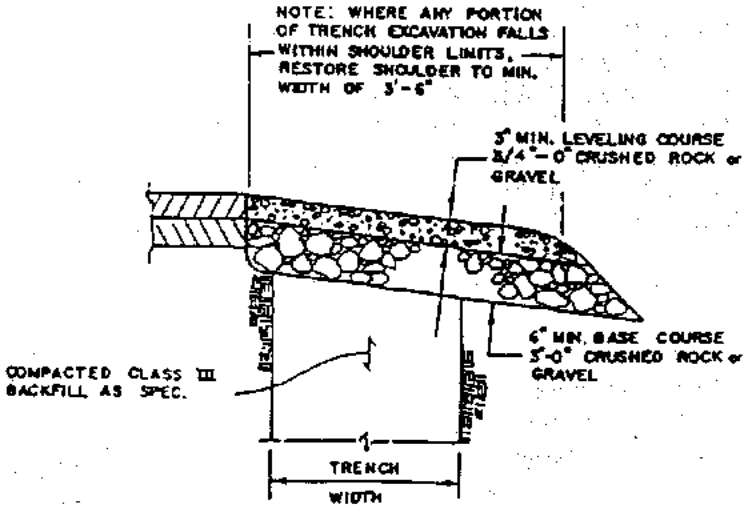
CLASS D
GRAVELED ROAD
or STREET



CLASS B
PAVED STREET
(MINOR STREETS)



CLASS E
UNIMPROVED
& OPEN AREAS



CLASS C
GRAVEL SHOULDER

SURFACE RESTORATION DETAILS

DETAIL IV - 12

TABLE OF CONTENTS - SECTION V

CITY POLICY FOR ACCEPTING NEW STREETS

The City may accept new streets, built to City Public Works Construction Standards, after 90 percent of the developed area which the street services has been built upon, or three years after the initial paving has been installed, whichever occurs first. However, the City shall not accept streets sooner than one (1) year after initial paving has been installed. The street pavement, curbs and sidewalks shall be in good condition as determined by the City Engineer to be accepted by the City.

STORM SEWER ACCEPTANCE POLICY

The City may accept storm sewer installations built to City Public Works Construction Standards providing the following conditions have been met:

1. After completion of construction of the total project, and after all preliminary inspections have been satisfactorily completed, a final inspection to prepare a check (punch) list shall be conducted with representatives present from the City, the project engineering firm, and the Contractor. The check list shall include any item(s) either damaged or improperly placed during construction, and any item(s) which, in the opinion of the City Engineer need repair. One set of mylar as-builts shall be submitted to the City for the subject project.

2. The final check list shall then be given to the Contractor to make necessary repairs.

3. Once those repairs have been satisfactorily completed and inspected by the City Engineer, the one (1) year warranty period shall then go into effect upon written notice to the Contractor.

4. If at any time during the course of the one (1) year warranty period, the City has reason to believe the storm sewer facilities have been damaged or are faulty in any way, the responsible party shall be required, at their own cost, to repair any damage or fault caused to the storm sewer facilities.

5. Just prior to the expiration of the one (1) year warranty period, the City Engineer will inspect the storm sewer facilities. If satisfactory, the City Engineer will notify the Contractor in writing, of the City's acceptance of the storm sewer facilities. If the storm sewer facilities are satisfactory, the City Engineer will notify the Contractor of those deficiencies. Upon satisfactory correction of such deficiencies, the City Engineer will again inspect the facilities and

will notify the Contractor in writing of the City's acceptance of the storm sewer facilities. Any delay in correcting deficiencies shall also operate to delay final acceptance.

SANITARY SEWER SYSTEM ACCEPTANCE POLICY

The City may accept new sanitary sewer installations or systems built to City Public Works Construction Standards, providing the following conditions have been met:

1. After completion of construction of the total project, and after all testing has been satisfactorily completed, a final inspection to prepare a check (punch) list shall be conducted with representatives present from the City, the project engineering firm and the Contractor. The check list shall include any items either damaged or improperly placed during construction, and any item(s) which, in the opinion of the City Engineer, need repair. One set of mylar as-builts shall be submitted to the City for the subject project.

2. The final check list shall then be given to the Contractor to make necessary repairs.

3. Once those repairs and as-builts have been satisfactorily completed and inspected by the City Engineer, the one (1) year warranty period shall taken go into effect upon written notice to the Contractor.

4. If at any time during the course of the one (1) year warranty period the City has reason to believe the sanitary sewer system has faults which were the result of workmanship or construction material flaws, the responsible party will be required (at their own cost) to TV inspect the sewer line (or otherwise verify the sewer's condition in a manner acceptable to the City Engineer) and repair any faults located during inspection by replacing leaking pipe sections. The inspection shall be done during the winter or wet weather months to note all leaks.

5. Just prior to expiration of the one (1) year warranty period, the City Engineer shall inspect the sanitary sewer facilities. If satisfactory, the City Engineer will notify the Contractor in writing of City acceptance of the sanitary sewer facilities. If the sanitary sewer facility is not satisfactory, the City Engineer shall notify the Contractor of those deficiencies. Upon satisfactory correction of such deficiencies, the City Engineer shall again inspect the facilities and will notify the Contractor in writing of City's acceptance of the sanitary sewer facilities. Any delay in correcting deficiencies shall also operate to delay final acceptance.

WATER SYSTEM ACCEPTANCE POLICY

The City may accept new water system installations built to City Public Works Construction Standards providing the following conditions have been met:

1. After completion of construction of the total project, and after all testing has been satisfactorily completed, a final inspection to prepare a check (punch) list shall be made with representatives present from the City, project engineering firm, and the Contractor. The check list shall include any items either damaged or improperly placed during construction, and any item(s) which, in the opinion of the City Engineer, need repair. One set of mylar as-builts shall be submitted to the City for the subject project.

2. The final check list shall then be given to the Contractor to make necessary repairs.

3. Once those repairs and as-builts have been satisfactorily completed and inspected by the City Engineer, the one (1) year warranty period will then go into effect upon written notice to the Contractor.

4. If at any time during the course of the one (1) year warranty period, the City has reason to believe the water facilities have been damaged or are faulty in any way, the Contractor will be required, at their own cost, to repair any damage or fault deemed necessary to the water system.

5. Just prior to expiration of the one (1) year warranty period, the City Engineer shall inspect the water facilities. If satisfactory, the City Engineer shall notify the Contractor in writing, of City acceptance of the water facilities. If the water facilities are not satisfactory, the City Engineer shall notify the Contractor of those deficiencies noted. Upon satisfactory correction of such deficiencies, the City Engineer shall again inspect the facilities and will notify the Contractor, in writing, of City's acceptance of the water facilities. Any delay in correcting deficiencies shall also operate to delay final acceptance.