

RESOLUTION # 73-495

WHEREAS, the Board of Supervisors deems it necessary and advisable in the public interest to revise existing improvement standards governing the design of roads, streets, sanitary sewers, storm drainage, concrete structures, water supply, street lighting and other facilities within the County of Sacramento, to provide for proper development;

NOW, THEREFORE, BE IT RESOLVED AND ORDERED that the attached Improvement Standards and Standard Drawings for said improvements are hereby adopted as the Sacramento County, Department of Public Works Improvement Standards; and

BE IT FURTHER RESOLVED AND ORDERED that the Improvement Standards adopted pursuant to Resolution 66-1048, as amended, are hereby repealed; and

BE IT FURTHER RESOLVED AND ORDERED that the Improvement Standards adopted herein, together with the Standard Construction Specifications and Standard Drawings adopted pursuant to Resolution 70-35 shall govern the design and construction of improvements in Sacramento County; and

BE IT FURTHER RESOLVED AND ORDERED that this resolution shall be in full force and effect on and after June 1, 1973.

On a motion by Supervisor Kloss, seconded by Supervisor Gualco, the foregoing resolution was passed and adopted by the BOARD OF SUPERVISORS of the County of Sacramento, State of California, this 30th day of April, 1973, by the following vote, to-wit:

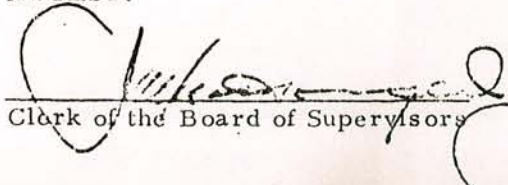
AYES: Supervisors, GUALCO, KLOSS, MELARKEY, SMOLEY, SHEEDY

NOES: Supervisors NONE

ABSENT: Supervisors NONE

(SEAL)

ATTEST:


Clerk of the Board of Supervisors



Chairman of the Board of Supervisors

TABLE OF CONTENTS

<u>TITLE</u>	<u>SECTION</u>	<u>PAGE</u>
PURPOSE	1.00	1
DEFINITIONS	2.00	1
GENERAL REQUIREMENTS	3.00	3
STANDARD SHEETS AND SCALES	4.00	5
PLAN DETAILS	5.00	6
INSPECTION DURING CONSTRUCTION	6.00	8
FINAL INSPECTION	7.00	9
AS BUILT PLANS	8.00	10
STREETS AND HIGHWAYS	9.00	10
STORM DRAINAGE	10.00	23
DOMESTIC WATER SYSTEMS	11.00	37
SANITARY SEWER SYSTEM	12.00	44
STREET LIGHTING	13.00	63
INDEX TO STANDARD DRAWINGS		66

TABLE OF CONTENTS

1	1.00	GENERAL REQUIREMENTS
2	2.00	STANDARD DETAILS AND NOTES
3	3.00	STANDARD DETAILS
4	4.00	STANDARD DETAILS FOR HIGHWAY BRIDGES
5	5.00	STANDARD DETAILS FOR RAILROAD BRIDGES
6	6.00	STANDARD DETAILS FOR TRESTLES
7	7.00	STANDARD DETAILS FOR TUNNELS
8	8.00	STANDARD DETAILS FOR WATERWAYS
9	9.00	STANDARD DETAILS FOR AIRPORTS
10	10.00	STANDARD DETAILS FOR MARSHES
11	11.00	STANDARD DETAILS FOR WATERSHEDS
12	12.00	STANDARD DETAILS FOR WATERSHEDS
13	13.00	STANDARD DETAILS FOR WATERSHEDS
14	14.00	STANDARD DETAILS FOR WATERSHEDS
15	15.00	STANDARD DETAILS FOR WATERSHEDS
16	16.00	STANDARD DETAILS FOR WATERSHEDS
17	17.00	STANDARD DETAILS FOR WATERSHEDS
18	18.00	STANDARD DETAILS FOR WATERSHEDS
19	19.00	STANDARD DETAILS FOR WATERSHEDS
20	20.00	STANDARD DETAILS FOR WATERSHEDS

IMPROVEMENT STANDARDS

1.00 PURPOSE:

1.01 It is the purpose of these Improvement Standards to provide minimum standards to be applied to improvements and private works to be dedicated to the public and accepted by the County for maintenance or operation, as well as improvements to be installed within existing rights of way and easements. This is necessary in order to provide for coordinated development of required facilities to be used by and for the protection of the public. These Standards shall apply to and regulate the design and preparation of plans for construction of streets, highways, alleys, drainage, sewerage, street lighting, water supply facilities and related public improvements.

1.02 It is recognized that it is not humanly possible to anticipate all situations that may arise or to prescribe standards applicable to every situation. Therefore any items or situation not included in these Improvement Standards shall be designed in accordance with accepted engineering practice, the Sacramento County Standard Construction Specifications, and as specified by the Director of Public Works.

2.00 DEFINITIONS:

2.01 In these Improvement Standards, the intent and meaning of the terms that are used shall be as defined in County Standard Specifications, and as herein specifically noted.

2.01-1 Consulting Engineer - Any person or persons, firms, partnership or corporation legally authorized to practice civil, mechanical or electrical engineering in the State of California who prepares or submits improvement plans and specifications to the Department of Public Works of Sacramento County for approval.

2.01-2 Contractor - Shall mean any person or persons, firm, partnership, corporation, or combination thereof, licensed to perform the type of work involved, who has entered into a contract with any person, corporation, company, special district, of the County of Sacramento as party or parties of the second part, or his or their legal representatives, for the construction of any improvement or portions of any improvement within the County of Sacramento.

2.01-3 County - Shall mean County of Sacramento including special districts administered by County Board of Supervisors.

2.01-4 Department of Public Works - Shall mean the Department of Public Works of Sacramento County.

2.01-5 Developer - Shall mean any person or persons, firm, partnership, corporation, or combination thereof, financially responsible for the work involved.

2.01-6 Development - Shall mean single properties as well as subdivision improvement.

2.01-7 Director - Shall mean the Director of Public Works of Sacramento County acting either directly or through the Chiefs of the appropriate Divisions of the Department of Public Works or their authorized representatives. Director shall also mean the District Engineer where special districts are involved.

2.01-8 Engineer - Meaning shall be identical to the definition of Director as herein defined.

2.01-9 Laboratory - Shall mean any testing agency or testing firm which has been approved by the Department of Public Works.

2.01-10 Standard Specifications - Shall mean the Sacramento County Standard Construction Specifications adopted January 19, 1970, by the Board of Supervisors and amendments thereto. If a later edition is adopted the reference shall be to that edition.

2.01-11 State Specifications - Shall mean the Standard Specifications of the State of California, Department of Public Works, Division of Highways, dated January, 1973. If a later edition is published, the reference shall be to that edition.

2.01-12 State - As used in the State Specifications, shall mean Sacramento County.

2.01-13 State Standard Drawings - Shall mean the Standard Drawings and plans of the State of California, Department of Public Works, Division of Highways.

2.01-14 Zoning Classifications - Shall mean those zones established by and as listed in the Sacramento County Basic Zoning Code.

3.00 GENERAL REQUIREMENTS:

3.01 Complete plans and specifications for all proposed streets, drainage facilities, sewerage, street lighting, water distribution systems, industrial developments and subdivisions, including any necessary dedications and easements shall be submitted to the Department of Public Works for approval and this approval must be substantiated by the signature of the Director prior to the beginning of construction of any such improvements. The Director or his representative shall order the Contractor to cease work on any project if said Contractor does not have properly approved plans in his possession. Possession of a complete set of County approved plans shall constitute the only necessary permit for a Contractor, duly licensed by the State of California, to perform work of the type involved in the County right of way or easement. The Contractor shall be bonded as required and meet the requirements of Chapter 12.08 of the County Code. All plans and specifications for improvements which are to be accepted for maintenance by the County shall be prepared by a Consulting Engineer of the appropriate branch of engineering covering the work submitted.

3.02 The Standard Specifications shall be made a part of contract documents by note of reference which shall appear in the Special Provisions and in the General Notes of the plans. The note of reference shall be as follows: "The Sacramento County Standard Construction Specifications adopted January 19, 1970 (or latest adopted edition) are part of the contract documents of this project and all materials and construction shall be in strict conformance with said Standard Specifications."

3.03 Eight sets of plans, complete and in accordance with these Improvement Standards and the Standard Specifications, shall be submitted along with any required specifications, computations, test data, and other material requested by the Director, to the Department of Public Works for approval. When the plans are initially submitted to the Department of Public Works a portion of the total plan check and inspection fee for the development will be required as a deposit to initiate checking of the plans by the Director. Should the development not be carried to completion any portion of the required deposit over and above the accumulated costs expended by the Department on the development will be refunded to the Developer. Should there be required alterations or revisions to the plans as submitted, the Director will return one copy with the required corrections marked or indicated thereon. If the plans submitted are not prepared in accordance with these Improvement Standards and the Standard Specifications or not in keeping with the standards of the profession, the Director may return them unmarked and unapproved. No plans

will be approved nor construction authorized until such time as the Director signifies his approval by his signature on the set of plans and not unless such changes, corrections or additions are resubmitted to the Director for approval as previously prescribed for the original plans. At such time as the Consulting Engineer preparing the plans has made the necessary revisions and the remainder of the total plan check and inspection fee, as provided under the provisions of Chapter 22.48 of the County Code, and amendments thereto, and any fee required under the provisions of Ordinance No. 1 of Sacramento County Water Agency, and amendments thereto, have been paid, the Director will sign the tracings in the space provided, after the Consulting Engineer has signed them. The Consulting Engineer shall deliver the necessary sets of prints from the approved tracings to the Director.

3.03-1

Should changes become necessary during construction, the Consulting Engineer must obtain the consent of the Director and resubmit the plan sheets that are applicable. Necessary changes shall be clearly shown and dated on the plans. Minor changes, which do not affect the basic design or contract may be made upon the authorization of the Director but said changes must be shown on "as built" plans when the contract is completed.

3.03-2

Excepted from approval are any features of the plans that are contrary to, or conflict with, or do not conform to any California State Law, Sacramento County Code or Resolution or generally accepted good engineering practice, in keeping with the standards of the profession; even though such errors, omissions or conflict may have been overlooked in the Department of Public Works review of the plans.

3.03-3

If the developer elects to have a registered civil engineer or licensed land surveyor other than the engineer that prepared the plans provide the construction staking he shall provide the Director in writing with the name of the individual or firm one week prior to the staking of the project for construction. The Developer shall then be responsible for providing professional engineering service for any plan changes which may be required during the construction phase and for the preparation of revised plans for changes if necessary and "as built" plans upon completion of the construction. In the Developer's notification of a change in the firm providing construction staking he shall acknowledge that he accepts responsibility for design changes of as built information as noted above.

3.04 As required in Section 5.02-4, all utilities are to be shown on the plans. In addition, the Consulting Engineer must submit to the utility companies involved, prints of the approved plans. This is necessary for the utilities to properly plan their relocation projects and needed additional facilities. The Consulting Engineer shall

notify the Director, by letter, when and which utility companies have been so notified.

3.05 Additional copies of improvement plans may be requested by the Director at his discretion, and these shall be furnished the County without cost.

3.06 Where the improvement plans submitted cover only a portion of ultimate development, the plans submitted must be accompanied by the approved tentative plan or a study plan if there is no approved tentative plan showing topographic features of the ultimate development at an adequate scale to clearly show the proposed improvements.

3.07 A print of the recorded subdivision map shall be included with each set of subdivision improvement plans submitted. This may be incorporated in the title sheet as described in Section 5.02-1.

3.08 A print of the recorded subdivision map showing the location of all proposed underground utilities and water lines, if the water service is supplied by other than a county water maintenance district, must be submitted for the issuance of a separate encroachment permit.

3.09 "On-site" drainage plans for commercial developments and planned unit developments shall conform to the standards contained herein, and shall be submitted to the county for approval.

"On-site" drainage plans may be prepared without the profile unless otherwise requested.

3.10 The Consulting Engineer is responsible for obtaining the approval of other agencies when their facilities are involved; for example, an encroachment permit from the State Reclamation Board to do work within their jurisdiction.

4.00 STANDARD SHEETS AND SCALES:

4.01 All improvement plans shall be prepared on plan and profile sheets 22" or 24" x 36", F.A.S. sheets, Plate "A" plan and profile paper, or special consulting engineer's sheets which have been accepted by the County. Scales: Horizontal 1" = 20', 40' or 50'; Vertical 1" = 2', 4', or 5', but only the scale, horizontal or vertical, for which the sheet was intended.

4.02 Storm drainage, sanitary sewer and water plans may be shown on the street plans or separately as indicated above. Street lighting shall be shown separately. Street lighting plans shall be drawn to a scale of 1 inch equals 100 feet with individual lot dimensions and street

dimensions shown. Where wells are included as a part of the water system, the layout of the well site shall be drawn to a scale no smaller than 1 inch equals 5 feet with the layout covering an area at least 50 feet in all directions from the well location.

5.00 PLAN DETAILS:

5.01 All plans, approved by the County, will be microfilmed. Therefore, certain drafting standards have become necessary to produce legible film and subsequent prints. All line work must be clear, sharp and heavy. Letters and numerals must be 1/8 inch minimum height, well formed and sharp. Numerals showing profile elevations shall not be bisected by station grid lines.

5.02 The following details are to be shown on plans submitted for approval. This does not in any way exempt the Consulting Engineer preparing plans from the responsibility of preparing neat, accurate and comprehensive plans in keeping with the standards of the profession.

5.02-1 Title Sheet - On subdivision or improvement plans exceeding three sheets in the set, a title sheet shall be prepared showing the entire subdivision or project complete with subdivision or assessment district limits, city limits, street names, section lines, grant lines and corners, and the location within the County. The title sheet shall also include an index of the sheets; the Consulting Engineer's name, license number and signature; the date and scale of the drawing; and the block for the necessary approval of the Director and other officials, and the receipt of fees. A sample of the County approval block may be obtained from the Department of Public Works.

If the plans are exclusively for sanitary sewers, the title sheet shall conform with Section 12.13-3 of these Standards and the above.

5.02-2 Title Blocks - Each sheet within the set of drawings shall have an approved title block showing the sheet title, number, date, scale, and the Consulting Engineer's name, signature and license number; the name of the County maintenance water agency or sanitation district, and the name of the subdivision or assessment district. Samples may be obtained from the Department of Public Works.

5.02-3 Right of Way - Right of way lines, the boundaries of lots fronting on the street, drainage easements, utility easements, planting easements, section lines and corners, land grant lines,

and temporary construction easements both existing and proposed shall be shown on the plans. All right of way and easement lines shall be properly dimensioned.

5.02-4 Topography - All pertinent topographic features shall be shown such as street lines, curbs, sidewalks, shoulders, location and size of storm and sanitary sewer lines, high water and frequent inundation levels, water lines, gas lines, telephone conduits, other underground utilities, existing structures, houses, trees (4" and larger) and other foliage, traffic signals, street lights, pullboxes, underground electrical conduits, drainage ditches, utility poles, fire hydrants, retaining walls, masonry structures, and all other features of the area which may affect the design requirements for the area. Any tree which falls within the existing or proposed right of way or easement must be shown on the cross section when requested by the Director. Permission to remove any tree in the rights of way or easements must be obtained from the Director (Title 19 SCC).

5.02-5 Contours and Elevations - Existing contours or supporting elevations shall be shown on all plans submitted for subdivision, commercial improvements, or planned unit developments.

5.02-6 Profiles - The plans shall show the existing profile of all roadway centerline, edges of pavement, curb and gutter flow lines, drainage ditches, storm and sanitary sewers. All profiles of proposed improvements shall state centerline elevations at fifty foot intervals and rate of grades, vertical curves and other vertical alignment data. When curb and gutters are designed for reconstructed County Roads, elevations must be shown at the edge of the outside travelled way, or if road has full paved section, must also be shown two feet from proposed lip of gutter. Any warped surface shall set elevations at twenty-five foot intervals. All profiles must be coordinated with County stationing. The Consulting Engineer shall contact the County for such stationing. When required by Director, the Consulting Engineer shall provide centerline profile information beyond the limits of the proposed development to facilitate setting proper vertical alignment within the proposed improvement limits.

5.02-7 Stationing and Orientation - The stationing on plan and profile shall read from left to right. Plans shall be so arranged that the north arrow points toward the top or upper 180°, insofar as practical.

5.02-8 Bench Marks - The bench marks and datum shall be clearly pointed out on the plans both as to location, description and elevations. The datum shall be 1929 North American Datum (U.S.G.S. or U.S.C. & G.S.). Consulting Engineers shall contact the County for location and elevation of the nearest official bench mark.

5.02-9 The Director may require that the proposed improvements be tied into the California Coordinate System if monumented coordinate points are available within a reasonable (200' or less) distance of said improvement as determined by the Director.

5.02-10 Typical Sections - A typical section for each type of facility within the improvement, setting out the structural features shall be a part of the plans.

5.02-11 Cross Sections - Cross sections shall be included in the plans, where determined necessary by the Director. When, in limited areas, unusual topographic features or special conditions occur that would affect the work individual cross sections may be shown on the pertinent plan sheet.

5.02-12 Special Notes - Special notes shall be clearly indicated, and it shall be conspicuously noted on the plans that all construction work and installations shall conform to the County of Sacramento Standard Specifications and that all work is subject to the approval of the Director. See Section 3.02. Notes shall contain a statement regarding obtaining encroachment permits from other agencies when applicable.

6.00 INSPECTION DURING CONSTRUCTION:

6.01 Any improvement, other than "rough grading," constructed to the Standard Specifications and which it is intended that the County will assume maintenance responsibility, must be inspected during construction by the Director. Each phase of construction must be inspected and approved prior to proceeding to subsequent phases.

6.02 Any improvements constructed without inspection as provided above or constructed contrary to the orders or instructions of the Director will be deemed as not complying with Standard Specifications and will not be accepted by Sacramento County for maintenance purposes. The Consulting Engineer shall notify the Director when the Contractor first calls for grades or staking.

6.03 For purposes of the inspection requirement above, embankments

over two feet in height constructed in dedicated street right of ways are not considered "rough grading." Said "rough grading" in any location shall comply with Chapter 13.04 of the County Code regarding either the diversion or blockage of natural drainage.

6.04 In the past it has been Public Works' policy to accept a private road that had been inspected and built from plans previously approved by the Highways and Bridges Division providing that if there was any delay in the dedication, lab tests in the field would have to be taken prior to acceptance.

Henceforth, the County will not accept any private road that has not gone through the necessary street dedication plan approval process, through the Planning Commission, the filing of appropriate improvement plans and the inspection by County personnel during construction.

If the Board of Supervisors should so direct us to accept a previously constructed private road for which no plans had been previously approved, it would be our recommendation that the requirement for acceptance be, (1) the examination of as-built plans prepared by a registered civil engineer; and (2) the payment of material testing fees, in advance, for as many tests as are necessary to determine the conformance to County construction standards.

6.05 The County will inspect the work for ultimate compliance with the specifications and will not be responsible for the conduct of the work itself or the manner in which it is performed.

7.00 FINAL INSPECTION

7.01 Upon completion of any improvements which are constructed under and in conformance with the Standard Specifications and prior to requesting a final inspection, the area shall be thoroughly cleaned of all rubbish, excess material and equipments, and all portions of the work shall be left in a neat and orderly condition satisfactory to the Director.

7.02 Within 10 days after receiving the request for final inspection, the Director shall inspect the work. The Contractor, Consulting Engineer, and Developer, will be notified in writing as to any particular defects or deficiencies to be remedied. The Contractor shall proceed to correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, a second inspection shall be made by the Director to determine if the previously mentioned defects have been repaired, altered, and completed in accordance with the Standard Specifications. At such time as the Director approves the work and accepts the work for Sacramento County, the Contractor, Consulting Engineer and Developer will be notified in writing as to the date of final approval and acceptance.

On assessment districts and projects where Sacramento County

participates on the costs thereof, quantities will be measured in the presence of the Director, Consulting Engineer, and Contractor, and witnessed accordingly.

8.00 AS BUILT PLANS:

8.01 Where traffic signal and street lighting facilities are involved, one complete set of reproducible plans, as prescribed by the Director, shall be submitted to the Department of Public Works at such time as all corrections or additions requested by the Department of Public Works are complete and approved, and prior to issuance of plans for bidding purposes. These plans are to be retained and utilized by the Department of Public Works for preparing the "as built" plans. Attention is directed to Sections 3.03 and 3.04 of these Standards limiting the alteration of approved plans.

8.02 The Consulting Engineer shall keep an accurate record of all approved deviations from the plans. These are to be utilized with the Inspector's plans for preparing a complete and accurate set of "as built" plans for the permanent records of the County.

9.00 STREETS AND HIGHWAYS:

9.01 Street types and classes:

9.01-1 Alley -- A street depressed in the center, with a right of way and surface width of 20 feet. This can only be dedicated as a public alley if constructed of 6" P. C. C., and specifically accepted by the Director.

9.01-2 42 Foot Street -- Type M.R. -- A minor residential street with a right of way width of 42 feet and a back to back curb width of 32 feet.

9.01-3 54 Foot Street -- Type P.R. -- A primary residential street with a right of way width of 54 feet and a back to back curb width of 42 feet.

9.01-4 60 Foot Street -- Type M.C. -- A minor commercial or minor residential collector street with a right of way width of 60 feet and a back to back curb width of 48 feet.

9.01-5 80 Foot Street -- Type M.A. -- A major arterial street with a right of way of 80 feet and a back to back of curb width of 66 feet.

9.01-6 100 or 110 Foot Street -- Type M.H. -- A major highway with right of way width of 100 feet or 110 feet and a back to back of curb width of 88 feet.

9.01-7 Type "I" Street -- Proposed street improvement in an industrial development or industrial subdivision having a minimum right of way width of 60 feet and 42 feet asphalt concrete surface on an aggregate base with a Type 6 modified "V" gutter and no sidewalks.

9.01-8 Type "F" Street -- A street which serves as a frontage road having curbs, curb and gutters, and a sidewalk.

9.01-9 Partial Street -- A street for which the full right of way cannot be dedicated or the complete street cannot be constructed ((See 9.03-8).

9.01-10 Class "A" Streets -- Class "A" streets shall consist of an asphalt concrete surface and an aggregate base with concrete curb, gutter and sidewalks, side slopes not less than 1 1/2:1 or a reinforced concrete retaining wall beginning at the right of way line. Street frontage improvements for all single family residential developments having a net area of 14,500 square feet or less, and a lot having a street frontage of 100 feet or less shall be Class "A". Property developments on land zoned for duplex, multiple, residential, business and professional and commercial uses shall install Class "A" frontage improvements regardless of the individual lot frontage or area. In a case of subdivision development: (1) Lots or parcels in excess of 16,000 square feet shall not be considered in averaging lot areas; (2) Lots having a street frontage in excess of 150 feet shall not be considered in averaging street frontages. In any development the net area shall be considered to be that portion of the property exclusive of street rights of way, fenced easements and fenced parkways. Street lighting in accordance with Section 13.00 of these Improvement Standards is required.

9.01-11 Class "B" Streets -- Class "B" streets shall have the same components as Class "A" except that sidewalks may be omitted. Any single family residential property being developed which has a net area of more than 14,500 square feet and a street frontage of more than 100 feet may install Class "B" streets. In the case of subdivisions: (1) No more than 20 per cent of the lot street frontages can be less than 100 feet; (2) Lots or parcels having 2,500 square feet in excess of 14,500 square feet shall not be considered in averaging lot areas. Street lighting in accordance with Section 13.00 of these Improvement Standards is required.

9.01-12 Class "C" Streets -- Proposed street improvements

for agricultural area developments requiring public road frontage, and all single family residential development having a net average lot area of more than one-half acre, and an average lot street frontage of more than 125 feet may be Class "C". The net square footage of said residential developments shall be considered to be that portion of the total square footage excluding the areas required for street rights of way, fenced easements and parkways. In no case shall more than 20 per cent of the lot street frontages be less than 125 feet. No lot shall have a net area of less than 20,000 square feet. Street shall have two 12 foot traffic lanes with double seal or paved shoulders of the following widths: 42 foot street, 4' shoulders; 54 foot street, 5' shoulders; 60' streets, 6' shoulders. Erosion control is required on ditch section of Class "C" streets if slope exceeds 3 per cent. This may be asphalt concrete dikes at the outside of shoulder or as approved by the Director. Street lighting in accordance with Section 13.00 of these improvement Standards is required. Except as provided in Sacramento County Code Section 22.32.140.

9.01-13 Type 1 curb and gutter may be installed for all developments except that Type 2 curb and gutter shall be installed on "fill-in" developments that connect existing Type 2 curbs and gutters and along major arterials and highways adjacent to frontage roads. All school developments shall have 8 foot sidewalks along all frontage except fenced play areas where no access is provided, as determined by the Director. All fences along schools shall be set back a minimum of 8' from back of curb regardless of sidewalk width. The area between the sidewalk and fence shall not exceed 10 per cent cross slope. Type 6 curb and gutter may be installed on the internal streets of all developments, zoned M-1 and M-2, except corner properties being used for commercial purposes.

9.01-14 Barrier curb Type 3 or 4 shall be required at all locations where parking will be allowed in the front yard. Planting may not extend to the back of sidewalk except in single family or two family development which are on MR-PR or MC streets. When a 110 foot right of way width is developed to a 100 foot street standard, the planter together with the sprinkler system, may be placed in the normal relationship (as determined by the Director) to the back of sidewalk, if an encroachment permit is obtained. Signs and light standards must have the normal set back from right of way. The area between the back of sidewalk and the planter shall be surfaced with either 3 5/8 inches concrete or 3 inches asphalt concrete at the developer's option.

9.02 Profiles:

9.02-1 The following standards for the design of profiles for proposed improvement shall govern the preparation of plans for such improvements.

9.02-2 Minimum Grades and Cross Slopes:

- a. Minimum grade on new streets shall be 0.25 per cent.
- b. Minimum grade of gutter section constructed on existing street shall be 0.20 per cent.
- c. Standard cross slope on new streets shall be 2.0 per cent.
- d. Minimum cross slope on widening shall be 1.5 per cent.
- e. Maximum cross slope on widening shall be 3.0 per cent.
- f. When two streets intersect, neither street shall have a grade greater than 3.0 per cent for a minimum distance of 40 feet measured from the curb line of the intersecting street, except in unusually rough terrain, as determined by the Director. The centerline of the lesser intersecting street shall meet the crown slope at the projected lip of gutter. Crown slope may be reduced to 1.0 per cent within the intersection, if necessary.
- g. The minimum vertical curve length allowable at the intersection of two grades shall be 50 feet, however, vertical curves may be omitted where the algebraic difference in grades does not exceed 2.0 per cent.
- h. The minimum stopping sight distance over any segment of the roadway on 42 foot and 54 foot streets shall be designed for a vehicle speed of 30 mph unless specific approval for a lesser design speed is received from the Director. Design speed for 60 foot, 80 foot, and 110 foot roads is to be as determined by the Director.

9.03 Geometric and Structural Sections:

9.03-1 The following standards for the design of geometric and structural sections for proposed improvements shall govern the preparation of plans for such improvements.

9.03-2 The limits of elevation differences between the existing centerlines and the proposed flow line of gutters are as follows:

42 foot streets 0.37 foot to 0.56 foot;
54 foot streets 0.44 foot to 0.71 foot;
60 foot streets 0.50 foot to 0.80 foot;
80 foot streets 0.62 foot to 1.07 feet;
100 foot streets 0.78 foot to 1.40 feet.

9.03-2.01 The above minimum and maximum street crowns are to be used on existing or irregular streets. Street section shall conform as closely as possible to standard typical section of 2 per cent cross slope.

9.03-3 No cross gutters will be allowed on 60 foot, 80 foot and 100 foot streets. Cross gutters will be permitted on 42 foot and 54 foot streets only with the specific approval of the Director when the intersection cannot be drained to an underground system.

9.03-4 The curve data for all centerline curves shall be computed and shown on the plans. Minimum radius curve for 42 foot and 54 foot streets shall be 200 feet. Minimum radius curve for 60 foot streets shall be 500 feet. Minimum radius curve for 80 foot and 100 foot streets shall be 2,000 feet. Special consideration will be given to unusually difficult alignment problems. Right angle intersections shall be designed to conform with Standard Drawing No. 63.

Property line radius at curb returns for streets intersecting 80 foot, 100 foot and 110 foot streets are as follows: 42 foot streets shall have a 20 foot radius; 54 foot streets shall have a 20 foot radius in single family subdivision, otherwise a 25 foot radius. 60 foot streets shall have a 25 foot radius.

9.03-5 The radius for property line in cul-de-sacs shall be 45 feet unless otherwise specified by the Director. A curve of 55 foot radius shall connect the tangent and the 45 foot radius curve. See Standard Drawing No. 61.

9.03-5.01 Industrial cul-de-sac streets shall have a minimum property line radius of 60 feet and shall be constructed on a 60 foot street.

9.03-6 Driveways entering Class "B" or "C" streets shall meet the property line at such a grade and elevation as to permit conversion to a Class "A" street without regrading the driveway beyond the property line. Maximum driveway slope shall be 10 per cent except in unusual terrain conditions and specifically approved by the Director.

9.03-6.01 Concrete driveways will not be permitted within the right of way lines when entering Class "C" street.

9.03-6.02 No driveway will be allowed within 5 feet of a side property line on a commercial development. Exceptions may be approved by the Director for joint driveways or in unusual cases.

9.03-6.03 The minimum width for a single family residential and duplex driveway shall be 18 feet. Residential driveways with plus grades shall have a maximum rise of 8 inches above the back-of-sidewalk grade at a point 7 feet from the back of sidewalk. Maximum driveway width shall be 35'.

9.03-6.04 The standard multiple family and commercial driveway width shall be 35 feet on MA and MH streets. The Director may approve driveways of larger widths for developments with considerable street frontage and lesser widths for development on minor commercial streets. Minimum driveway width shall be 25'.

9.03-6.05 When driveways are abandoned or relocated, the driveway section must be removed and replaced with standard curb and gutter and sidewalk.

9.03-6.06 When street frontage improvements are existing with Type 1 curb and gutter. Type A-6 driveways must be installed, if the access serves more than four single dwelling units.

9.03-6.07 Driveways entering levee roads must have a maximum slope of 5.0% for a minimum distance of 20 feet, measured from the edge of existing pavement. Driveways normally used by

vehicles towing house or boat trailers shall have special requirements to be determined on an individual basis by the Director.

9.03-7 Pedestrian walks and lanes within a development shall be constructed with a minimum of 4 inches of portland cement concrete, Class "B", for the full width of the easement. The easement shall be not less than 10 feet in width. The maximum grade for pedestrian walks and lanes shall be 12 per cent. Pedestrian walks, if situated between lots, must be fenced with chain link fencing from the street right of way to the back lot line. These fences shall be 6 feet high from the building setback line to the back lot line and 30 inches high from the building setback line to the street right of way. Guard posts shall be placed at both ends of all pedestrian lanes in accordance with Standard Drawing No. 53. Lighting shall be installed in accordance with Section 13.00 of these Improvement Standards.

9.03-8 Partial streets may be permitted by the Director along the boundary of a subdivision or property of the developer where the full right of way cannot be dedicated or where the complete street cannot be constructed. The minimum right of way width shall be 40 feet or one-half of the proposed right of way, whichever is greater. Such streets shall be constructed to a complete geometric and structural section for a minimum of 24 feet or one-half of the proposed roadway, whichever is greater. On 60 foot streets, pavement must extend five feet past centerline for a total of 26 feet.

9.03-9 Minimum allowable thickness of roadbed section shall be as follows:

9.03-9.01 2" asphalt concrete and 4" aggregate base on 42 foot and 54 foot streets.

9.03-9.02 3" asphalt concrete and 6" aggregate base on 60 foot streets.

9.03-9.03 3" asphalt concrete, 6" aggregate base and 6" aggregate subbase on 80 foot and 100 foot streets.

9.03-9.04 Structural section for Type "I" streets will be 3" asphaltic concrete and 6" aggregate base unless otherwise specified.

9.03-9.05 Consulting engineers shall use paving sections established by the Director for streets other than 42 foot and 54 foot where such sections have been established.

9.03-9.06 Class "C" street shall have same pavement structural section as the corresponding width of Class "A" streets.

9.03-9.07 As an alternate to the preceding, total asphaltic concrete structural sections may be specified to the following minimum thicknesses:

42 foot and 54 foot streets -- 5" asphaltic concrete

60 foot and Type I streets -- 6" asphaltic concrete

80 foot streets -- 8" asphaltic concrete

100 and 110 foot streets -- 10" asphaltic concrete.

Total asphaltic concrete sections shall receive the specific approval of the Director.

9.03-10 In those areas considered by the Director as being critical soil condition areas, it will be required that the pavement be designed on the basis of the resistance factor "R" as determined in accordance with Division of Highways, State of California, California Bearing Ratio or other approved method.

9.03-11 The thickness of the various structural components will be determined by the tables, charts, formulas and procedures contained in the State Design Manual, or as directed by the Director.

9.03-12 Traffic index will be furnished by the Director.

9.03-13 Edge of Pavement Protection -- When paving partial construction of the ultimate street development, the edges of the current pavement are to be protected by use of 2" x 6" redwood headers, construction grade, or by placing a minimum of one foot of aggregate base material beyond the edge of pavement to the grade and depth of the pavement.

9.03-14 The Developer shall be responsible for paving to the centerline on minor streets, unless the existing paving section

meets the approximate current standard, and the centerline grade and alignment are satisfactory. The Developer shall overlay beyond the centerline in any areas where the design centerline deviates from the existing. If the new paving meets the existing paving, the Developer shall overlay any low areas to maintain a uniform cross slope. The County will pay for any paving necessary beyond the centerline, if the Director elects to adjust the grade and/or alignment.

On select system streets the Developer shall be responsible for 13 feet of paving measured from the lip of gutter. The Director may elect to authorize cooperative payment for paving between this paving and the existing edge of pavement, or require bond or cash deposit for the Developer's share of paving, if the entire street will be paved under a pending County contract. Any temporary approaches to the existing road which the Developer requires shall be at his own expense. They must be paved, structural section need not conform to normal County requirements. The Developer is responsible for entire frontage road construction where it is a part of the proposed improvements. Frontage roads adjacent to State freeways shall be constructed to 60' right of way standards.

Select system streets are those shown as such on Master Street and Highway Plan, Sacramento County Code Chapter 12.04, and any amendments thereto and are in general all 80, 100 and 110 right of way with some exceptions. Minor county streets are all those not shown on this plan.

9.03-15 The County will cooperate in the replacement of cross culverts for the same length as the existing culvert, as follows: Entire cost for inflowing cross culverts; entire cost for outflowing cross culverts if the existing culvert is of unsatisfactory size and grade--cost of pipe only if the existing culvert is of satisfactory grade but unsatisfactory size.

9.03-16 With the submittal of improvement plans for checking, the Engineer shall include an application for County cooperation in the proposed work if County participation is proposed for the improvement. This application shall show the items of work and the estimated quantities. The County will notify the Engineer by letter as to the acceptance or the extent of cooperation. The Engineer is to submit the County proposal to the Developer for his approval prior to the final approval of the improvement

plans. Should the Developer not approve the County proposal, time will be allowed for negotiation between the Developer and the County to arrive at a mutually acceptable price or a separate course of action prior to final approval of the improvement plans.

9.03-17 Any portion of work shown on the Consulting Engineer's plans, for which the County has agreed to cooperate, shall not be segregated by note or legend, but shall be included in the general contract. The County will reimburse the Developer for these cooperative items, after acceptance by the Director, and final payment of Plan Check Inspection Fees, if these fees were direct billed. Final quantities will be determined by field measurement, observed jointly by the County Inspector, the Contractor, and the Developer, or his designated agent. Unit prices shall be those shown on the current County list, prepared for fee and bond calculation, and authorized in County Code 22.48.070. The Director may negotiate unit or lump sum prices for items not usually encountered, or for unusual field conditions.

9.04 Survey Monuments; Subdivisions:

9.04-1 The Consulting Engineer shall place survey monuments at the following locations within the improvement.

9.04-1.01 At the intersection of all street centerlines.

9.04-1.02 At the beginning and end of curves on the street centerline.

9.04-1.03 At all subdivision boundary corners designated by the Director; at the intersection of subdivision boundaries and street centerlines and such other locations so as to enable any lot or portion of the improvement to be retraced or located.

9.04-2 The above prescribed monuments shall be as follows:

9.04-2.01 Subdivision boundary monuments except those in street pavement shall be not less than 1 1/4 inch galvanized iron pipe 30 inches in length, capped and tagged.

9.04-2.02 Subdivision boundary monuments in street pavement shall be not less than 3/4 inch

galvanized iron pipe 18 inches in length. Top of pipe shall be driven flush with surface pavement.

9.04-2.03 Centerline and street intersection monuments shall be 3/4 inch galvanized iron pipe or No. 4 reinforcing bar, not less than 12 inches in length. Top of the pipe or bar shall be driven flush with pavement surface.

9.04-2.04 All such monuments shall be referenced to permanent objects located nearby and all ties shall be furnished the Director for general public use. Final approval of the subdivisions will not be made until such ties have been furnished to the Director.

9.04-3 Permanent survey monuments shall be placed by the Consulting Engineer at all section and quarter corners within the improvement. The section corner monuments shall be Class "B" concrete, poured in place, with minimum dimensions of 4" x 4" x 24". A metal survey plate will be furnished and marked by the Department of Public Works to be installed by the Consulting Engineer. Plates shall be placed before the concrete has acquired its initial set and shall be firmly embedded in the concrete.

9.04-4 The Consulting Engineer shall place a note on all construction plans stating that the Contractor is responsible for the protection of all existing monuments and other survey markers. (See Section 5.02-11.)

9.05 Testing of Materials:

9.05-1 Testing of materials to be utilized in work performed under Standard Specifications shall be performed in accordance with the methods of the Laboratory of the California Division of Highways. Signed copies of the test results as required shall be submitted to the Director. Test results shall show clearly the name of the individual and the firm performing the tests, as well as the name of the project, the date of sampling, and the date of testing. Tests performed by County Materials Laboratory will be charged to the Developer as part of inspection billing.

9.05-2 The tests indicated in the Standard Specifications will be required. In large developments or those developments presenting special problems, a more comprehensive and extensive testing program may be required. Such conditions

will be evaluated and an appropriate testing program prescribed on an individual basis. Two copies of any Federal Housing Administration required soils tests shall be submitted with proposed plans.

9.06 Right of Way:

9.06-1 Minimum right of way widths shall be as set out in these Standards for the type of street under consideration or as determined by the Director. In no instance, without specific approval of the Director, shall a street have a right of way width which is less than the street of which it is a continuation. Right of way requirements for widening at intersections shall be as shown in the Standard Drawings No. 62 and 63, or as approved by the Director.

9.06-2 In addition to the intersection widening requirements for major streets as shown on Standard Drawing No. 62, intersection widening on 60 foot streets will be required by the Director where the right of way width on the continuation of the street beyond the intersection increases and at intersections that have unusually high traffic volume.

9.07 Signing and Barricades:

9.07-1 Street Names -- All roads and streets within an improvement shall be named by the owner or subdivider subject to approval of the Director. No duplication of names already in use or previously proposed will be permitted. Sound alike names or names with more than 13 spaces are not acceptable. Street name signs shall be furnished and erected by the Contractor. Street name signs shall conform to requirements of the Standard Specifications and these Improvement Standards. Street names and street name sign locations shall appear on plans submitted for approval. Standard Drawing No. 51 shows sign details.

9.07-2 Street Name Sign Locations.

9.07-2.01 Two street name sign installations (with four sign plates on each post) are required at each intersection where one or both of the intersecting streets has a right of way width of 80 feet or greater. At a 4-way intersection, the installations shall be located on both far right hand corners of the intersection relative to the street having the greater right of way width or relative to the more important street if the right of way widths are equal. At a "Tee" intersection,

the first installation shall be located on the far right hand corner of the intersection, relative to the through street, and the second installation shall be located adjacent to the through street at a point in line with the centerline of the terminating street. One sign plate should be omitted from the standard four plate installation at the "Tee" intersection sign locations where an approach street does not exist.

9.07-2.02 One street name sign installation (with four sign plates on each post) is required at each intersection where both intersecting streets have a right of way width of less than 80 feet. At a 4-way intersection the installation shall be located on one of the far right hand corners of the intersection relative to the street having the greater right of way width or relative to the more important street if the right of way widths are equal. At a "Tee" intersection, the installation shall be located on the far right hand corner relative to the through street.

9.07-2.03 For highways with frontage roads, the street name sign installations shall be located in the divider strip between the frontage road and the main traveled lanes of the highway. All other requirements shall be as outlined in 9.07-2.01 and 9.07-2.02 above, except that only one sign will be required (in the divider strip in line with the centerline of the minor street) when there is no opening in the divider strip for access to the main highway.

9.07-2.04 Standard Drawings No. 50 and 52 of these Improvement Standards show additional placement details for street name signs. On streets having a right of way width of 80 feet or greater the street name sign installations are to be located adjacent to the more important street, at the end of the curb return. On streets with right of way widths less than 80 feet the street name sign installations are to be located at the midpoint of the curb return.

9.07-3 Permanent Barricades -- Where improvement only covers a portion of the ultimate improvement and where an improved street is proposed to be extended in the future, the improvements shall include a permanent type barricade at the end of such a street to extend completely across the right of way

to serve as a warning to the public. The barricade shall be constructed, erected, painted, and signed in accordance with the Standard Specifications, Standard Drawing No. 41. When necessary, barricades may be lengthened by making the 2" x 12" plank continuous with splicing at the posts. Gates may be required where streets stub into public park areas or like areas.

10.00 STORM DRAINAGE:

10.01 Classification -- Modifications to the following classifications may be required by special conditions. Any such modifications or questions concerning classification will be resolved on an individual basis, between the Consulting Engineer and the Director. Either party may initiate action to reclassify a drainage conduit in lieu of the area drained classification.

10.01-1 Lateral -- Drainage conduits receiving drainage from areas of less than thirty acres.

10.01-2 Collector -- Drainage conduits receiving drainage from areas of thirty acres or more, but less than one hundred acres.

10.01-3 Trunk -- Drainage conduits receiving drainage from areas of thirty acres or more.

10.01-4 On-site drainage shall mean all surface drains and underground drainage pipe within the development, that does not take underground or concentrated surface drainage waters from the adjoining properties.

10.02 Alignment and Capacity:

10.02-1 Capacity -- Special provisions must be made within the drainage system to insure that the inlet flow line elevations and the capacity of the drainage basin will accommodate ultimate development. This is to include the entire upstream portion and the portion of the basin outside the development regardless of existing conditions.

10.02-2 Alignment -- The diversion of natural drainage will be allowed only within the limits of the proposed improvement. All natural drainage must enter and leave the improved area at its original horizontal and vertical alignment unless an agreement, approved by the Director, has been executed with the adjoining property owners.

10.02-3 The location of storm drainage pipelines in new streets shall be 6 feet north or west of the centerline or under the curb and gutter. When pipes are placed under curb and gutter, the minimum clearance shall be 3 inches between bottom of gutter section and top of pipe. All new pipes and channels shall be placed a minimum of 100 feet from existing water wells.

10.02-4 When storm drainage lines are to be placed in existing streets, factors, such as curbs, gutters, sidewalks, traffic conditions, pavement conditions, future street improvement plans, and existing utilities shall be considered. Other general requirements for alignment are as follows:

10.02-4.01 Lines are to be parallel with the centerline of streets as possible.

10.02-4.02 Avoid meandering, and unnecessary angular changes.

10.02-4.03 Angular changes shall not exceed 90 degrees.

10.02-4.04 Open ditches, lined channels, swales and flood plain areas shall be maintained as nearly as possible in their existing alignment. When an open ditch, other than a roadside ditch, is to be constructed parallel to an existing roadway the ditch shall be constructed outside the proposed right of way of the ultimate street development.

10.02-4.05 The vertical alignment shall be so designed to preclude any ponding within the drainage system.

10.03 Easements:

10.03-1 Drainage conduits and channels when not located in a public street, road or alley, or within an existing public drainage easement, must be located in a recorded or dedicated public easement over private property. Necessary dedication for construction on private property must be completed before the improvement plans will be approved for construction. Where a minor improvement of a drainage channel falls on adjacent property, such as daylighting a ditch profile, a right of entry must be obtained from the adjacent property owners for such construction, and a copy

of the right of entry from the adjacent owners shall be submitted to the Director prior to approval of the improvement plans. Easements shall be on forms supplied by the Engineer.

10.03-2 Easements for closed conduits shall meet the following requirements:

10.03-2.01 Minimum width of ten feet with the centerline of the pipe at quarter point; pipe may reverse sides at angle points.

10.03-2.02 Provide access and working space rights.

10.03-2.03 For pipes exceeding 24" in diameter or trenches exceeding 5 feet in depth, the easement shall have additional width to provide ample working space as required by the Director.

10.03-3 Easements for open channels shall have sufficient width to contain the open channel with side slopes, fencing where required, and a 15' service road when required by the Director. Suitable ramps must be provided for access to the bottom when the bottom is used for maintenance. (See Standard Drawing No. 71.)

10.04 Design Runoff:

10.04-1 The runoffs to be used in storm drainage design for drainage areas 160 acres and smaller shall be computed from the drainage zones as shown on Standard Drawing 65 (page 1D) and the accompanying graph on Standard Drawings 66, 67 and 68 (pages 2D, 3D, 4D). The selection of the appropriate chart will be on the basis of the current County zoning.

In drainage areas which contain multiple zoning the runoff shall be computed from the following formula:

$$Q_{\text{Design}} = Q_r + (Q_m - Q_r) \cdot \frac{A_m}{A} + (Q_c - Q_r) \cdot \frac{A_c}{A}$$

Where:

Q_r = Flow from residential curve using total area of watershed

Q_m = Flow from Multiple Family curve using total area of watershed.

Q_c = Flow from Commercial curve using total area of watershed.

A_m = Area of Multiple Family development in the watershed.

A_c = Area of Commercial development in the watershed.

A = Total area of the watershed.

10.04-2 The runoff to be used in storm drainage design for drainage areas over 160 acres shall be computed from Plates 4, 5, 6, 7a, 7b, and 7c of the County of Sacramento Master Drainage Plan, Part I, County Wide Hydrology, October, 1961. Medium density runoff curves shall be used for urban watersheds with improved channels. Commercial or multi-family development shall use the high density runoff curves.

10.04-3 Ultimate Development -- In computing runoff in a partial development, adequate provisions must be made for the drainage of the overall improvement including possible commercial and multi-family areas.

10.05 Hydraulic Design Criteria:

10.05-1 In order to provide a uniform drainage system in the County of Sacramento, the following criteria will be followed in all hydraulic computations unless specific approval otherwise is received in writing from the Director.

10.05-2 Flow computations -- All hydraulic computations shall be in accordance with the following:

10.05-2.01 Manning's Formula shall be used to compute capacities of all open and closed conduits and all cross culverts which will become a part of the closed conduit system.

10.05-2.02 The Formula $H_1 = H_e + H_o + H_f$ shall be used to compute the capacity of all cross culverts that are not to become a part of the closed conduit system. Cross culverts shall be sized to utilize upstream and downstream channel velocities. The constants $K_e = 0.25$ and $K_o = 0.75$ shall be used for concrete pipes and box culverts. For corrugated pipes $K_e = 0.50$ and $K_o = 1.0$ shall be used.

10.05-2.03 The 'n' values to be used in Manning's Formula shall conform to the following:

Precast Pipe	0.015
Concrete cast-in-place	0.015
Vitrified Clay Pipe	0.013
Asbestos Cement	0.013
Corrugated Metal Pipe (C. M. P.)	
Plain Unlined	0.024
Corrugated Metal Pipe (C. M. P.)	
3"x1" corrugation	0.026
Multi-Plate Arch Pipe	0.031
Open Channel Fully Lined	0.015
Earth Channel	0.030
Open Channel with Lined Bottom, clean sides	0.020

The 'n' value for unimproved or partially improved channels shall be determined by the Consulting Engineer and then approved by the Director.

10.05-3 Closed conduits shall be of either cast-in-place concrete pipe, precast reinforced concrete pipe, non-reinforced concrete pipe, asbestos cement pipe, vitrified clay pipe, corrugated metal pipe, or corrugated aluminum pipe as defined in the Standard Specifications. Corrugated aluminum pipe shall not be used in the roadway right of way.

The specific type of pipe or alternate pipes to be used in the development shall be shown on the plans. Any type the developer proposes to use not shown on the approved plans shall be resubmitted to the Director for approval.

All pipe alternates shall be shown on Assessment District plans to be constructed under the Improvement Act of 1911 and plans for pipe to be constructed with Sacramento County Water Agency contributions.

10.05-3.01 Minimum pipe diameter allowable on any storm drain shall be 10 inches except for on-site drainage where the minimum size shall be 8 inches.

10.05-3.02 Driveway culverts shall be approved by the County for size, grade, alignment and type. Contractor shall contact County for survey stakes and permits pursuant to Ordinance No. 1. Driveway culverts for R-1 through R-3 property shall not exceed length necessary for 24 feet maximum driveway width, and for C-1 through M-2 shall not exceed length necessary for 35 feet maximum

driveway width. Driveway culverts will not be allowed unless the County has agreed to defer the normal Class "A" or Class "B" street improvements, except for temporary construction access.

10.05-3.03 Minimum velocity in closed conduits shall be 2 f.p.s. when flowing 0.8 full.

10.05-4 Cover requirements are shown on Standard Drawings 69 and 70 (pages 5D and 6D). At locations where the standard minimum cover requirements cannot feasibly be obtained, the conduit will be either encased in concrete or provided with a concrete cover or another method of pipe protection as specified by the Director.

10.05-5 Open Channels -- Shall consist of concrete lined channels, lined bottom channels, or natural earth channels.

10.05-5.01 Minimum velocity:

- a. Unlined channels 2 f.p.s.
- b. Lined channels 2 f.p.s.
- c. Paved invert channels 2 f.p.s.

10.05-5.02 Maximum velocity:

- a. Earth channels 6 f.p.s.
- b. Lined channels 10 f.p.s.
- c. Paved invert channels 8 f.p.s.

10.05-5.03 For all channels with earth sides, freeboard of at least one and one-half feet (1.5') shall be provided at design capacity for a 10 year storm. For lined channels freeboard of at least 0.5 foot of lining shall be provided at design capacity for a 10 year storm.

10.05-6 Design Computations -- The design computation for drainage shall include the following information which shall be submitted with the plans:

- a. Watershed map.
- b. Drainage area in acres.
- c. C.F.S. in each pipe or channel reach.
- d. Flow line elevation of each pipe and structure.
- e. Top of structure elevation or top of channel lining elevation.

- f. Hydraulic grade line elevation.
- g. Hydraulic gradient.
- h. Pipe, size, class, length and gradient. Items e and f not required when design is based on hydraulic grade line inside conduit.
- i. Channel dimensions and water surface profile computations.

10.05-6 Hydraulic Grade Line -- Hydraulic grade line shall be a minimum of 0.50 feet below the elevation of inlet grates and manhole covers of all structures of the upstream system. Hydraulic grade line at the intake must enter the conduit at the property line.

Hydraulic grade line shall be shown on the plans for all open channel systems and shall be shown on pipe systems when the hydraulic grade line is above the top of the pipe.

10.06 Drainage Structures:

10.06-1 Manholes

10.06-1.01 Standard precast concrete or saddle type manholes shall be used where required. When cases arise where special manholes or junction boxes are required, the design must be approved by the Director. In no case will junction boxes or manholes be allowed which are smaller than twenty-four inches inside dimensions.

10.06-1.02 Manholes shall be located at junction points, changes in gradient, and changes in conduit size. On curved pipes with radii of 200 feet to 400 feet, manholes shall be placed at the B.C. and E.C. of the curve and on 300 feet maximum intervals along the curve. On curves with radii exceeding 400 feet manholes shall be placed at the B.C. and E.C. of the curve, and on 400 feet maximum intervals along curve for pipes 24 inches and less in diameter and 500 feet maximum intervals along the curve for pipes greater than 24 inches in diameter. Manhole spacing on curves with radii less than 200 feet will be determined on an individual basis.

10.06-1.03 Spacing of manholes junction boxes or inlets of such size as to be enterable for maintenance shall not exceed 500 feet for drains 24 inches and smaller in diameter and 600 feet for pipes greater than 24

inches in diameter, except under special approved conditions. The spacing of manholes shall be nearly equal wherever possible.

10.06-1.04 All manholes and junction boxes other than inlets shall have standard manhole covers, as shown in Standard Drawing No. 11 (page 19D). Manholes will not be allowed in gutter flow line except as approved by the Director.

10.06-1.05 A reinforced concrete lid as shown on Standard Drawing No. 13 (page 21D) shall be required when any pipe enters the manhole above the base of the taper.

10.06-1.06 Manholes or junction boxes will not be required for a reach of pipe less than 100 feet in length, with an inlet or other structure, that is to be connected to a 30" or larger diameter pipe.

10.06-2 Inlets

10.06-2.01 Gutter inlets shall be in accordance with those types shown in the Standard Drawings or other approved special inlets.

10.06-2.02 Inlets shall be placed so that the length of flow in the gutter does not exceed 500 feet. The depth of flow in the gutter shall not exceed 0.35 feet, as determined by the charts on Standard Drawing Nos. 72 and 73. The runoff flow used to check the depth shall include any flow that by-passes upstream grates. Inlets at sag points where by-pass flow from upstream grates is possible shall be Type 3. Type 5A inlets shall be used at all other sag points. The outfall pipe shall accommodate the design runoff taking into consideration by-pass flow from upstream inlets.

10.06-2.03 Gutter drains as shown in Standard Drawing No. 24 (page 17D) may be used for on-site drainage only.

10.06-2.04 Type 1, 2, or 3 inlets may be used as junction inlets but only if the flow line is 4 feet

or less below the grate elevation. Types 4 and 5 inlets may be used as junction boxes for small pipes in a longitudinal direction only, and with a maximum depth of 4 feet. If these inlets are used for junction boxes where the pipe is changing directions, Sections 10.06-3.03 and 10.06-1.01 shall apply.

10.06-2.05 Type 4 inlet shall be used on Type "I" streets and may replace Type 1 or 2 inlets if not utilized as junctions.

10.06-2.06 Type 6 inlet shall be used in unimproved medians and locations away from driveways.

10.06-2.07 Inlets Type 1, 2, 3, and 4 only, shall be used on 80 foot and 100 foot streets.

10.06-2.08 Inlets may be modified to use without curb section for on-site drainage.

10.06-2.09 Other application of inlets shall be with the approval of the Director.

10.06-3 Junction Boxes

10.06-3.01 Junction boxes shall be constructed of reinforced concrete or fabricated from reinforced concrete pipe sections where size limitations permit.

10.06-3.02 Minimum wall thickness for reinforced concrete junction boxes shall be 6 inches.

10.06-3.03 The inside dimension of junction boxes shall be such as to provide a minimum of 3 inches clearance on the outside diameter of the largest pipe in each face. All junction boxes shall be rectangular in shape unless otherwise approved by the Director. Junction boxes deeper than 4 feet shall have a minimum dimension of 48 inches.

10.06-4 Headwalls, Wingwalls, Endwalls, Trash Racks and Railings.

10.06-4.01 All headwalls, wingwalls, and endwalls shall be considered individually and shall be, in general, designed in accordance with the Standards and Specifications of the California Division of Highways or the Sacramento County Department of Public Works.

10.06-4.02 Trash racks will be provided where, in the opinion of the Director, they are necessary to prevent clogging of culverts and storm drains and eliminate hazards. The trash racks shall be designed in conformance to the design shown in the Standard Drawings. Temporary trash racks will be allowed where pipe will be extended in the near future.

10.06-4.03 On cross culvert drains, pre-formed end sections conforming to Standard Drawing No. 8 may be utilized with the approval of the Director.

10.06-4.04 Metal beam guard rail may be required by the Director at culverts, headwalls and box culverts and on steep side slopes. When so required, the railing shall be installed in accordance with Section SS39 or SS46 of the County Standard Specifications.

10.06-5 Drainage Pumps

10.06-5.01 The use of drainage pumps shall be avoided whenever possible, and used only with the specific approval of the Director.

10.06-5.02 If the use of drainage pumps is permitted, the drainage system shall be so designed as to provide for gravity outfall during the summer months and other periods of low water stages. If a low stage gravity outfall is impossible or impractical, an alternate pump of smaller capacity for low stage flow may be used provided specific approval is granted by the Director.

10.06-5.03 Pumping installations shall be designed to accomodate a design storm as specified by the Director. When a station contains gravity discharge, pumping capacity must be equal to the design inflow. When the station does not have a gravity discharge, pumping units must be designed to furnish 100% capacity with any one pump out. Any deviation

from this criteria must receive the specific approval of the Director.

10.06-5.04 Pumping stations shall be designed so that gravity flow does not pass through the pump pit.

10.06-5.05 No motor overload condition shall exist at any sump or flow condition. This does not preclude high sump design if low sump condition does not create an overload.

10.06-5.06 Each pumping installation shall receive separate approval for each of the following items: electrical system, piping system, housing installation and other miscellaneous design features.

10.06-5.07 The electrical system for drainage pumps shall conform to the Standard Drawings and electrical codes.

10.06-5.08 Adequate access shall be provided for cleaning the pump sump.

10.06-5.09 Trash racks shall be provided upstream from the pumping plant. Provisions shall be made for easy cleaning of the trash racks.

10.06-5.10 Hatch covers, where used, shall be of raised pattern aluminum floor plate, or other approved lightweight cover. Dissimilar metals shall be insulated from each other when necessary.

10.06-5.11 Ladder rungs, where used, shall be of a non-slip variety.

10.06-5.12 All drainage pumping plant sites shall be fenced with 6' chain link fence with extension arms.

10.06-6 Temporary Drainage Diversions

10.06-6.01 Temporary drainage diversions, such as dams and pipe plugs, shall be located and constructed in such a fashion as to permit their removal during adverse weather.

10.06-6.02 Locations and removal procedures for

temporary drainage installations shall be approved by the Director, and these installations shall be removed when necessary to prevent damage to adjoining property.

10.06-7 Conductor pipe

10.06-7.01 Pipe used as a conductor pipe under a highway, or railroad, shall be either welded steel corrugated metal, or reinforced concrete. The Director may specify which type shall be used in any instance. The protective lining and coating, if any, shall be as shown on the plans or specified in the Special Provisions.

10.06-7.02 Welded steel pipe shall conform to the Standard Specifications, Section SS51.

10.06-7.03 Corrugated metal pipe shall conform to the Standard Specifications, Section SS46. Band couplers shall be of the same metal as the pipe.

10.06-7.04 Reinforced concrete pipe shall conform to the Standard Specifications, Section SS42. Flush joints shall be used.

10.06-7.05 When metal conductor pipe is to be installed by boring and jacking, the material shall be No. 10 gauge or thicker. The sections of pipe shall be especially prepared for making field joints by riveting or bolting. If the joints are bolted, the bolts shall be 3/8 inch diameter and galvanized. Rivets shall be of the same material as the base metal used for the corrugated sheets and shall be galvanized or sherardized.

10.07 Channels and Outfalls:

10.07-1 Open Channels

10.07-1.01 Drainage may be conducted through an improvement in open channels under the following criteria and if approved by the Director,

- a. The quantity of flow is such that it will exceed the capacity of a 72 inch pipe.

- b. The outfall point is such an elevation that minimum cover cannot be obtained over the pipe.

10.07-1.02 All channels to be fully lined shall be lined with concrete or airblown mortar to an elevation of 0.5 feet above the 10 year design water line. The channel bottom shall be constructed using Portland cement concrete. The side slope shall not exceed 1:1 on the lined portion and 1 1/2:1 on the unlined portion above the top of the concrete lining. The minimum bottom width shall be 6 feet. Where a channel is to have a lined bottom only, channel lining shall extend up the side slopes of the channel a vertical distance of at least one foot from the flowline of the channel.

10.07-1.03 In unlined channels, and channels with lined bottoms only, all underbrush and debris shall be removed from the channel cross section with the exception of certain trees which may be utilized to retain the ecology of the area. All such trees shall be shown on the plans and those to be left in place so designated. All abrupt changes in the alignment or profile of the natural channel which seriously restricts flow shall be improved and regraded.

10.07-1.04 For all channels, either realigned or natural, the following items shall be shown on improvement plans in addition to information heretofore required.

- a. Typical sections and cross sections.
- b. Profile of the existing channel and top of bank profile for a minimum of 1000 feet each side of the development in order to establish an average profile grade through the development. The County has established profiles for major drainage channels. The Consulting Engineer shall contact the County for such profile information.

10.07-2 Interceptor Ditches. Interceptor ditches shall be placed at the top of the cut where deemed necessary by the Director to prevent erosion of the channel bank.

10.07-3 Upstream and downstream profiles.

10.07-3.01 All drainage outfalls shall be shown both in plan and profile on the improvement plans for a distance of 1000 feet or until a definite "daylight" condition is established.

All drainage ditches upstream of the improvement shall be shown on plan and profile for a distance of at least 500 feet or until an average profile grade through the improvement is established.

The profiles shall include ditch flowline and top of bank elevations.

10.07-3.02 When improvements have more than one unit the drainage outfall shall be shown as extending to the property boundary, and beyond if required, although it may not be constructed with the current unit development. All temporary outfalls shall be shown both in plan and profile on the improvement plans.

10.08 Cross Culverts:

10.08-1 Cross culverts may be of reinforced concrete culvert pipe or corrugated metal pipe meeting the requirements of the Standard Specifications.

10.08-1.01 Cross culvert size shall be determined on the basis of runoff as specified in Section 10.04 of these Standards. A 10 year storm with no head on the inlets shall be used.

10.08-1.02 Cross culverts shall be checked on the basis of the runoff obtained as specified in Section 10.04 of these Standards plus 25 per cent to determine that no serious damage will be incurred due to ponding as a result of the higher design storm.

10.08-1.03 Cross culvert profile will be determined by an examination of the overall profile of the channel for a minimum distance of 500 feet each side of the installation.

10.08-1.04 Reinforced Concrete Box Culverts and Structural Plate Arch Culverts.

When specified by the Director, reinforced concrete

box culverts or structural plate arch culverts shall be installed.

All materials, design, and construction shall conform to the requirements of the State Specifications, State Standard Drawings, County Specifications and County Standard Drawings.

10.09 Fencing:

10.09-1 Improved channels in residential areas exceeding three (3) feet in depth and with side slopes steeper than 3:1 shall be fenced with six (6) foot chain link fence. Fencing may not be required when an agreement to delete the fencing is obtained from the adjacent property owners.

In all other areas, fencing shall be placed only upon the recommendation of the Director.

10.09-2 Drive gates shall be minimum 12' single and 10' double, and walk gates shall be provided complete with master keyed locks and keys at such locations as specified by the Director.

10.09-3 The fence shall be located 6 inches within the required drainage easement lines.

11.00 DOMESTIC WATER SYSTEMS:

11.01 Introduction:

11.01-1 These design criteria shall govern the engineering design of domestic water systems within Sacramento County.

11.01-2 The intent of these criteria is to provide a water system that will dependably and safely convey the required amount of high quality water throughout the distribution system with the least cost. In establishing the required amount of water, periods of peak domestic demand occurring in conjunction with an emergency fire flow demand shall be considered.

11.01-3 Pertinent and current requirements of the following agencies or standards shall be complied with. In case of conflict, the design criteria of the County of Sacramento, as established herein, shall govern. The Department of Public Works will advise where these standards may be obtained on request.

11.01-3.01 United States Public Health Service Drinking Water Standards.

11.01-3.02 Laws and Standards of the State of California, Department of Public Health, Relating to Domestic Water Supply, and particularly therein the Standards of Minimum Requirements for Safe Practice in the Production and Delivery of Water for Domestic Use, as approved by the California Section of American Water Works Association.

11.01-3.03 Standard Specifications of the County of Sacramento, Department of Public Works.

11.01-3.04 General Order No. 103 of the California Public Utilities Commission.

11.01-3.05 Ordinance No. 508 of the County of Sacramento, regulating the installation, operation, construction, reconstruction, and repair of wells and pumps.

11.01-3.06 Title 17, Chapter V, Sections 7583-7622, California Administrative Code, regarding cross-connections.

11.01-3.07 National Board of Fire Underwriters' "Standard Schedule for Grading Cities and Towns of the United States," including bulletins and amendments thereto.

11.02 Supply Requirements:

11.02-1 Quality -- The quality of the water shall conform to Sections 3 and 4 of the current United States Public Health Service Drinking Water Standards.

11.02-2 Pressure -- Normal operating pressures of not less than 35 p. s. i. nor more than 100 p. s. i. shall be maintained at service connections to the distribution system, except that during periods of peak domestic and fire demand the pressure shall not be less than 20 p. s. i.

11.02-3 Rate of Domestic Use -- For design of the distribution system, a peak domestic demand rate of fifteen gallons per minute per gross acre shall be assumed. For extension of existing systems consisting of more than 500 services, the

design shall be based on records of the average rate of consumption per service on the day of maximum use. Special consideration shall be given to areas zoned for multiple housing, schools, commercial, or industrial development. Storage reservoirs shall be considered in meeting these requirements.

11.02-4 Required Fire Flows -- For areas of the general types noted below, the indicated fire flows are to be provided with the initial development. Expansion or change in zoning of the development shall be subject to National Board of Fire Underwriters' requirements.

11.02-4.01 Residential Area -- For residential areas having primarily one story single family dwellings, on average size lots, provide a minimum 750 gallons per minute.

11.02-4.02 Commercial and Multiple Dwelling Areas -- For closely built areas containing apartments and light commercial structures, provide 2000 gallons per minute.

11.02-4.03 Principal Business Districts -- Consult the "Standard Schedule for Grading Cities and Towns of the United States" by the National Board of Fire Underwriters.

11.02-4.04 Other -- For industrial and other individual high value buildings, fire flow requirements shall be established as prescribed in Bulletin No. 266, "Water Works Requirements for Fire Protection," of the National Board of Fire Underwriters.

11.02-5 Well and Pumping Plant Design -- All phases of well and pumping plant design shall be closely coordinated with and shall be under the direction of Sacramento County Water Resources Division. Particular attention shall be given, both in design and construction, to conformance with Ordinance No. 508 of the County of Sacramento.

11.02-5.01 In no case, regardless of size of initial development, shall a single well system be accepted, unless adequate elevated or ground-level storage facilities are provided. The design yield of wells shall be limited to 1000 gallons per minute.

11.02-5.02 Care shall be exercised in the selection of a well site. No site shall be considered that will result in pumping equipment being within fifty feet of an existing or proposed structure or within 100 feet of an existing or proposed sanitary sewer.

11.02-6 Distribution System Design -- Sizing of mains shall be such that the pressures specified in Paragraph 11.02-2 are maintained. The minimum requirements for main spacing and sizing shall be as called for in Section 11.03-2.

11.02-6.01 The Hazen-Williams formula shall be used in the hydraulic study of the system, using a "C" value of 130 for asbestos cement and cement lined pipe. A Hardy-Cross hydraulic analysis of any proposed distribution system shall be supplied the Water Resources Division upon request. In design of the system, the maximum delivery from any hydrant of a type conforming to current County Standard Construction Specifications shall be assumed to be limited to 1500 gallons per minute.

11.03 Distribution System Requirements:

11.03-1 Main Location -- All water mains shall be installed within a five foot easement immediately adjacent to and behind property line fronting on public streets or roads. If it should be necessary because of existing improvements to locate the main within the pavement of a public street or road, the preferable location shall be three feet from the curb and gutter on the northerly or westerly side of the street. In every instance where main is to be installed in public streets or roads, the Sacramento County Highways Division shall be consulted for preferred location and Water Resources Division approval obtained.

11.03-1.01 If it is necessary to install a water main within a private road, the easement shall be the width of the paving plus one foot each side.

11.03-1.02 Ten (10) feet shall be the minimum horizontal distance between parallel water and sanitary sewer lines and the water main shall be higher than the sewer. On crossings, the water line shall be at least 12" above the sewer line.

11.03-1.03 When crossing a sanitary sewer force main, it shall be specified that the water main be

installed a minimum of two feet above the sewer line and be of cast-iron or, if asbestos cement, be encased in Class "B" concrete, in either case extending at least five feet on each side of the force main.

11.03-2 Main Layout and Sizing -- The distribution system, whenever possible, shall be in grid form so that pressures throughout the system tend to become equalized under varying rates and locations of maximum demand. The minimum pressures and flows as specified in Section 11.02-2 shall govern design of the system. The following conditions are to be considered for the minimum size pipe.

11.03-2.01 In general, the minimum pipe size shall be six inches inside diameter. The installation of four inch mains shall be limited to cul-de-sacs or courts where the length of the pipeline is 300 feet or less, or as indicated under dual mains, below.

11.03-2.02 Dual mains (one pipeline on each side of the street) shall be installed in streets which carry heavy concentrations of traffic, or the rights of way which are 80 feet or more in width. State highways and County major thoroughfares generally are in this category. In those streets classified for dual mains, the minimum size shall be six inch on each side in residential areas, except that one of them may be four inches in diameter where the distance between intersecting lines is not greater than 600 feet. In commercial districts the sizes shall be not less than one eight-inch and one six-inch.

11.03-2.03 The distribution system shall be gridironed with eight inch or larger cross connecting mains at intervals of approximately 1300 feet, with intermediate six inch lines as required.

11.03-2.04 Larger mains shall be provided at one mile intervals or to serve multiple housing, commercial or industrial areas as determined by an engineering evaluation of the anticipated demand.

11.03-3 Valves, Hydrants, and Blow-offs -- The distribution system shall be equipped with a sufficient number of valves

so that no single shut down will result in shutting down a transmission main, or necessitate the removal from service of a length of pipe greater than 500 feet in school, commercial, industrial, or multiple family dwelling areas or greater than 800 feet in other districts. In no case shall more than two fire hydrants be removed from service. The valves shall be so located that any section of main can be shut down without going to more than three locations to close valves. Valves shall preferably be located at street intersections, three feet into the pavement from the curb and gutter where possible. If it is necessary to install valves between street intersections, they shall be located on property lines between lots.

11.03-3.01 Fire hydrants shall be placed at street intersections wherever possible, and located to minimize the hazard of damage by traffic. They shall have a maximum normal spacing of 500 feet measured along the street frontage. Hydrants located at intersections shall be installed at the curb return. All others shall be located on property line between lots.

11.03-3.02 Not more than two hydrants shall be placed on a six inch main between intersecting lines, and not more than three hydrants on an eight inch main between intersecting lines. The minimum size main serving a fire hydrant shall be six inches in diameter. The pipeline connecting the hydrant and the main shall be six inch, with a gate valve installed near the main.

11.03-3.03 A blow-off assembly shall be installed on all permanent dead-end runs. Special attention shall be given to those of a temporary nature, taking into consideration the length of the dead-end run, the number of services on the line and the estimated time before extension. Wherever possible, the blow-off shall be installed in the street right of way, three feet from the curb and gutter. In no case shall the location be such that there is a possibility of back-siphonage into the distribution system.

11.03-4 Service Lines -- Service lines from the water main to the property line or edge of easement shall normally be installed at the time the main is constructed. Services from

mains installed in private roads shall extend one foot beyond the edge of the pavement.

11.03-4.01 In all new subdivisions, the service line shall preferably be located near the center of the lot to be served. If it is preferred to have the service located other than near the center, it shall be brought in no closer than nine inches to a side property line. The service line to existing buildings shall be located so as to make the most direct connection to the existing structure.

11.03-4.02 Normal size of a service line shall be one inch. Schools, commercial, industrial, or multiple family units with higher demand shall be provided with larger service lines, subject to approval of the Water Resources Division. Service lines in sizes up to and including two inches in diameter shall be copper water tubing or polyethylene pipe as set forth in the Standard Construction Specifications; material for lines larger than two inches shall be subject to Water Resources Division approval. All services shall be installed with a corporation stop at the main and a curb stop or gate valve at the property line. The gate valve may be used only when the service is 1 1/2 inches or larger. Installation of a valve box is required for all services.

11.03-4.03 The Water Quality Division Maintenance Section shall make all water service taps into existing mains upon application for a permit and payment of required fees. A note to this effect shall be placed on the plan sheet which details the area that requires such tapping. Application should be made to the Sacramento County Department of Public Works and the required fees paid at least 48 hours in advance of the time the tap is desired. All excavation and backfill, and the installation of the remainder of the water lateral or service shall be done by the Contractor. (Note: The above applies only when the service is constructed as a part of an improvement contract. For rules regarding the installation of an individual water service, contact the County Department of Public Works.

11.03-5 Water Pipe -- Pipe used in the construction of water distribution systems shall be either asbestos-cement, cast iron, or welded steel pipe. The use of steel pipe should be limited to those areas where an engineering evaluation indicates that galvanic (or soil) corrosion is not a problem, or provision is made for suitable cathodic protection. The pipe and method of placement shall conform to the Standard Construction Specifications.

11.03-5.01 Locating Wire. All runs of non-metallic water pipe shall have a No. 10 gauge solid, bare, soft drawn copper wire laid along the pipe to facilitate locating the pipe at a later date. The wire shall be stubbed up inside each valve box, and be placed as shown on Standard Drawing No. 39. Wire extending into the valve boxes shall have 4/64 inch polyvinyl chloride insulation.

12.00 SANITARY SEWER SYSTEM:

These criteria shall apply to the engineering design of any sanitary sewer system to be maintained by the County of Sacramento or with exceptions as noted in Section 12.14 to that within a planned unit development.

12.01 Average Flow Determination:

12.01-1 Zoning -- Flow determination shall be based upon the most recent zoning. The minimum population density used shall be equivalent to that of single family zoning. The area shall be examined for trends toward population concentration greater than present zoning allows and/or more than four lots per acre and, if found, an estimate should be made of the probable extent of such concentration. This estimate shall be used as the basis for determining flow.

12.01-2.01 Single family, detached units -- flow shall be based on 400 gallons per residential unit (lot) per day, and a minimum of four lots per acre. However, if the number of lots per acre is known, and is greater than four, the actual number shall be used.

12.01-2.02 Single family, planned unit developments -- flow per unit shall be the same as above and the actual number of units per acre shall be considered. However, in the absence of known data, the density shall be assumed to be 12 units per acre.

12.01-3 Commercial and multiple residential -- flows shall be determined from the curves on Standard Drawing No. 74. However, if the type of planned improvements are known and estimated discharges are available, they shall be used in the design, subject to the approval of the Engineer. Multiple residential is differentiated from planned unit developments in that the latter contain individually owned residences with the adjacent land owned in common and with maintenance performed by a homeowner's association. Multiple residential is designed to be owned by one party with the individual residences rented or leased. The average flow from single bedroom multiple residential units shall be 200 gallons per day per unit; from two bedroom units, 300 gallons per day; and from three or more bedroom units, 400 gallons per day. Mobile home flow shall be 300 gallons per day per unit. Arrangements for the connection of facilities with a high discharge rate or with a type of discharge that could be detrimental to the public system shall be subject to the approval of the Engineer. The requirements of the sewer use ordinance shall apply.

12.01-4 Schools -- the larger flow, as determined from one of the two following methods, shall be used:

12.01-4.01 The entire school area shall be assumed to contribute an average flow equivalent to that of an equal area of single family, detached residential units, i. e., 1600 gallons per acre per day.

12.01-4.02 Total average daily flow per school shall be based on the type of school proposed as follows, with the indicated limits of ultimate design student population plus administration, teaching, and operating personnel.

<u>Type of School</u>	<u>Avg. Daily Flow</u>	<u>Capita Limit</u>
Elementary (K-5, K-6 or K-8)	0.025 MG	1,000
Upper Elementary (6-8, 7-8, or 7-9)	0.060 MG	1,500
High School (9-12 or 10-12)	0.080 MG	2,000

For enrollments and personnel in excess of that indicated there shall be added 25 gallons per day per additional capita in elementary schools and 40 gallons per day per additional capita in upper elementary and high schools.

12.01-5 Industrial -- Every attempt should be made to base flows on specific, known industrial development. In the absence of specific knowledge of type of development, the flow shall be determined from the curves on Standard Drawing No. 74. Special attention shall be given to any facilities with a magnitude or type of discharge that could be detrimental to the public system. The requirements of the sewer use ordinance shall apply.

12.01-6 Infiltration -- A normal amount of infiltration was considered in establishing the above discharge rates. However, in areas with high ground water, it may be necessary to increase these rates to reflect a greater amount of infiltration.

12.02 Design Flow:

Design flow shall be calculated by multiplying the average flow for the upstream service area, as determined above, by the peaking factor obtained from the curve on Standard Drawing No. 75.

12.03 Pipe Slope, Velocity, Size, Depth, and Types:

12.03-1 The minimum size of laterals which serve single family development shall be 6 inches in diameter. Schools, commercial, industrial, and multiple residential shall be served by lines a minimum of 8 inches in diameter. However, single commercial buildings which contribute negligible flow, when located among single family development, may be served by a lateral 6 inches in diameter subject to the approval of the Engineer.

12.03-2 Manning's formula shall be used to determine the relation of slope, design flow, velocity, diameter, and "N" value. The "N" value shall be 0.013 for all pipe materials.

12.03-2.01 Following is a table of slopes and design flow capacities for various pipe diameters. Pipe slopes less than those listed in this table shall not be used without the approval of the engineer.

<u>Pipe Diameter inches</u>	<u>Slope, foot per foot</u>	<u>Capacity at 0.7 depth in MGD</u>	<u>Capacity when flowing full in MGD</u>
6	0.005	0.22	
8	0.0035	0.38	
10	0.0025	0.58	
12	0.0020	0.85	1.0
15	0.0015	1.32	1.6
18	0.0012	1.95	2.35

12.03-2.02 The maximum depth of flow at design conditions in any lateral (10 inch diameter or less) shall be 0.7 diameter. Trunk lines (12 inch diameter or larger) may be designed to flow full unless direct service sewer connections to the trunk are planned, in which case the 0.7 diameter maximum depth shall govern.

12.03-3 Pipe capacity, in all cases, shall be adequate to carry the design flow from the entire tributary area, even though said area is not within the project boundaries.

12.03-4 In the design of a system, one of the controlling conditions shall be that the lateral system is to be at sufficient depth to provide a minimum slope for the service sewer of 1/4 inch per foot, at the same time maintaining a minimum cover of 12 inches at any buildable location within the properties to be served.

12.03-5 Pipe material shall be as approved by the Engineer and shall conform to the requirements of the Standard Specifications. Material other than that included in the Standard Specifications may be used if approved by the Engineer.

12.04 Location and Alignment:

12.04-1 All sanitary sewers shall be placed within rights of way dedicated for public streets unless the use of easements is specifically approved by the Engineer. In some streets dual laterals may be required. A minimum horizontal clearance of 10 feet is recommended between parallel water mains or services and sanitary sewers.

12.04-2 New subdivisions -- Sewers shall preferably be located 6 feet south or east of street centerline within minor and primary residential streets. Where dual laterals are required or in streets of 60 foot width or greater, the normal location shall be 3 feet from the lip of gutter.

12.04-3 Existing streets -- When sanitary sewers are to be installed in existing streets, factors such as curbs, gutters, sidewalks, traffic conditions, traffic lane conditions, pavement conditions, future street improvement plans, and existing utilities shall all be considered. The approval of the County Highways and Bridges Division, the Water Resources Division and the Water Quality Division shall be obtained in every instance.

12.04-4 Easements -- The minimum width of easements shall be 10 feet. Temporary working easements of adequate dimensions shall be provided to allow the construction within the permanent easement to be completed in a safe and reasonable manner.

12.04-5 No sanitary sewer trunk line, lateral, or service shall be placed nearer than 100 feet to any water well, public or private, unless the well has been abandoned in full accord with County Health Department standards, or the location otherwise approved, in writing, by the appropriate health agencies.

12.04-6 Horizontal alignment -- Alignment shall be parallel to the street centerline wherever possible. Minimum radius for sanitary sewers 6 inches through 12 inches in diameter shall be 200 feet. A larger radius shall be used wherever practicable or where necessary to avoid joint deflection in excess of the pipe manufacturers' recommended maximum. For pipe 27 inches in diameter and larger, mitered joints, fittings, or other methods as specified in the Standard Specifications may be utilized to accomplish alignment changes.

12.04-7 Vertical Alignment -- A constant slope shall be maintained between manholes. If a change in grade in excess of two percent is necessary, construction of a manhole shall be required unless the use of a vertical curve is approved by the Engineer. In such case, elevations shall be shown at ten foot intervals throughout the length of the vertical curve. The maximum deflection shall be two percent at each ten foot interval.

12.05 Trench Loading:

12.05-1 Loading Conditions:

12.05-1.01 Rigid Conduits -- Marston's formula shall be used to determine the load placed on the pipe by the backfill. The procedure for rigid pipe is described in the ASCE Manual of Engineering Practice No. 37, the Clay Pipe Engineering Handbook, and in similar handbooks. In the absence of specific soils data, as determined by a registered engineer specializing in soil mechanics, a soil weight of 120 p.c.f. and a Ku factor of 0.110 shall be used.

12.05-1.02 Flexible Conduits -- Marston's formula for flexible conduits as shown in ASCE Manual of Engineering Practice No. 37 and in other similar handbooks shall be used to determine the load placed on the pipe by the backfill. The maximum load allowable shall be determined by pipe deflections computed by the Iowa Deflection Formula (or Spangler's Formula). In the absence of specific soils data, as determined by a registered engineer specializing in soil mechanics, a soil weight of 120 p.c.f., a Ku factor of 0.11, and a bedding constant of 0.11 shall be used. The minimum soils reaction modulus (E') used in the deflection calculation shall be 700 psi and shall correspond to that for Type II bedding utilizing imported material to 6 inches above the top of the pipe. The deflection lag factor shall be 1.5.

12.05-2 Pipe Design:

12.05-2.01 Rigid Conduits -- A safety factor of 1.25 shall be used for reinforced concrete pipe, and 1.5 for all other pipe. Only the three edge bearing strength of the pipe shall be used in the computations for rigid pipe.

12.05-2.02 Flexible Conduits -- A maximum deflection of 3 percent of the nominal pipe diameter is allowable under installation conditions. Computations shall be submitted showing the ability of the conduit to withstand local buckling.

12.05-3 Bedding types and factors shall be as per Standard Drawing No. 5. Bedding and initial backfill type shall be as necessitated by height of cover over the pipe, trench width, pipe strength, and other factors used to determine safe pipe loading. Special attention shall be given to backfill requirements for pipe located in State rights of way and for pipe placed in areas where trench width is excessive, such as in the vicinity of bore pits. See Section 12.11 regarding this condition. Any special backfill requirements shall be noted on the plans.

Unless otherwise noted on the plans, bedding and initial backfill shall be Type I with an unlimited trench width allowable. The minimum trench width shall be pipe O. D. plus 12 inches.

12.05-4 Type III and IV bedding and initial backfill are intended primarily for emergency field conditions and their use shall normally not be specified on the plans. Type IV shall require specific written approval of the Engineer before use.

12.05-5 Cast iron, ductile iron, asbestos-cement, or other high strength pipe approved by the Engineer, shall be used whenever cover is greater than 25 feet or extra support strength is required. Cast iron or ductile iron pipe, or other high strength pipe approved by the Engineer, shall be used whenever cover is less than 3 feet, or insufficient clearance exists between the sewer pipe and rigid or load transmitting structures.

12.05-6 A table which relates cover, pipe diameter, trench width, and bedding and initial backfill type for vitrified clay and asbestos-cement pipe, according to Marston's formula, is provided on Standard Drawing No. 76.

12.06 Manholes:

12.06-1 Manholes shall be placed at the intersections of all sanitary sewer lines, unless waived as per Section 12.09-2, at the end of all permanent lines 120 feet or more in length, and at the end of any temporary line more than 200 feet in length. Special consideration shall be given the location at major street intersections.

12.06-2 Maximum spacing of manholes shall be 400 feet for all straight lines of 10 inch diameter or less. A line

with a radius greater than 400 feet shall be considered as straight for purposes of this section. Manhole spacing on lines which are on a continuous curve of 200 foot radius (min. allowable) shall be 200 feet. Manhole spacing on curved lines of radius between 200 and 400 feet, or where only a portion of the line is curved, shall be adjusted proportionately. Reverse curves require a manhole at the point of tangency between the curves. A manhole shall be required at any abrupt change in vertical alignment in excess of two percent. A manhole shall also be placed at any abrupt change in horizontal alignment, except as specified in Section 12.04-6 for pipe 27 inches in diameter and larger.

12.06-3 The hydraulic grade line of any pipe which flows into a manhole shall be 0.10 foot (minimum) above the hydraulic grade line of the exit pipe. When the major line, based on quantity of flow, passes through a manhole with less than 20 degrees deflection, the 0.10 foot differential between hydraulic grade lines will not be required for that line. The hydraulic grade lines shall be determined from the design flows, based upon 100 percent development of the tributary areas. Hydraulic grade line calculations must be submitted for the design of all lines 12 inches or greater in diameter.

12.06-3.01 In the absence of calculations which establish the hydraulic grade lines and when the flow must change direction by more than 20 degrees, the invert of an incoming side pipe shall be located no lower than the spring line nor higher than the crown of the exit pipe. The crown of the exit pipe shall never be higher than the crown of any pipe entering the manhole. Drop connections are not governed by the above elevation requirements.

12.06-3.02 Service sewers and laterals with ten or less services shall enter manholes at an invert to crown match with the exit pipe.

12.06-4 Manhole construction shall conform with the provisions of Standard Drawing No. 14. Lock-type or pressure type manhole covers, dependent upon drainage conditions, shall be used on manholes located in unimproved areas. Where the manhole depth is less than four feet, an 18-inch high cone as shown on Standard Drawing No. 13 may be used.

12.07 Drop Connections:

12.07-1 A drop connection shall be required whenever a

pipe enters a manhole higher than as specified in Section 12.06-3. Drop connections shall conform to Standard Drawing No. 15. The inside drop connection shall be used for all 6 and 8 inch diameter laterals and services and the outside drop type for 10 inch and larger connections.

12.07-2 If an elevation difference of at least four feet is not available, the need for the drop shall be eliminated by use of a vertical curve or by increasing the slope of the incoming line.

12.08 Flushing Branches:

A flushing branch may be used in lieu of a manhole at the end of any line less than 120 feet in length. A flushing branch may also be used at the end of a line less than 200 feet in length if the line extends to a subdivision boundary and if there are definite plans for its extension. If a line extends to a subdivision boundary, is planned for definite extension, and has no service sewer connections, it may be capped. Flushing branches shall conform to Standard Drawing No. 32.

12.09 Service Sewers:

12.09-1 Service sewers shall conform to Standard Drawing No. 33 and shall be constructed normal to the lateral unless otherwise approved by the Engineer. The service sewer shall extend from the lateral sewer to the edge of public right of way or edge of easement. Service sewers shall extend one foot beyond edge of pavement of any private road and easements of adequate width to accommodate the services shall be obtained. A plan and profile of any service sewer shall be supplied the Engineer upon request.

12.09-2 Normal service sewer size is 4 inches. Schools and other developments expected to contribute high sewage flows shall be served by 6 inch or larger service sewers. In addition, service sewers shall be sized according to requirements of the Plumbing Code, the Water Quality Division, and determinations by the Consulting Engineer. A 6 inch service sewer shall enter a 6 inch lateral by means of a manhole but may enter an 8 inch or larger lateral by means of a factory fitting. Eight inch diameter and larger services shall be connected to the lateral by use of a manhole. Connections to trunk lines, where permitted, shall be as directed by the Engineer.

12.09-3 The Water Quality Division, upon application for permit and payment of required fees, shall construct all service sewers from existing sewers and manholes to individual residential lots and commercial, multiple residential, and industrial developments and shall make all service sewer taps into existing sewers and manholes within new subdivisions. A note to this effect shall be placed on any plan sheet which indicates a connection to the existing system.

12.09-4 Service sewers shall not directly connect to 12 inch diameter or larger pipe or to lines more than 25 feet in depth without the approval of the Engineer. (See Section 12.03-2.02.)

12.09-5 If the service has less than 3 feet of cover measured from the gutter flowline, cast iron or ductile iron pipe, or other high strength pipe approved by the Engineer, shall be used.

12.09-6 When sanitary sewers are constructed as part of new subdivision improvements, a service sewer shall be constructed to each lot. In new subdivisions or developed areas, unless specifically requested otherwise in writing by the property owner or Consulting Engineer, service sewers shall be placed on the low side of any typical subdivision lot or similar parcel with 2 percent or greater slope across the front or shall be placed in the center of lots of lesser slope. Consideration shall be given to trees, improvements, etc., so as to minimize interference when service sewer is extended to serve the house. If the property is located such that service is available both to a line located in an easement and in right of way, service shall be to the latter location unless otherwise approved by the Engineer. No service sewer shall be located such that the future on-site construction will result in the line being in such proximity to a water well or water main or service that applicable health standards will be violated.

12.09-7 The Consulting Engineer shall verify the adequacy of the normal service sewer depth at the edge of easement or right of way, to serve the intended parcel. A depth of 4 feet at back of existing or proposed sidewalk to crown of pipe shall be considered normal service sewer depth. Whenever greater depth is required, the Consulting Engineer shall designate the invert elevation of the service sewer at the edge of the right of way or easement on the construction

plans. If a joint trench is being utilized for other utilities, the Consulting Engineer shall indicate on the plans that a joint trench will exist and shall adjust service elevations as necessary. It shall be the responsibility of the Consulting Engineer to arrange for coordination of the grade of utilities located in the joint trench and the service sewers.

12.09-8 In developed areas, a service sewer shall be provided each parcel participating in the project which contains a source of sewage less than 200 feet from a lateral. A property owner's request for service location shall be honored whenever practicable. Parcels which have two or more sources of sewage must have an independent service sewer provided each sewage source which can be separated from the rest of the parcel and sold. A service sewer shall be provided each subdivision lot or lot similar as to size and possible development. At an early stage of design, the Consulting Engineer shall send every property owner affected by the proposed work, a questionnaire requesting, in writing, the owner's preferred service sewer location. In absence of a response to this questionnaire, the Consulting Engineer shall provide a service sewer as required by this Section. In addition, when the service sewers are staked immediately prior to construction, each property owner shall be given notice that he should give consideration to the staked location of his service sewer and, if not satisfactory, immediately notify the Consulting Engineer. The date of notification by the property owner, method of notification, nature of change, and other pertinent information shall be recorded. Compilation of this information shall be the responsibility of the Consulting Engineer and the information shall be furnished the Engineer upon request.

12.10 Creek Crossings:

12.10-1 In all cases, the proposed future creek bed elevation shall be used for design purposes. Crossing details of pipe, piers, anchorage, transition couplings, etc., shall be shown upon a detail sheet of the plans in large scale.

12.10-2 For line sizes 10 inches and smaller, cast iron pipe shall be used under the full creek width plus 10 feet each side unless the pipe is 4 feet or more below the creek elevation. For line sizes 12 inches and larger, pipe used shall be as directed by the Engineer. Special care shall be taken to provide a firm base for the pipe bedding. The plans shall specify that all soft or organic material within the

creek banks shall be replaced with select imported backfill. In addition, a layer of 4" x 8" cobbles shall be placed and compacted on the top surface of the trench area for the full width of the creek. Unless otherwise directed, a clay plug shall be required about the pipe at the downstream side of the crossing. The plug shall be a minimum of 4 feet in length, shall extend the full width of the trench, and shall extend 12 inches above and below the pipe.

12.10-3 If the pipe must cross above the creek bed, aluminum pipe, Sch. 40 minimum, cast iron, or welded steel pipe shall be used. Steel pipe may be cement lined and coated, or fusion epoxy lined and coated or glass lined; the Engineer shall approve the type of coating and lining specified, and the gage, class, or thickness of the pipe. The Engineer may specify which is to be used. Reinforced concrete piers of adequate depth shall be located as necessary for adequate support of the pipe. The pipe shall be held in cylindrical cradles, formed in the pier tops, by galvanized steel straps, with galvanized anchor bolts of adequate size. Cushion material shall be placed between the pipe, clamps, and support. The invert elevation at the point of maximum deflection of the suspended pipe shall be higher than the invert of the pipe at its downstream support.

12.10-4 Calculations shall be submitted, which clearly indicate the design of the pipe and supports regarding impact, horizontal and vertical forces, overturning, pier and anchorage reactions, etc.

12.11 1 Boring and Jacking:

All pipe, except R.C.P. and service sewer pipe, which is bored and jacked shall be placed in welded steel, C.M.P., or R.C.P. conductor pipe of sufficient diameter to allow dry sand to be blown into the void between the carrier and the conductor and to allow adjustment of the carrier pipe to grade. Normally, an inside diameter six inches greater than the outside diameter of the couplings of the carrier pipe is sufficient. R.C.P. and service sewer pipe may be bored directly, placed in a conductor, or placed in tunnel liner. The method used shall be specifically approved by the Engineer. Welded steel conductor pipe shall have a minimum wall thickness of 1/4 inch for sizes up to and including 24 inches in diameter, and 5/16 inch for sizes 27 inches to 36 inches in diameter. C.M.P. conductor shall be not less than No. 10 gauge for sizes up to 36 inches, and No. 8

gauge for diameters to 60 inches. R.C.P. conductor must be designed for the loading condition and, if jacked, the additional loading imposed by the jacking operation. Backfill in bore pits shall be given special attention with respect to preventing structural failure of the pipe entering or exiting the conductor, and adequate bedding and initial backfill shall be specified.

12.12 Pump Stations -- Force Mains:

Every phase of pump station design, including force mains, shall be closely coordinated with the Sacramento County Water Quality Division.

12.12-1 Location -- The minimum distance from the station to any existing or future home or other structure shall be 100 feet. Adequate access must be furnished for vehicles of such size as may be necessary to deliver chlorine cylinders or to remove station equipment.

12.12-2 Capacity -- Depending upon the size of the service area and its extent of development at the time of station design, the station's initial pumping capacity may be less than the ultimate. In such an installation, allowances for larger or additional pumping equipment must be made for future requirements. If the initial design capacity is in excess of anticipated initial flow, the effects of the minimum flow conditions must be estimated to be sure that the retention of sewage in the wet well will not create a nuisance and that the pumping equipment will operate with reasonable frequency.

12.12-3 Wet well -- Unless the station is of such size that variable speed drive pumps are justified, the shape of the wet well and the detention time should be such that the deposition of solids is minimized and the sewage does not become septic.

12.12-4 Type -- For a permanent station, a factory-built unit or concrete structure shall be used, depending upon station capacity. Temporary stations, if of limited size, may utilize manhole-installed submersible pumps, subject to the approval of the Engineer. In all stations, applicable safety codes shall be complied with, including but not limited to those pertaining to electrical installation, ventilation, and the location of railings and equipment guards.

12.12-5 Pumps -- The pumping equipment shall consist of either centrifugal pumps or pneumatic ejectors. The latter are to be used only in smaller installations. Pump suction and discharge size shall be a minimum of 4-inch diameter. Pump drive units shall normally be electric. A sufficient number of pumping units shall be installed such that station capacity can be maintained with any one unit out of service. Provisions for telemetry shall be included in the station control system.

12.12-6 Station Piping -- Suction, discharge, and header piping within the station shall be sized to adequately handle flows. Piping less than 4 inches in diameter should not be used for conveying sewage. Valves shall be located to allow proper equipment maintenance and operation and in such locations that they are readily accessible for maintenance.

12.12-7 Odor Control -- If required, the station shall have equipment and/or space provided for the purpose of chlorinating the upstream gravity line and/or the force main. Adequate provisions shall be made for the safe handling and storage of chlorine containers. As an alternate for force main odor control, provision shall be made, if directed, for introducing air into the main. To facilitate this, the force main shall be designed to maintain a continuous uphill grade or, as a minimum, to be level. All force mains shall have a tap for introduction of either air or chlorine whether or not the odor control equipment is initially installed.

12.12-8 Force mains shall be designed such that velocities normally fall within a range of from 3 to 5 feet per second. If initial capacity of the station is considerably less than the ultimate, consideration should be given to the undesirable effect of extensive detention time within the force main. The feasibility of installing dual force mains to accommodate initial and ultimate flows should be investigated in such situations. Provision shall be made for introducing a cleaning pig into all force mains.

12.13 Sewer Improvement Plans:

Plans for the construction of sanitary sewers, whether in conjunction with other improvements or for a sewer project only, shall conform to the following standards, as well as other standards contained herein.

12.13-1 Study Map -- A study map may be required

prior to review of the sewer design if there is a possibility that upstream or adjacent areas might require service through the subject property. The map should show the entire service area including upstream tributary and adjacent areas, and all other data necessary to determine anticipated sewage flows. The method of sewerage the entire service area, including pipe sizes and slopes, shall be shown to the extent necessary to determine the requirements within the subject property.

12.13-2 Plans for sewer improvement projects should include a layout sheet, plan and profile of each sewer line, and any necessary detail drawings. The plans must be clearly legible and conform to accepted practice with respect to drafting standards. All information which, in the opinion of the Engineer, is necessary for the satisfactory design, review, construction and maintenance of a project shall be provided and, where applicable, shall be shown on the plans.

12.13-3 Signatures -- The first sheet in the set of plans shall include signatures of the following:

12.13-3.01 For cash projects:

- a. Submitted, Consulting Engineer;
- b. Approved, Water Quality Division;
- c. (If any sewers lie within public right of way)
Approved, Highways and Bridges Division;
- d. (If modification to or proximity of drainage facilities is involved)
Approved, Water Resources Division.

12.13-3.02 For assessment district projects:

- a. Submitted, Consulting Engineer;
- b. Approval Recommended, Chief, Water Quality Division;
- c. Approval Recommended, Chief, Highways and Bridges Division;
- d. Approved, District Engineer (Director of Public Works.

12.13-3.03 For cash or assessment district projects for only sanitary sewer improvements, the title block on each sheet shall be signed by the Water Quality Division's project engineer to indicate technical approval.

12.13-4 Layout Sheet -- All sewer improvement plans shall include an overall map which shows the project boundaries, sewer lines, manholes, flushing branches, and other important items of the work. Where pavement is to be cut in several locations, the pavement replacement requirements shall be shown on the layout sheet. A parcel or area which benefits from and financially participates in a sewer construction project, but is not included within the project boundaries, shall have a note to this effect placed on the layout map and on the plan and profile sheet if the parcel appears thereon. Parcels which make use of those facilities may be subject to additional fees at the time of connection if the participation has not been so noted.

12.13-5 Plan and Profile Sheets -- Sewers which are to be maintained by a District shall be shown by both plan and profile views on approved plan and profile paper.

The following standards with respect to drafting and the information to be included on the plan and profile sheets generally apply to projects in developed areas. In new subdivisions, only the requirements of Sections 12.13-5.01 through 12.13-5.13 which are applicable shall apply.

12.13-5.01 The sewer lines to be constructed shall be indicated on the profile by parallel lines spaced the pipe diameter or by a single heavy line at the pipe invert for 10 inch diameter and smaller lines only. Manholes shall also be indicated by parallel lines spaced according to scale or by a single, heavy vertical line if the sewer profile is also shown as a single line. Slope shall be printed 1/8 inch above and preferably parallel to the pipe line, or between the parallel lines. The length, size and type of pipe between each manhole shall be printed parallel to the horizontal grid lines and approximately halfway between the ground surface and pipe line. All pipe inverts at manholes and other structures shall be indicated on the profile. The invert elevations shall be printed parallel to the horizontal grid lines and

shall be underlined by a line which then runs at a 45 degree angle to the corresponding pipe invert. Where manholes, manholes with drop connections, flushing branches, or other appurtenances are to be constructed, the profile shall be so noted. Existing facilities shown on the profile shall be cross-hatched.

12.13-5.02 In improved areas the location of each service sewer proposed to be constructed shall be indicated on the plans by stationing or by reference to a permanent, well-defined structure, if available. In new subdivisions, the service may be located by stationing, by dimension to lot line, or by notation to install at the center of the lot. The invert elevation of the service sewer at the property line shall be indicated on the plans whenever the standard depth is inadequate to serve the property. Improvements or lots shown on a plan sheet but served to a line shown on another plan sheet shall have the service shown by a small triangle and letter "S". "As built" plans shall also show the service sewer location measured from the nearest downstream manhole.

12.13-5.03 Both permanent and working easements shall be shown to scale on the plans. Easement dimensions shall be given and each easement shall be tied to both the property line and the sewer line. Each permanent easement shown on the plans shall be identified by a box or table, on the same plan sheet, which gives the property owner's name and the book and page number in which the easement is recorded. The Consulting Engineer shall provide the book and page number.

12.13-5.04 Indicate the limiting maximum trench width, as measured at the top of the pipe, on the plans between well defined points of application; the pipe material and class if more than one class is available; and the bedding-backfill type. Type I bedding, when used, and unlimited trench width, when allowed, need not be shown on the plans. If more than one combination of pipe class, maximum limiting trench width, or bedding type is available, a practical range of such combinations shall be shown on the plans.

12.13-5.05 Manhole identification on the plan view may be oblique. Stationing shall appear at the lower edge of the profile grid directly under the manhole.

12.13-5.06 Each revision and its date shall be indicated on the pertinent sheet.

12.13-5.07 The project name and district name, if applicable, shall appear on each sheet of the plans.

12.13-5.08 The proposed sewer line shall be adequately dimensioned from street centerline. If the sewer is to be located in an easement, sufficient dimensions and bearings from physical features to locate the line in the field shall be shown on the plans.

12.13-5.09 Gas, water, storm sewers and all other main utility lines above or below ground shall be determined and shown on the plans with accuracy as great as practicable. The location of any utility line which is parallel to and within 5 feet of the sewer line or which crosses the sewer line at an angle of 30 degrees or less shall be determined with an accuracy of ± 1.0 foot and the clearance shown on the plans. Service lines such as water and gas normally shall not be shown.

12.13-5.10 Trees and other objects within 10 feet of construction centerline shall have their correct location shown on the plans and the clearance from construction centerline shown. The diameter of tree trunks and interfering heavy tree branches shall be noted. Removal of a tree or object, or other special handling shall be noted on the plans. The Consulting Engineer shall assume full responsibility for such notes as it is assumed that he has made all necessary arrangements with the owner of the object to be handled. Written documentation of any special arrangements regarding preservation of property made between property owners and the Consulting Engineer shall be supplied to the Engineer if no easement document is involved. If an easement

is negotiated, all special arrangements are to be included in the easement document. Tree removal within public rights of way must be approved by the Engineer.

12.13-5.11 Culverts shall be shown on both plan and profile when crossed by the construction or when parallel and within 20 feet of the construction line. The size and type of all such culverts shall be indicated and when the culvert crosses or is perpendicular or nearly so and within 20 feet of the construction line, the invert of the culvert end nearest the construction line shall be shown.

12.13-5.12 Driveways, curbs, sidewalks, pavement edges, buildings and all other items which could influence the work shall be shown. Only the front line and indication of the side lines of buildings need be shown.

12.13-5.13 Addresses of buildings shall be shown on the plan view, within the outline of the building.

12.13-6 Detail Drawings -- Items of a special nature should be shown with detail drawings, either on the plan sheets, or on a separate detail sheet.

12.14 Planned Unit Developments:

The following design exceptions shall apply to that portion of the sanitary sewer system within a planned unit development that is "on-site" and is not an outfall sewer for an upstream area, thereby being considered private system and not subject to maintenance by County forces.

12.14-1 Maximum spacing of manholes on laterals shall be 300 feet for all straight lines.

12.14-2 Wyes shall be used for all service sewers connecting to the on-site laterals instead of tees as shown on Standard Drawing No. 33.

12.14-3 A 6-inch lateral may enter an 8-inch or larger public line without requiring the construction of a manhole. However, a cleanout to grade shall be required at the right of way or easement line.

12.14-4 Class 1500 or Class 2000 R asbestos cement pipe may be used as the minimum pipe class instead of Class 2400 as required by the Standard Specifications.

12.14-5 The house service line to each property shall have 3 feet of cover at the lot line and this shall be noted on the plans.

12.14-6 All lines located within vehicular traffic areas shall have a minimum cover of 3 feet.

12.14-7 On-site improvement plans may be prepared without the profile that is normally required, unless otherwise directed. However, the final on-site grades must be submitted, preferably on the same sheet as the plan view. Size of the on-site improvement plan sheets must be the same as that required for the off-site improvement plans.

13.00 STREET LIGHTING:

Street lighting shall be designed in conformance with these specifications, the current edition of the Sacramento County Standard Construction Specifications, and the "American Standard Practice for Street and Roadway Lighting" of the American Standards Association except that the average horizontal maintained footcandles and the uniformity ratio for the various street classifications shall be as shown on Standard Drawing 93. Data and calculations supporting the satisfaction of the above requirements shall be submitted for review.

13.01 Lighting Standards:

All standards shall be galvanized steel, aluminum, or concrete. Standards with bracket-arm shall be equipped with a two-inch diameter tendon. Standards with pole top mounting shall have three-inch diameter tendon. All standards shall be round in cross section and have tapered shafts. Standards shall be identified on the plans or in the Special Provisions. Identification shall be by type standard as shown on Standard Drawing 95 by construction material, by bolt circle diameter, by luminaire mounting height, by pole dimensions and by length of mast arm if applicable. The Director may approve special or unusual design if the character of the surrounding neighborhood warrants unusual design.

13.02 Luminaires:

The luminaires shall be either mercury vapor or fluorescent type with internal ballasts. Light patterns for each luminaire shall be shown on the plans. The light patterns shall be those commonly known as Type I, Type II, Type III or Type IV, as specified by the Illuminating Engineering Society. All luminaires shall conform to the appropriate section of the standards of the National Electrical Manufacturer's Association. All mercury vapor luminaires shall have regulator ballasts.

13.03 Lamps:

Lamps are to be standard to fit the luminaires specified, without adaptors. The type of lamp and the lamp wattage shall be shown on the plans. All lamps shall be of the group replacement type. Mercury vapor lamps shall be of the color improvement type.

13.04 Pullboxes:

Pullboxes shall be installed at the locations where conduit runs are more than 200 feet long and at such additional points as ordered by the Director.

13.05 Conductors:

Unless otherwise specified, conductors shall be single conductor, solid or stranded copper sized in accordance with these specifications and the National Electrical Code. The size of the conductors for all circuits shall be such that the voltage drop will not exceed 7% of the nominal service voltage to the farthest luminaire or combinations thereof. Calculations shall be submitted substantiating the design criteria for every circuit. Calculations shall also be submitted substantiating the design criteria for every circuit. Calculations shall also be submitted showing the total load, in amperes, of each circuit at the service location.

13.06 Electrical System:

The electroliers shall be energized by an underground multiple low voltage electrical system or a 1 or 2 lamp low voltage type system as shown in Drawing 94. Other suitable lighting systems may be approved by the Director. Not more than two lamps shall be energized by a single power source when service is provided directly to the service pedestal without a service as specified in Section 13.07 below.

All control and switching equipment and fusing of all circuits shall meet the requirements of the National Electrical Code, the Basic Electrical Regulations, Title 24, Part 3 of the California Administrative Code, the rules of the National Board of Fire Underwriters, and the County of Sacramento.

A single photo-cell receptacle shall be available on the nearest luminaire nearest to the service point for multiple and 1 or 2 lamp systems. Photo cells will be supplied by the serving utility or by the County.

13.07 Service:

Multiple service shall contain main breakers, auxiliary breakers, test switch and contactor in accordance with Standard Drawing 94. Multiple service installations may require commercial type meter sockets provided with blank cover, manual circuit closing device and jumpers approved by the serving utility as determined by the Director.

All service locations must be provided in a utility easement immediately adjacent to the right of way and must be open and easily accessible to the street frontage.

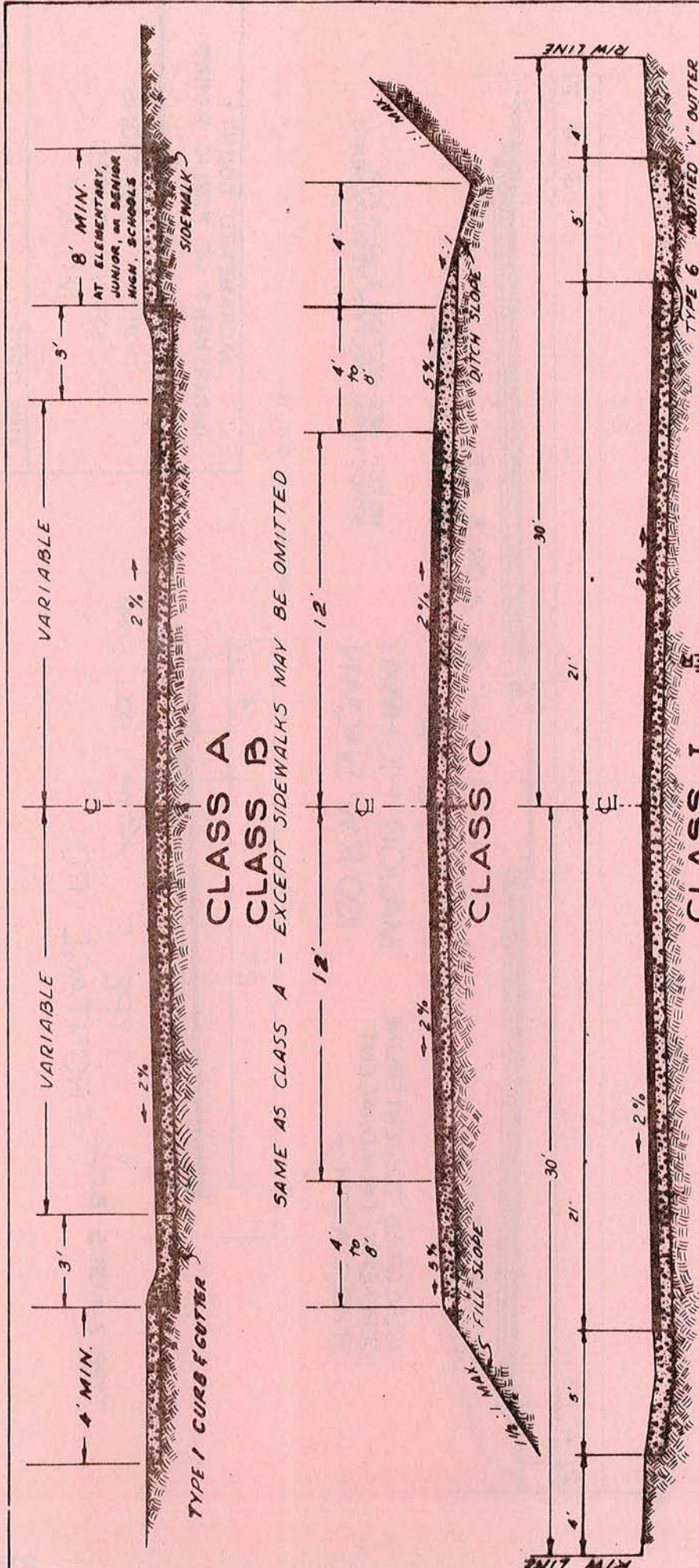
INDEX TO STANDARD DRAWINGS

<u>NO.</u>	<u>DRAWING TITLE</u>	<u>PAGE</u>
55	Typical Sections - Street Classes, A, B, C, & I	1H
56	Typical Sections - Street Types MH & F	2H
57	Typical Sections - Street Types MA & MC	3H
58	Typical Sections - Street Types MR & PR	4H
3	Commercial Driveway Type A-6	5H
4	Commercial Driveway Type A-7	6H
49	Alley Details and Driveway Transitions	7H
54	Typical Street and Site Development - cross section	8H
60	Commercial Frontage and Driveways	9H
1	Cross Gutter Design	10H
61	Cul-de-Sac	11H
2	Curbs and Gutters - Residential and Commercial	12H
42	Sidewalk Ramp for Type 1 Curbs	13H
62	Widening at Major Street Intersections	14H
63	Intersection Bulb	15H
41	Timber Barricade	16H
50	Street Name Sign Placement Details	17H
51	Street Sign Fully Reflectorized	18H
52	Placement Details	19H
53	Pedestrian Lane Bike Barrier	20H
93	Typical Street Lighting Design Standards	21H
94	Typical Street Lighting Design Standards	22H
95	Typical Street Lighting Design Standards	23H

<u>NO.</u>	<u>DRAWING TITLE</u>	<u>PAGE</u>
65	Drainage Zones	1D
66	Design Runoff	2D
67	Design Runoff	3D
68	Design Runoff	4D
69	Pipe Cover Requirements Concrete & Asbestos Cement Pipe	5D
70	Corrugated Aluminum and Metal Pipe	6D
71	Typical Access Ramp	7D
72	Capacity Charts Type 5 and 5A Grate	8D
73	Capacity Charts Type 1, 2, 3, & 4 Grate	9D
17	Drop Inlet Frame & Grate for Type 1, 2, 3, & 4 Drop Inlets	10D
18	Drop Inlet Type 1 and 2	11D
19	Drop Inlet Type 3	12D
20	Drop Inlet Type 4	13D
21	Drop Inlet Type 5	14D
22	Drop Inlet Type 5A	15D
23	Drop Inlet Type 6	16D
24	Gutter Drain	17D
25	Underdrains and Overside Drains	18D
11	Standard 24" Manhole Frame and Cover	19D
12	24" Standard Manhole	20D
13	Standard Pre-Cast Manhole	21D
16	Type A & B Saddle Manhole	22D
6	Lined Channel Section	23D
7	Pipe Connections	24D

<u>NO.</u>	<u>DRAWING TITLE</u>	<u>PAGE</u>
8	Pipe End Sections	25D
9	Corrugated Metal Pipe Fittings	26D
26	Pipe Inlet Structure	27D
27	Pipe Inlet Structure and Trash Rack	28D
28	Trash Rack	29D
29	Access Control Rack	30D
30	Erosion Control Ditch Discharge	31D
31	Erosion Control Pipe Discharge	32D
40	Standard Fence Detail	33D
74	Sewer Flows	1S
75	Peaking Factors	2S
5	Pipe Bedding and Initial Backfill	3S
76	Bedding and Maximum Trench Width (Sewers)	4S
10	Conductor Casing Detail	5S
14	Standard Pre-Cast Manhole (Sewer)	6S
15	Drop Connections	7S
32	Flushing Branch	8S
33	Service Sewers	9S
34	Utility Crossing	10S
35	Water Service Installation	1W
36	Typical Valve and Fire Hydrant Installation	2W
37	Thrust Block Bearing Area	3W
38	Blowoff Valve	4W
39	Locating Wire for Water Mains and Services	5W

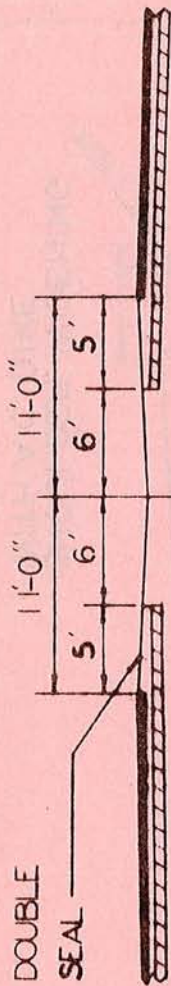
<u>NO.</u>	<u>DRAWING TITLE</u>	<u>PAGE</u>
78	Permanent Installation Indoor Motor Control Center	1E
79	Permanent Installation Indoor Motor Control Center	2E
80	Permanent Installation Indoor Motor Control Center	3E
81	Permanent Installation Indoor Motor Control Center	4E
82	Permanent Installation Indoor Motor Control Center	5E
83	Permanent Installation Indoor Composite Control Assembly	6E
84	Temporary Installation Outdoor Composite Control Assembly	7E
85	Temporary Installation Outdoor Composite Control Assembly	8E
86	Temporary Installation Outdoor Composite Control Assembly	9E
87	Temporary Installation Outdoor Composite Control Assembly	10E
88	Two-Part Winding C. B. Combination Starter	11E
89	Typical C. B. Combination Starter	12E
90	Float Switch Circuit for Auto Control for Three Unit Installation	13E
91	Float Switch Circuit for Auto Control for Two Unit Installation	14E
92	Float Switch and Remote Alarm Circuits	15E
	Identification List for Standard Drawings No. 78 thru No. 82	16E
	Identification List for Standard Drawing No. 83	17E
	Identification List for Standard Drawing No. 84	18E
	Identification List for Standard Drawing No. 85	20E
	Identification List for Standard Drawing No. 86	21E
	Identification List for Standard Drawing No. 87	23E



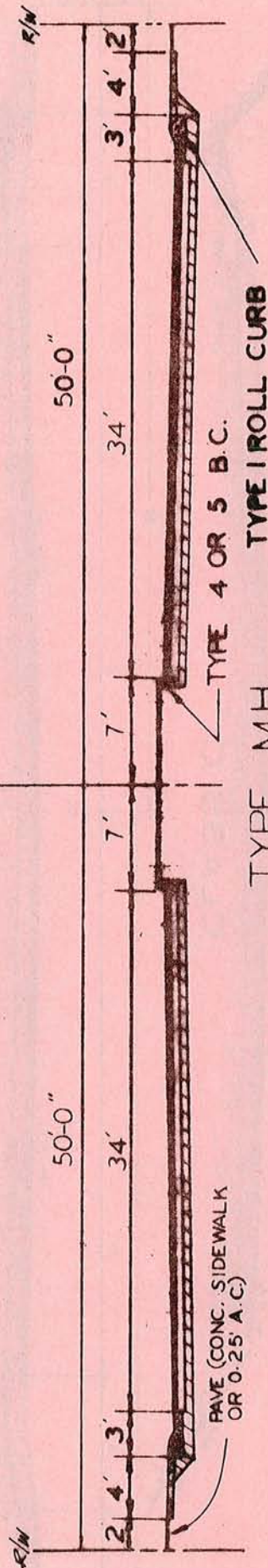
SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
TYPICAL SECTIONS STREET CLASSES 'A', 'B', 'C', & 'I'	
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SHOULDER WIDENING
WITH A.C. DIKE

DOUBLE
SEAL



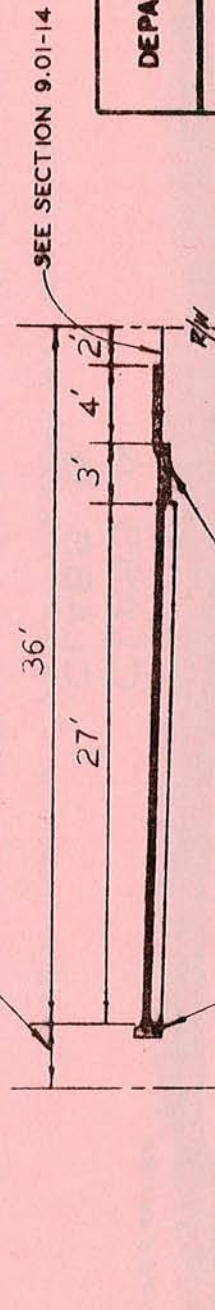
ALTERNATE MEDIAN



40', 50' OR 55' TO CENTERLINE
DEPENDING ON ADJACENT
STREET WIDTH

TYPE M.H.
MAJOR HIGHWAY
100' R/W SHOWN

NOTE: SEE SECTION 9.03-9 FOR
STRUCTURAL SECTION REQUIREMENTS

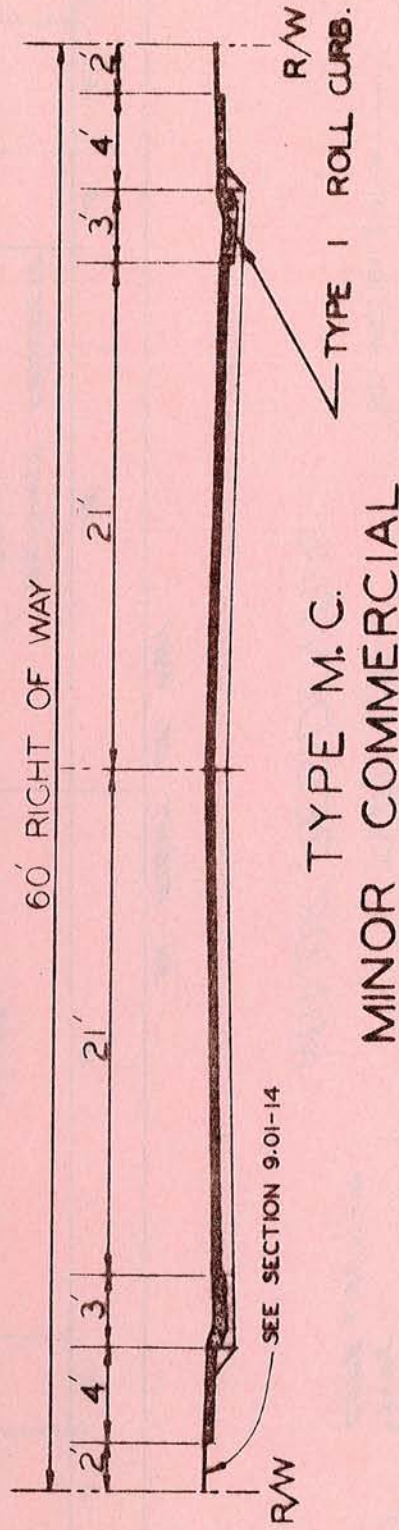
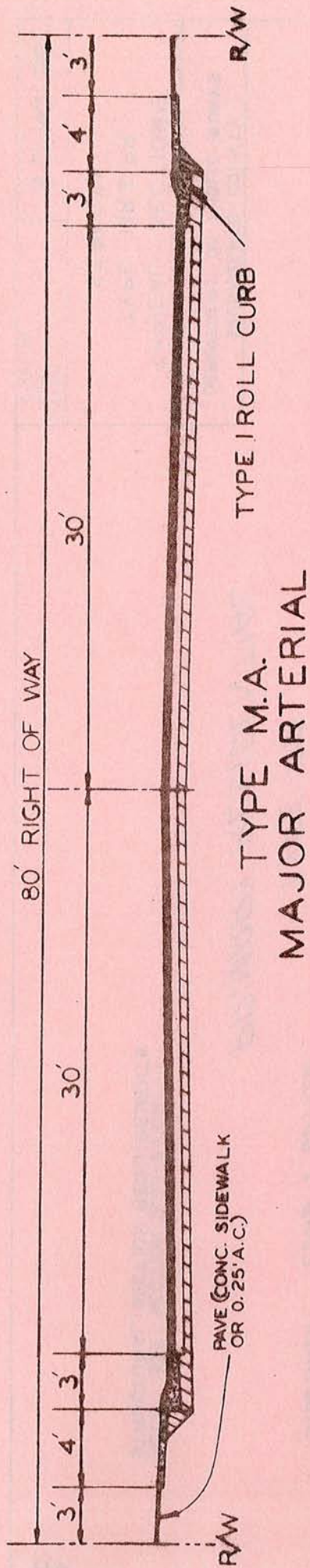


SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TYPICAL SECTIONS
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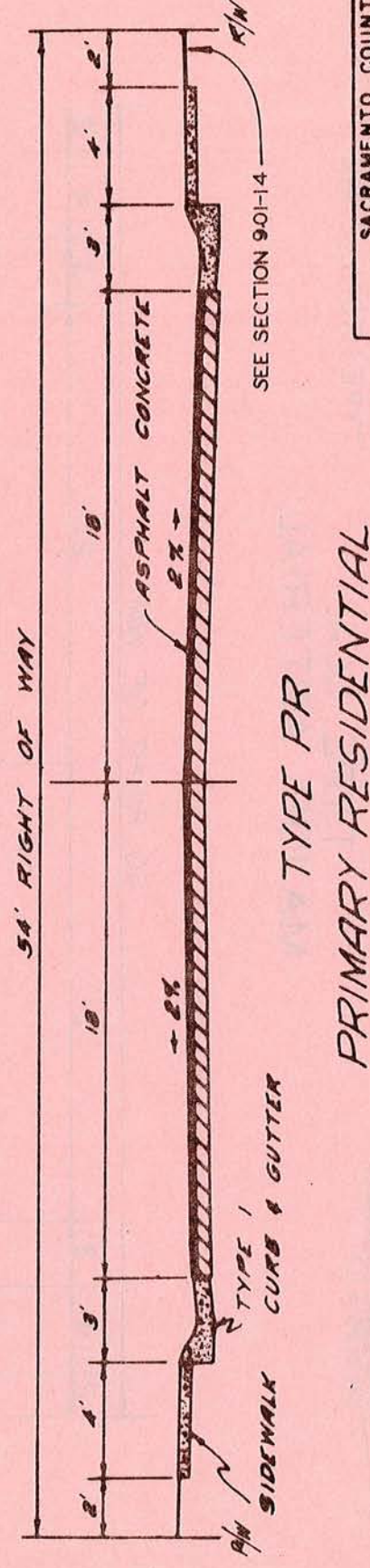
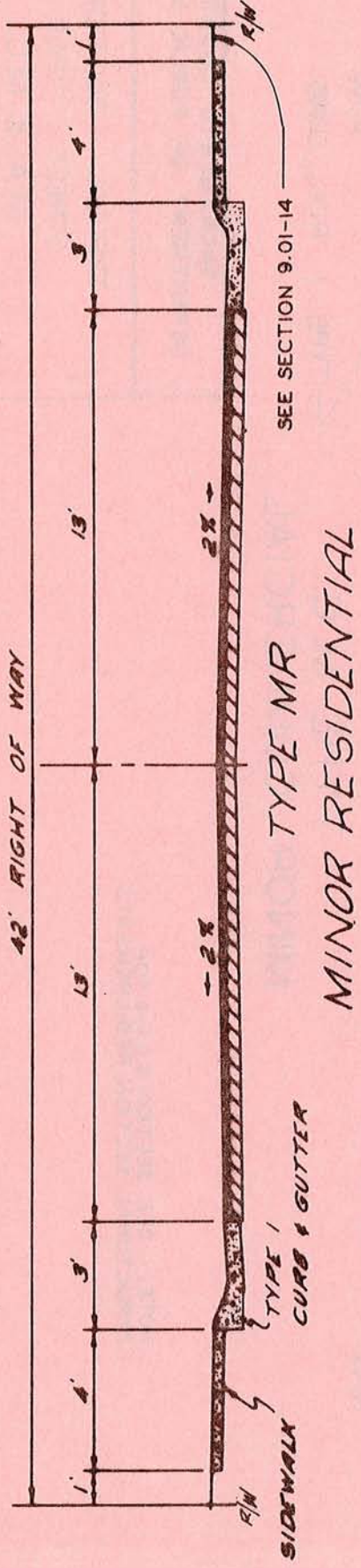
NOTE: SEE SECTION 9.03-9 FOR STRUCTURAL SECTION REQUIREMENTS

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TYPICAL SECTIONS
STREET TYPES
M.A. & M.C.

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S D NO. 57



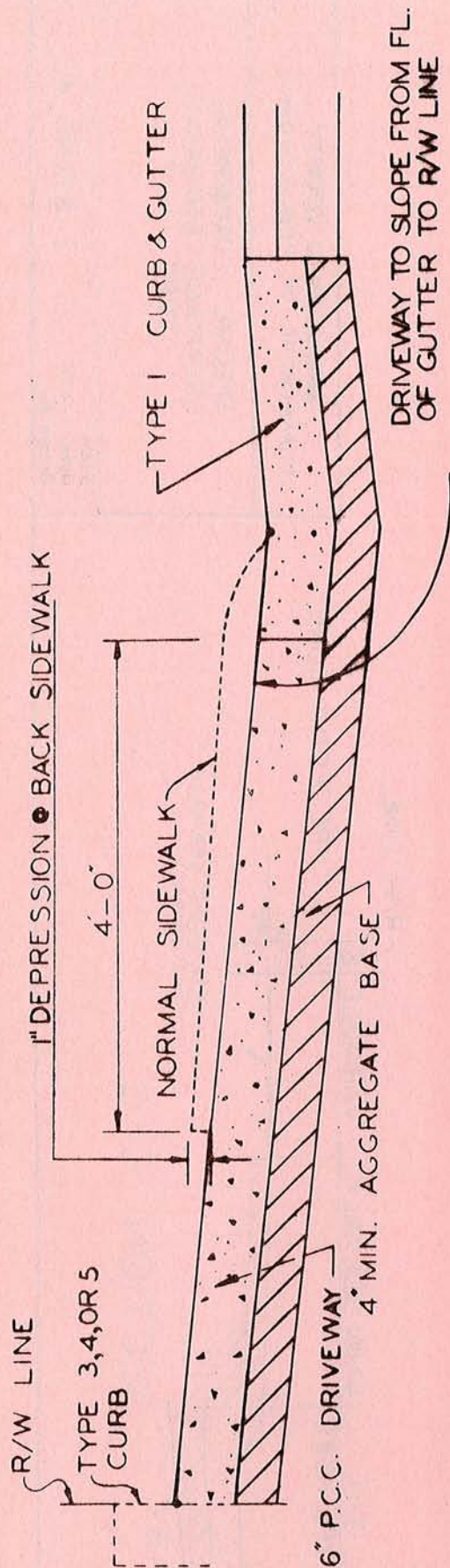
NOTE: SEE SECTION 9.03-9 FOR STRUCTURAL SECTION REQUIREMENTS

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

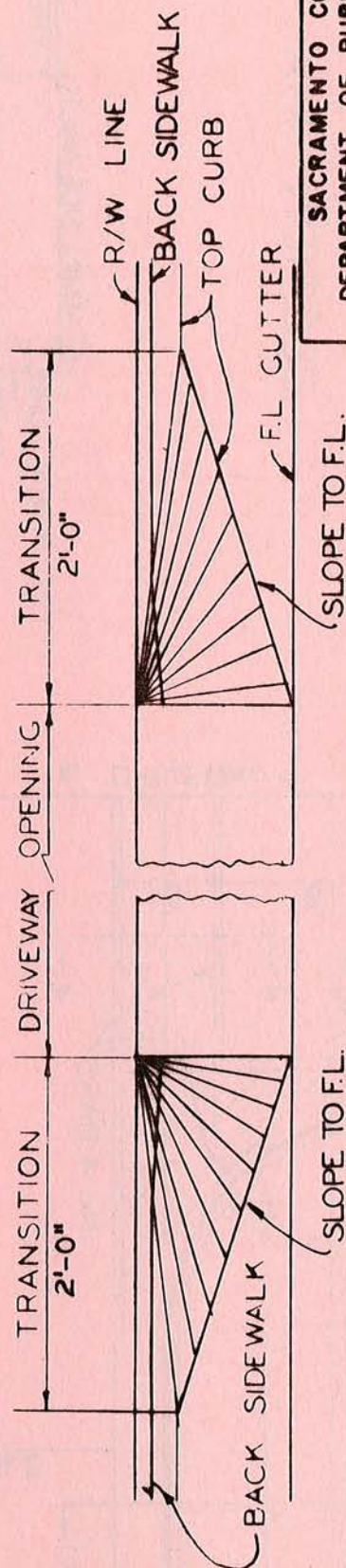
TYPICAL SECTIONS
TYPE MR & PR
STREETS

Scale
Date:
Drawn By:

S D NO. 58



TYPICAL DRIVEWAY SECTION

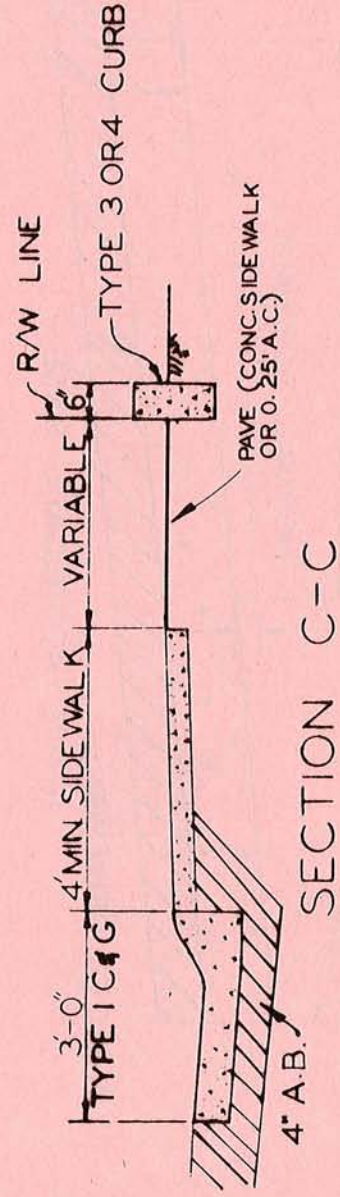
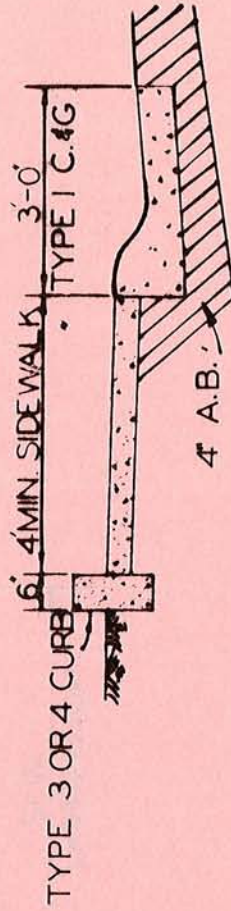
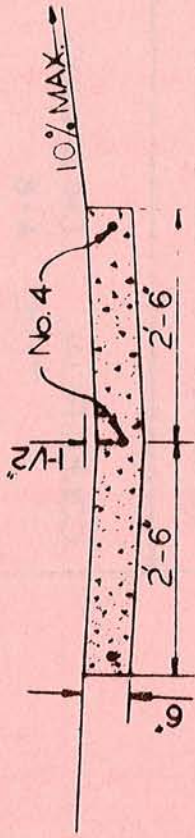
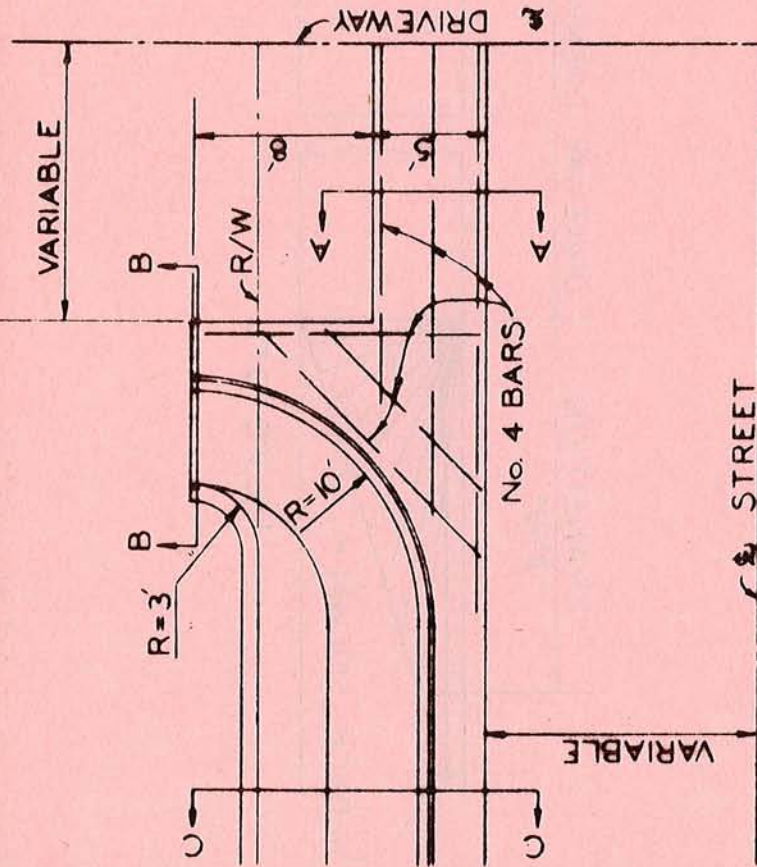


SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

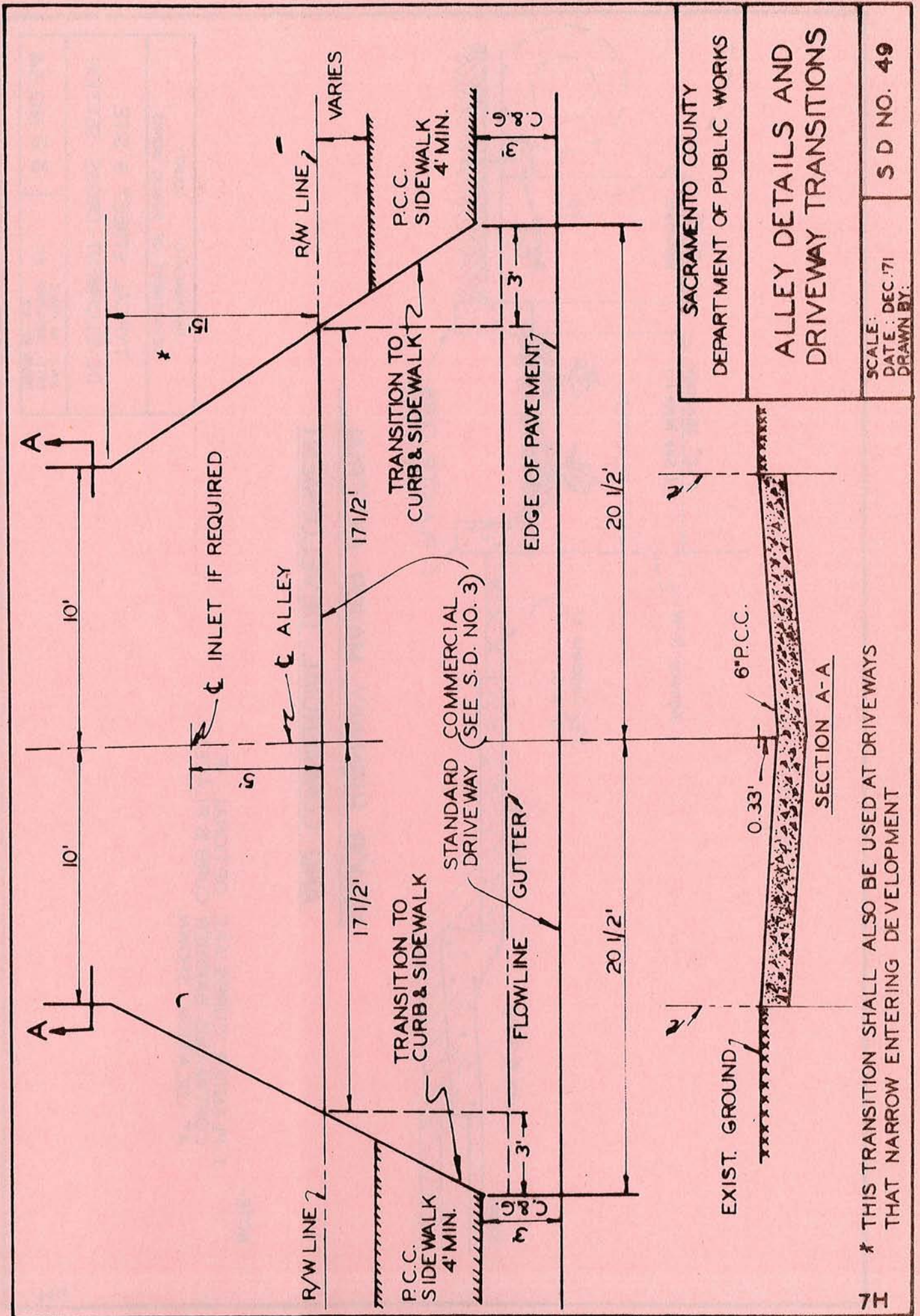
COMMERCIAL DRIVEWAYS
TYPE A-6

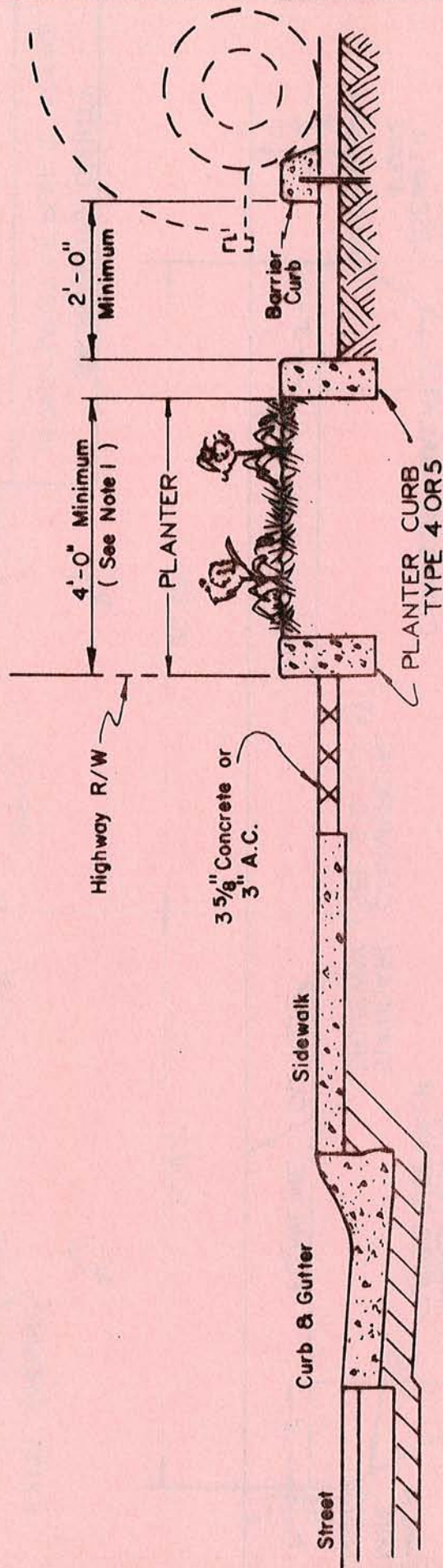
Scale:
Date: 1-2-70
Drawn By:

SD NO. 3



SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
SPECIAL COMMERCIAL FRONTAGE ENTRANCE TYPE A-7	
Scale: Date: 1-2-70 Drawn By:	SD NO. 4





MAJOR HIGHWAY, MAJOR ARTERIAL, AND COMMERCIAL DEVELOPMENT

NOTE:

1. PLANTER CURBS ARE OPTIONAL IF CONTINUOUS BARRIER CURB IS PLACED AT LOCATION SHOWN.

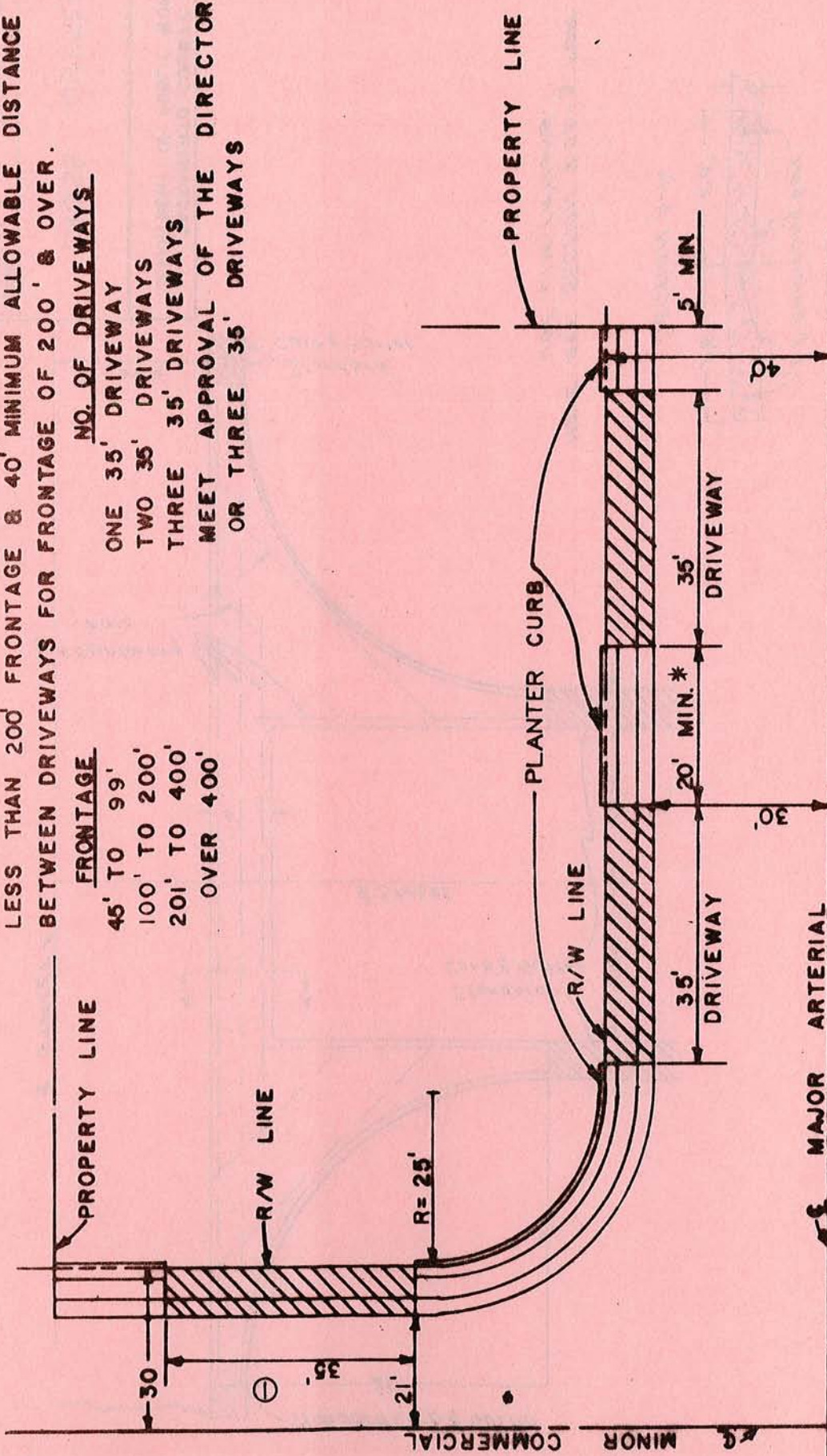
SACRAMENTO COUNTY	
DEPARTMENT OF PUBLIC WORKS	
TYPICAL STREET & SITE DEVELOPMENT - CROSS SECTION	
SCALE: NO SCALE DATE: NOVEMBER, 1972 DRAWN BY: D.S.	SD NO. 54

GENERAL NOTES

* 20' MINIMUM ALLOWABLE DISTANCE BETWEEN DRIVEWAYS FOR LESS THAN 200' FRONTAGE & 40' MINIMUM ALLOWABLE DISTANCE BETWEEN DRIVEWAYS FOR FRONTAGE OF 200' & OVER.

FRONTAGE	NO. OF DRIVEWAYS
45' TO 99'	ONE 35' DRIVEWAY
100' TO 200'	TWO 35' DRIVEWAYS
201' TO 400'	THREE 35' DRIVEWAYS
OVER 400'	MEET APPROVAL OF THE DIRECTOR

FRONTAGE	NO. OF DRIVEWAYS
45' TO 99'	ONE 35' DRIVEWAY
100' TO 200'	TWO 35' DRIVEWAYS
201' TO 400'	THREE 35' DRIVEWAYS
OVER 400'	MEET APPROVAL OF THE DIRECTOR



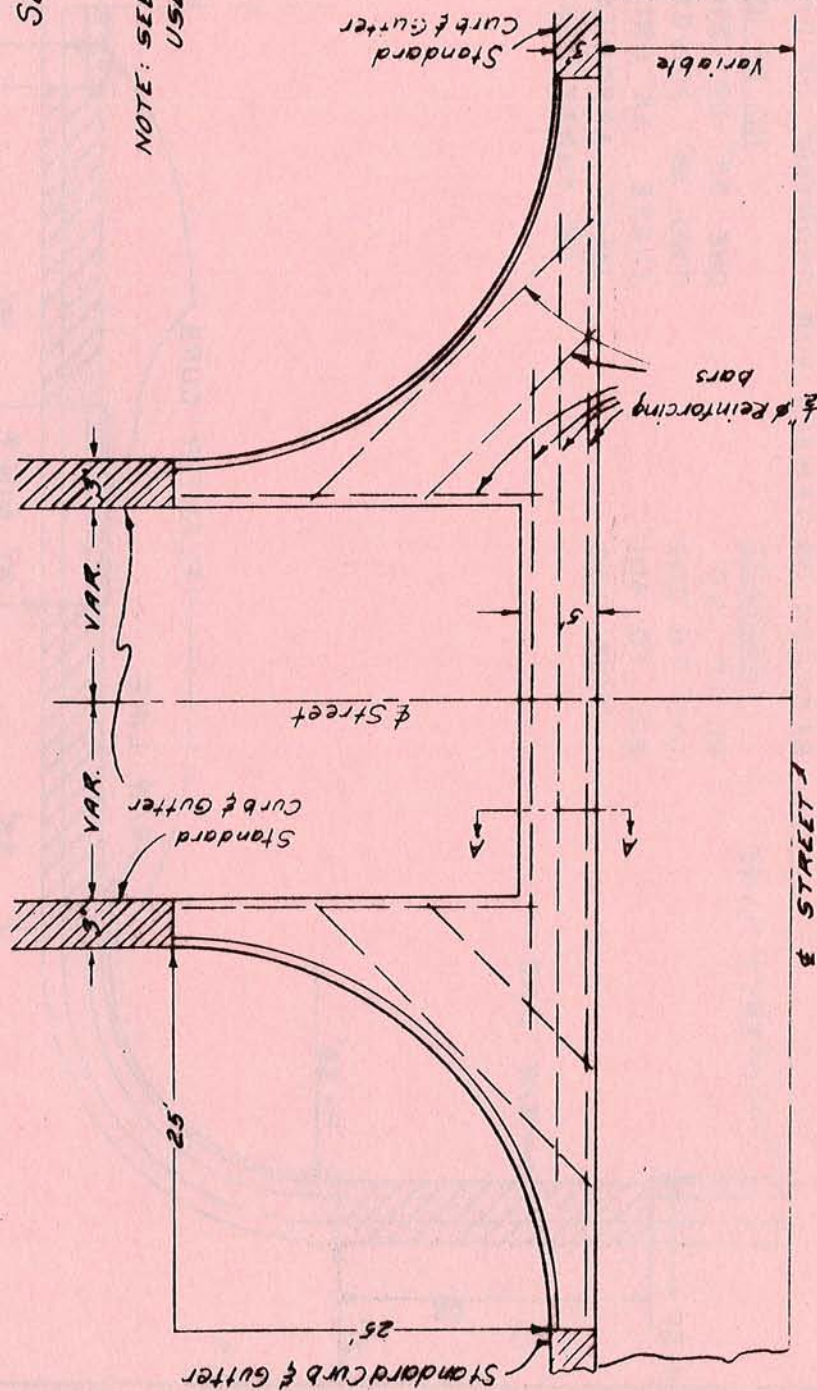
NOTE: ① 25' TO 35' WIDE DRIVEWAYS MAY BE USED ON M.C. M.R. P.R. FOR MULTIPLE RESIDENTIAL

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	COMMERCIAL FRONTAGE AND DRIVEWAY REGULATIONS	SCALE: NONE	SD NO. 60
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SECTION A-A

NOTE: SEE SECTION 9.03-3 FOR
USE LIMITATIONS.



HOI

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

CROSS GUTTER

Scale:
Date: 1-2-70
Drawn By:

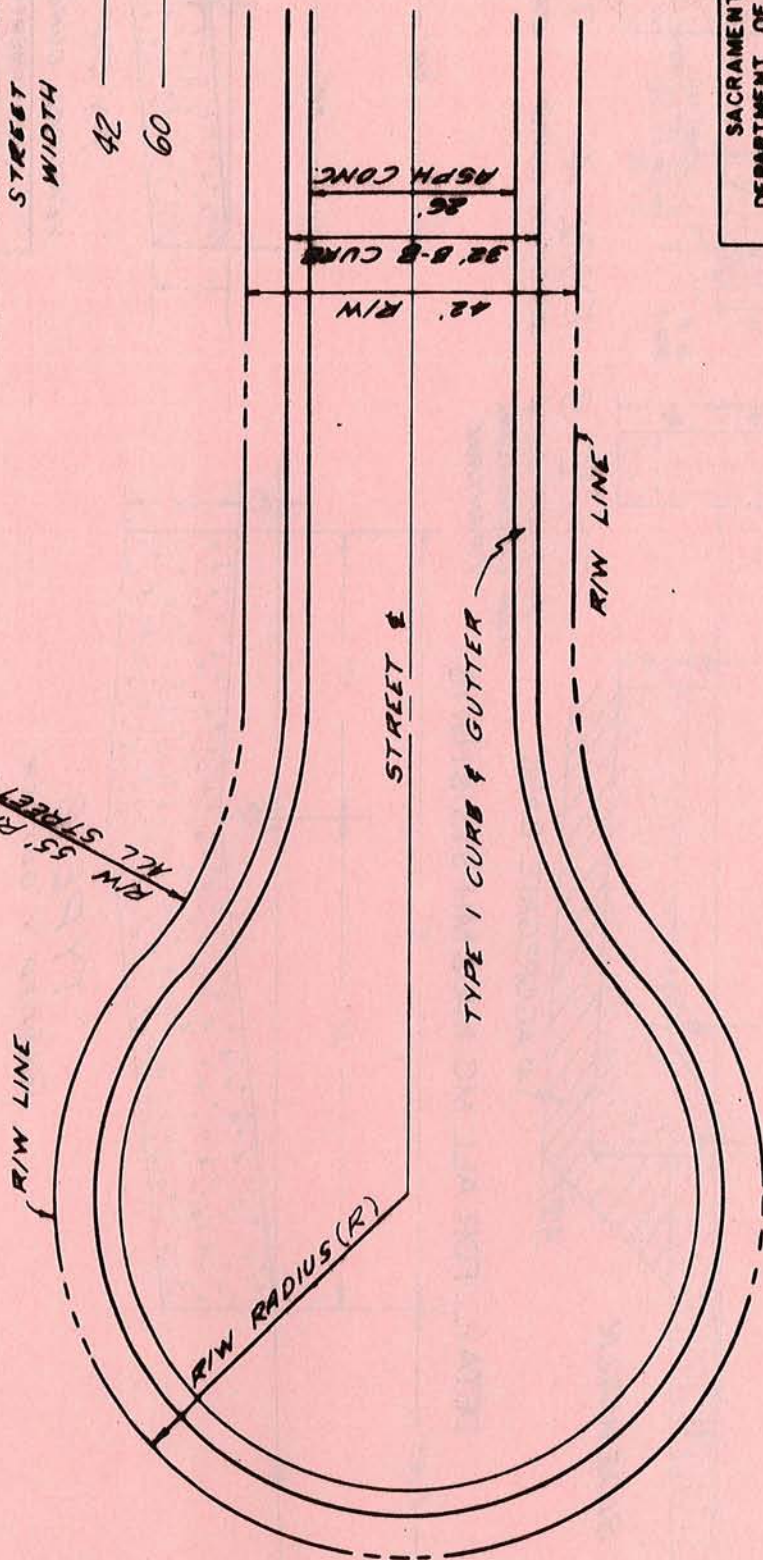
SD NO. 1

R/W 55' RADIUS
KCL STREET WIDTHS

NOTE:

RADII REQUIREMENTS

STREET	WIDTH	(R)
42	—	45'
60	—	54'

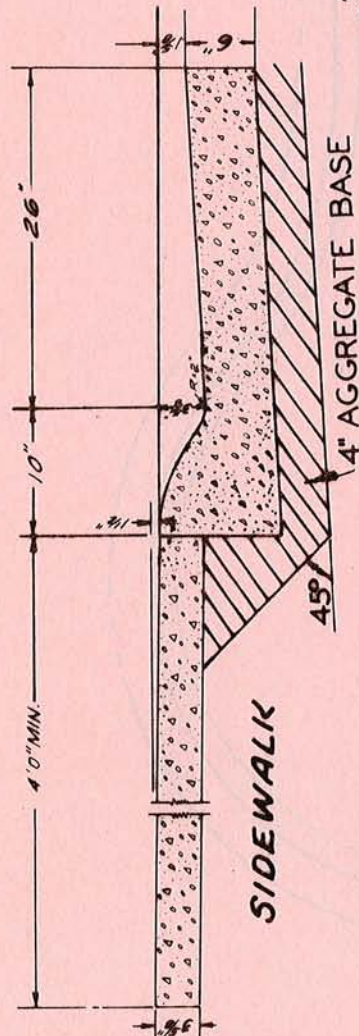


SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

CUL-DE-SAC

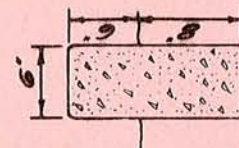
Scale:
Date:
Drawn By:

SD NO. 61

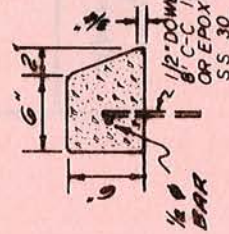


SIDEWALK

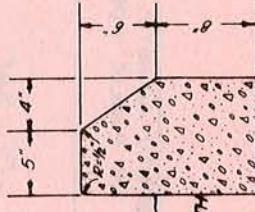
4" AGGREGATE BASE



TYPE 3
BARRIER CURB
FOR COMMERCIAL
FRONTAGE

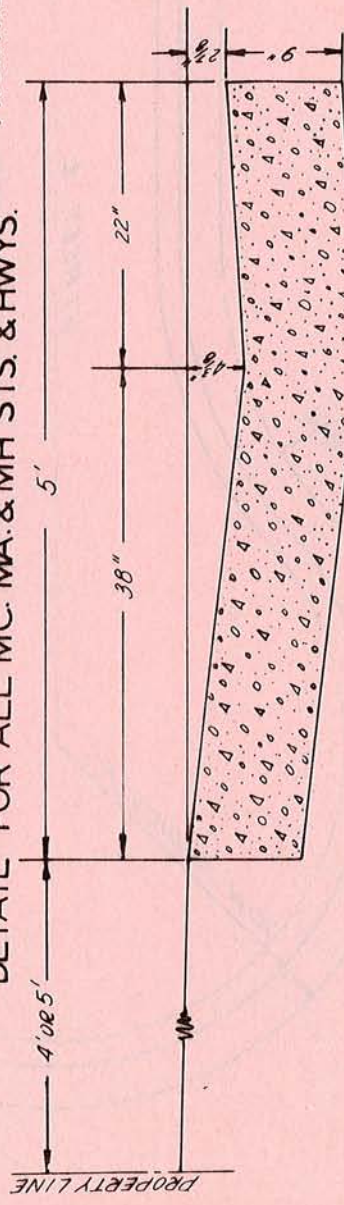


TYPE 4
BARRIER CURB

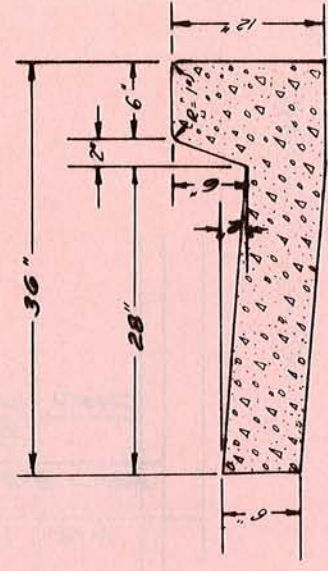


TYPE 5
BARRIER CURB

DETAIL FOR ALL MC. MA. & MH STS. & HWYS.



TYPE 6
MODIFIED 'V' GUTTER



TYPE 2
VERTICAL CURB & GUTTER

NOTE:
LOCATE 1/2" TRANSVERSE EXPANSION JOINTS OF ASPHALT IMPREGNATED
CELOTEX IN SIDEWALK, CURB AND GUTTER AT 20' INTERVALS.
ALL CONCRETE TO BE CLASS "B"

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
CURBS & GUTTERS	
Scale: Date: 1-2-70 Drawn By:	SD NO. 2

A hand-drawn sketch of a ramp structure. The ramp is labeled "4'-0\"/>

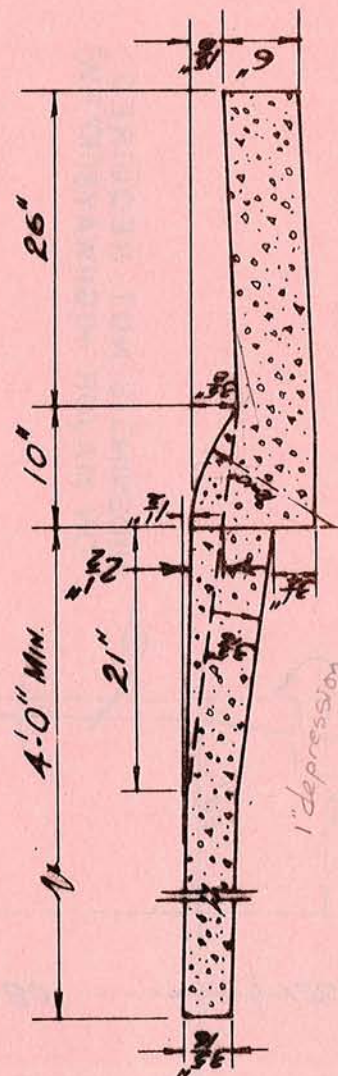
**RAMPS TO BE
CONSTRUCTED AT
CENTER OF CURB
RETURNS ON ALL
INTERSECTIONS**

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

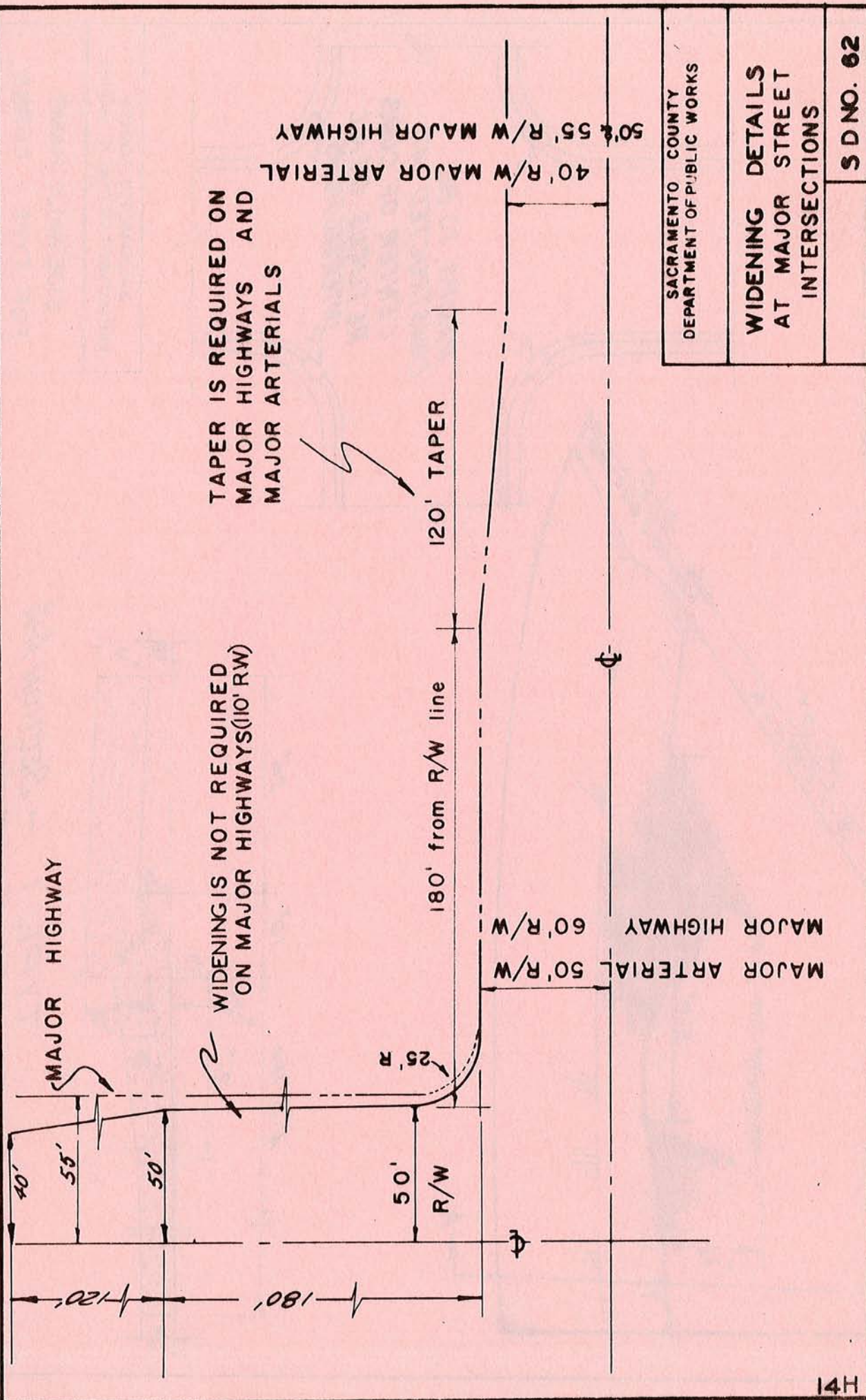
**SIDEWALK RAMP
FOR TYPE 1 CURBS**

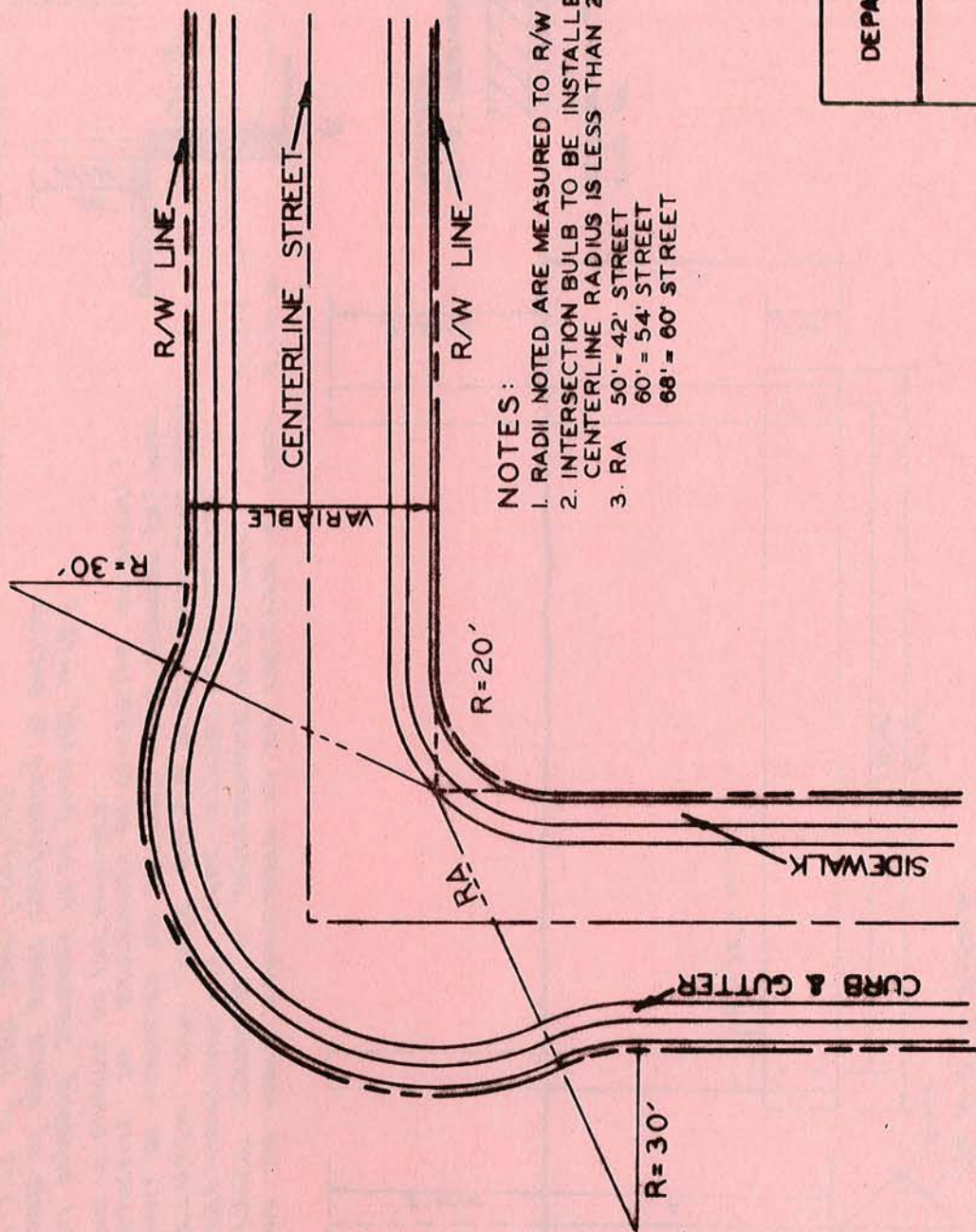
SCALE: NONE
DATE: 1-22-73
DRAWN BY:

SD NO. 42



TYPE 1 ~ SECTION A-A
ROLLED CURB & GUTTER





NOTES:

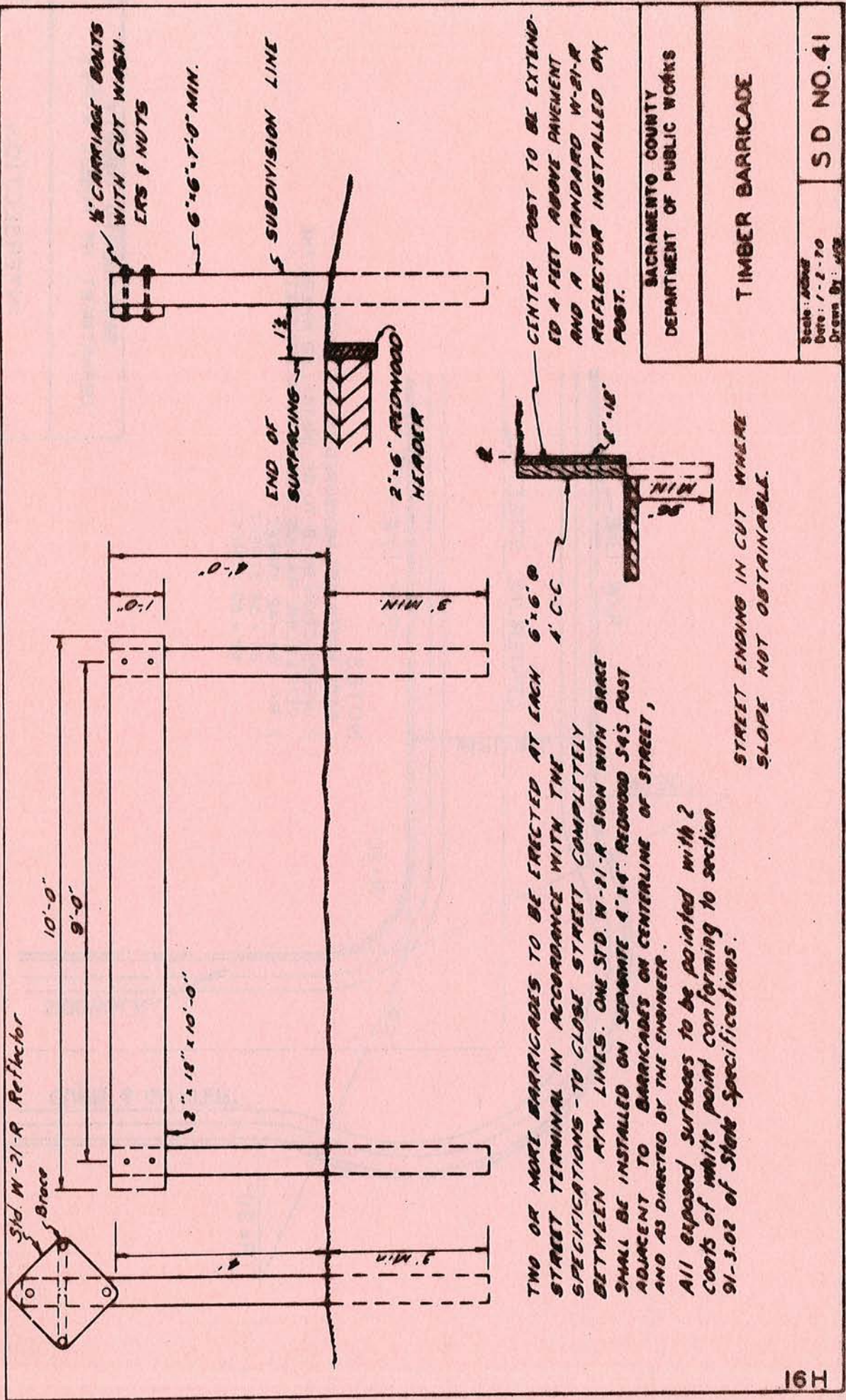
1. RADII NOTED ARE MEASURED TO R/W LINES
2. INTERSECTION BULB TO BE INSTALLED WHERE THE CENTERLINE RADIUS IS LESS THAN 200 FEET
3. RA 50' = 42' STREET
60' = 54' STREET
68' = 60' STREET

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

INTERSECTION
BULB

Scale:
Date:
Drawn By:

SD NO. 63

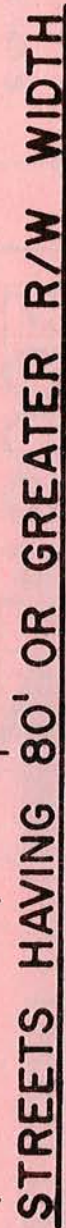


TWO OR MORE BARRICADES TO BE ERECTED AT EACH STREET TERMINAL IN ACCORDANCE WITH THE SPECIFICATIONS - TO CLOSE STREET COMPLETELY BETWEEN R/W LINES. ONE STD. W-21-R SIGN WITH BRACE SHALL BE INSTALLED ON SEPARATE 4"x4" REDWOOD S4S POST ADJACENT TO BARRICADES ON CENTERLINE OF STREET, AND AS DIRECTED BY THE ENGINEER.

ALL EXPOSED SURFACES TO BE PAINTED WITH 2 COATS OF WHITE POINT CONFORMING TO SECTION 91-3.02 OF STATE SPECIFICATIONS.

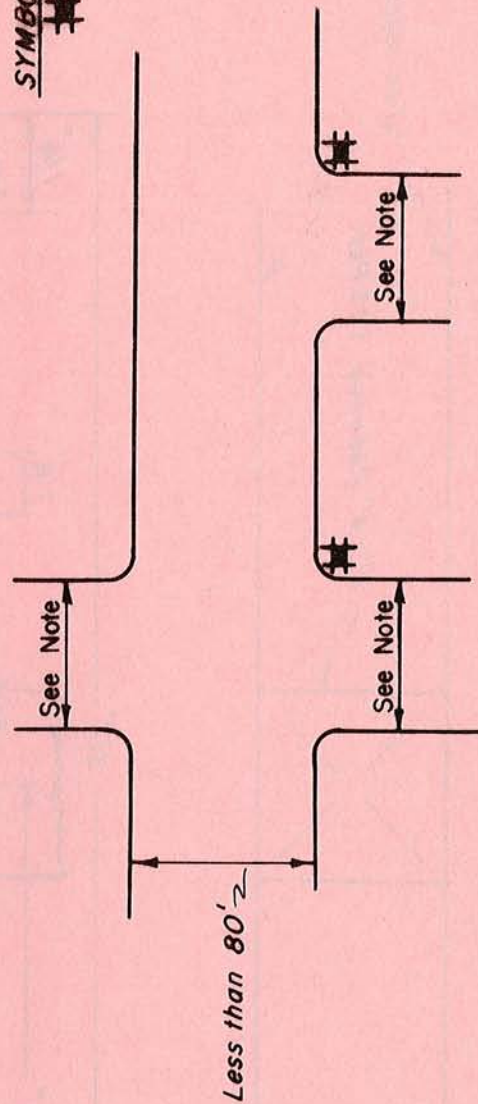
STREET ENDING IN CUT WHERE SLOPE NOT OBTAINABLE.

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
TIMBER BARRICADE	
Scale: AS SHOWN Date: 1-2-70 Drawn By: JCS	SD NO. 41



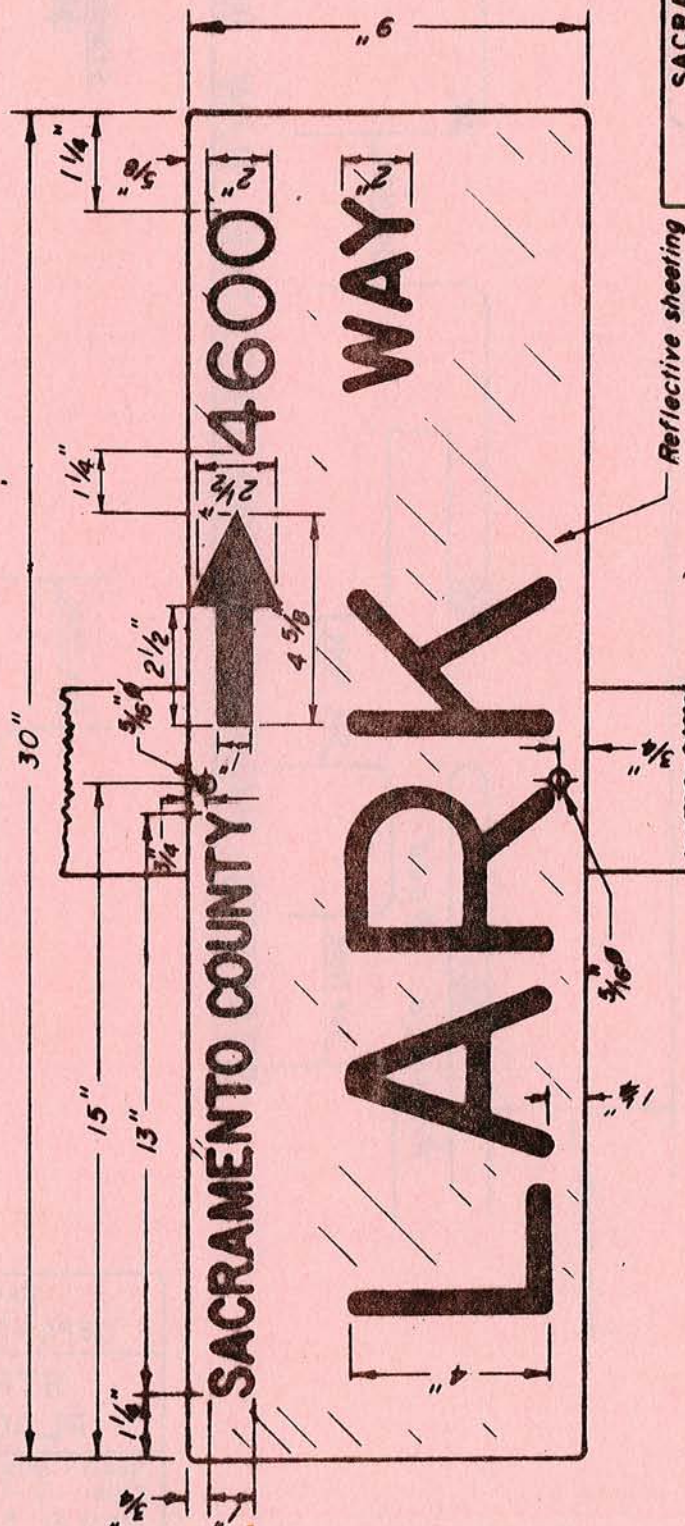
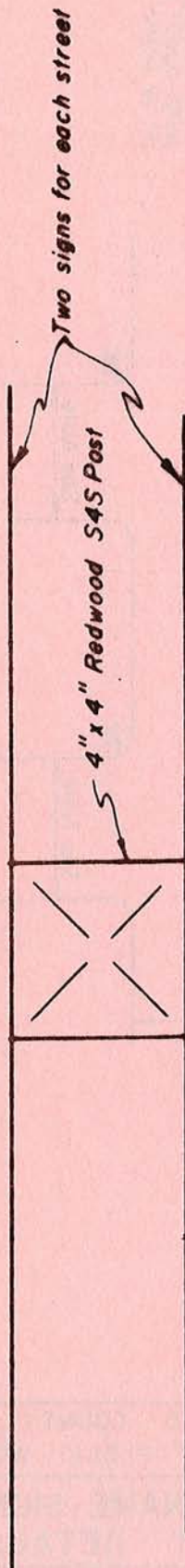
*Standard street name
sign installation. Four (4)
sign plates on 4 x 4
redwood post.*

**Intersecting streets
with equal or lesser
R/W width.**



STREETS HAVING LESS THAN 80' R/W WIDTH

SD NO. 50



Notes:

1. Aluminum sheet
alloy 6061-T6 0.125"
gauge rounded corners
1/4" radius.
2. For two (2) streets place
second pair of signs
and at 90° to signs as
shown.
3. Number to be shown on
plans. (Rounded to
hundreds).
4. Arrow to point in
direction of increasing
numbers.

2. For two (2) streets place second pair of signs and at 90° to signs as shown.

3. Number to be shown on plans. (Rounded to hundreds).

4. Arrow to point in direction of increasing numbers.

Reflective sheeting

**SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS**

DEPARTMENT OF PUBLIC WORKS

**STREET SIGN
FULLY REFLECTORIZED**

FULLY REFLECTORIZED

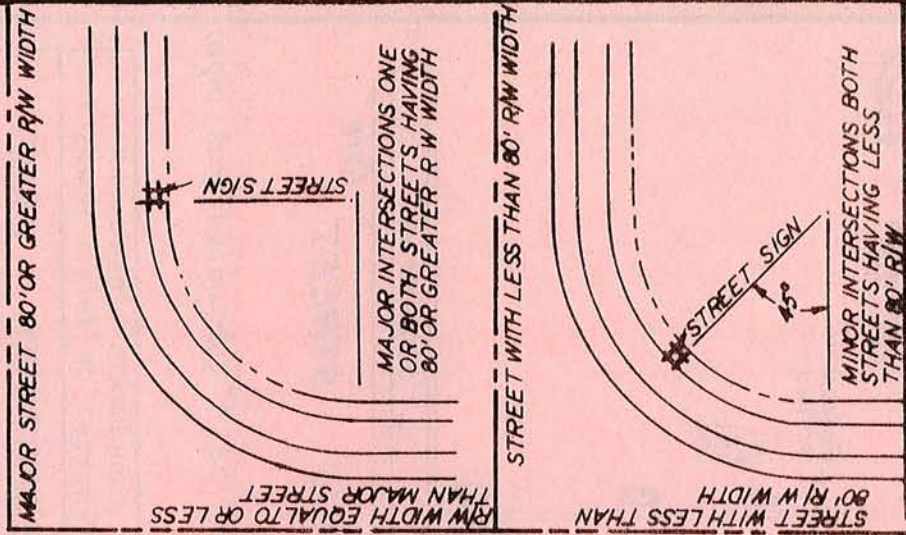
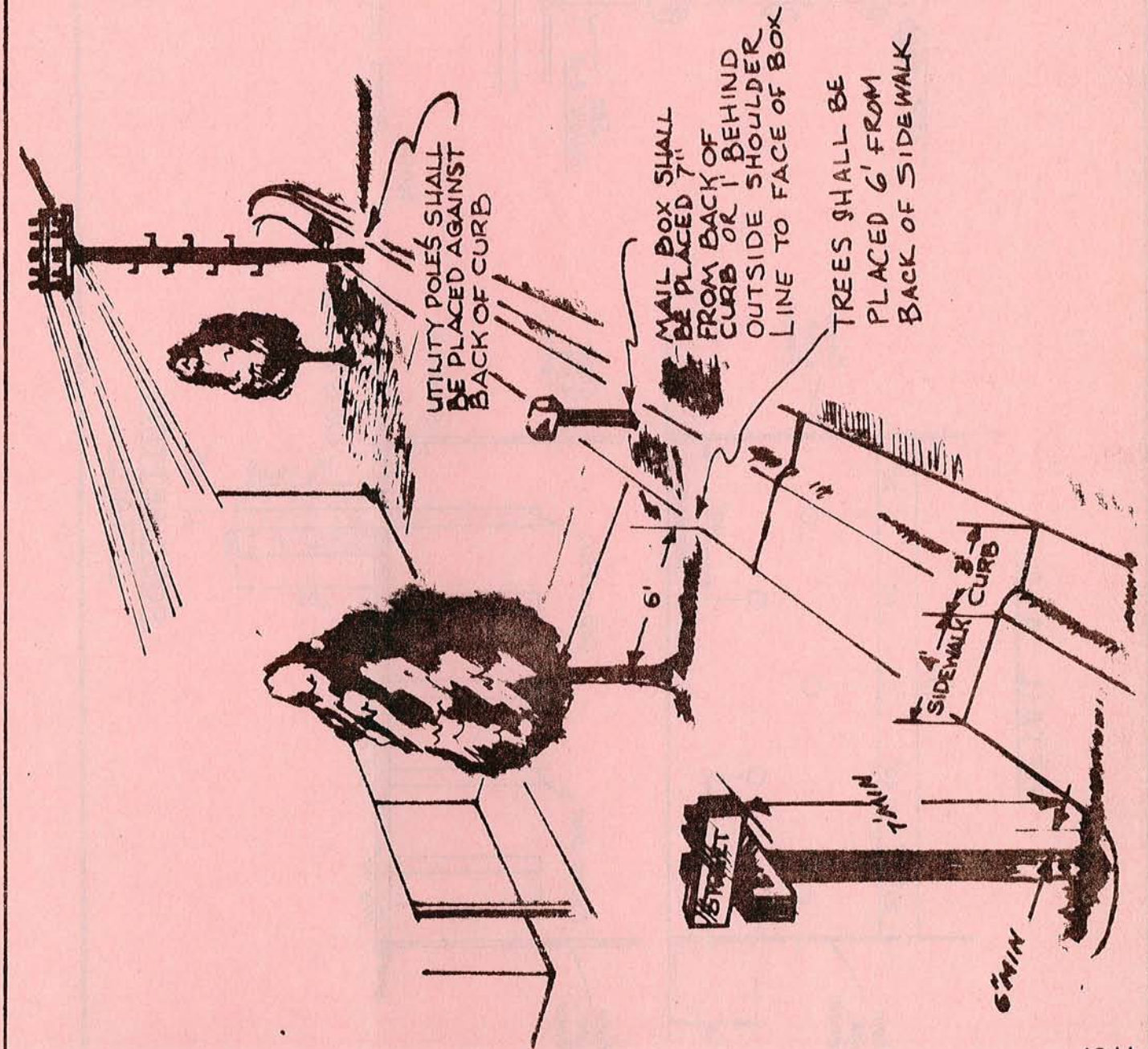
Scale: No Scale
Date: 12-1-72
Drawn By: R.N.

Date: 12-1-72

Drawn By: E.N.

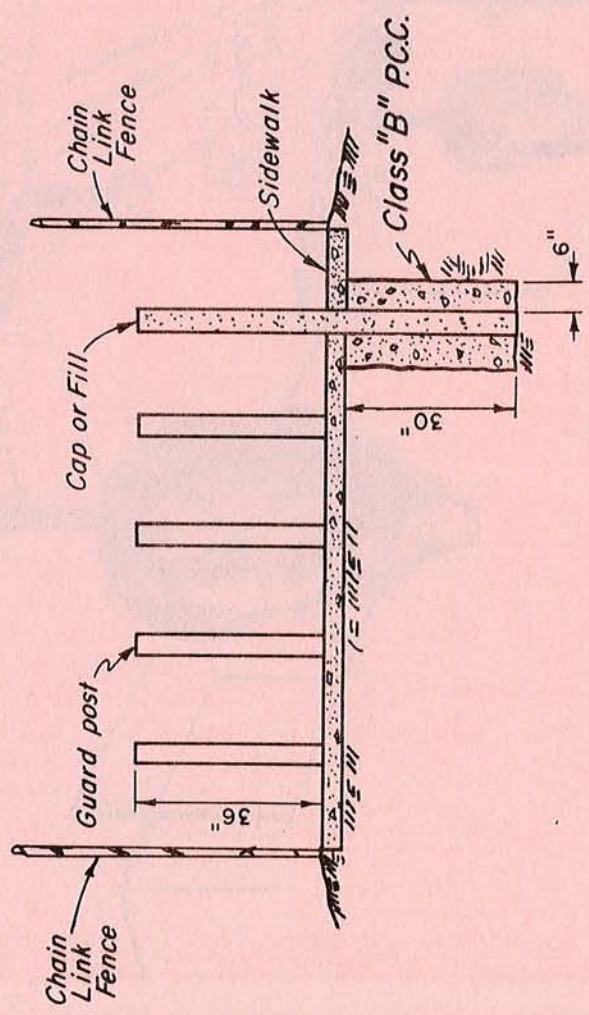
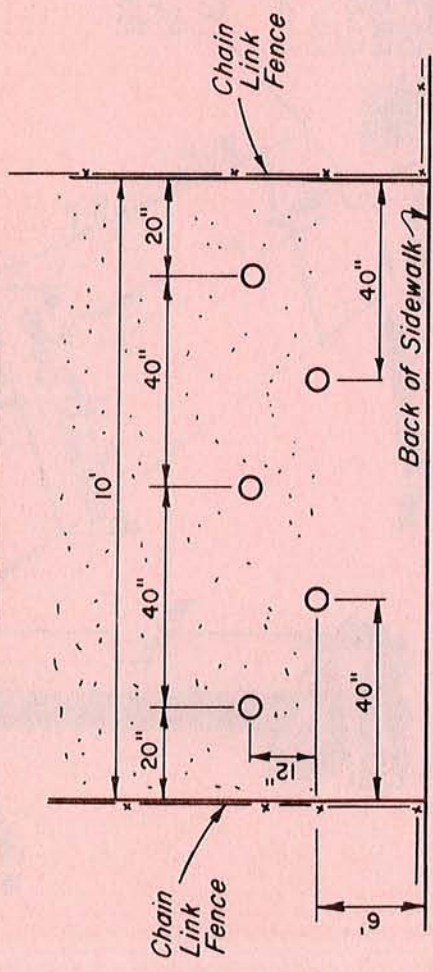
SD NO. 51

SIGN DETAILS FOR SINGLE STREET

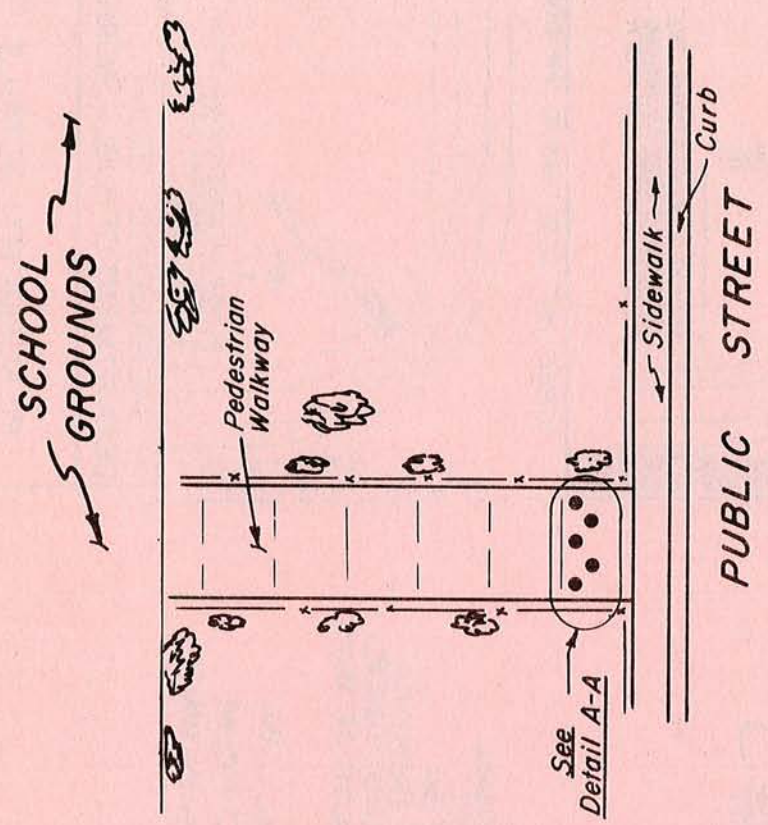


SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
PLACEMENT DETAILS	
Scale: NONE Date: 12-1-72 Drawn By: R.N.	SD NO. 52

DETAIL A-A

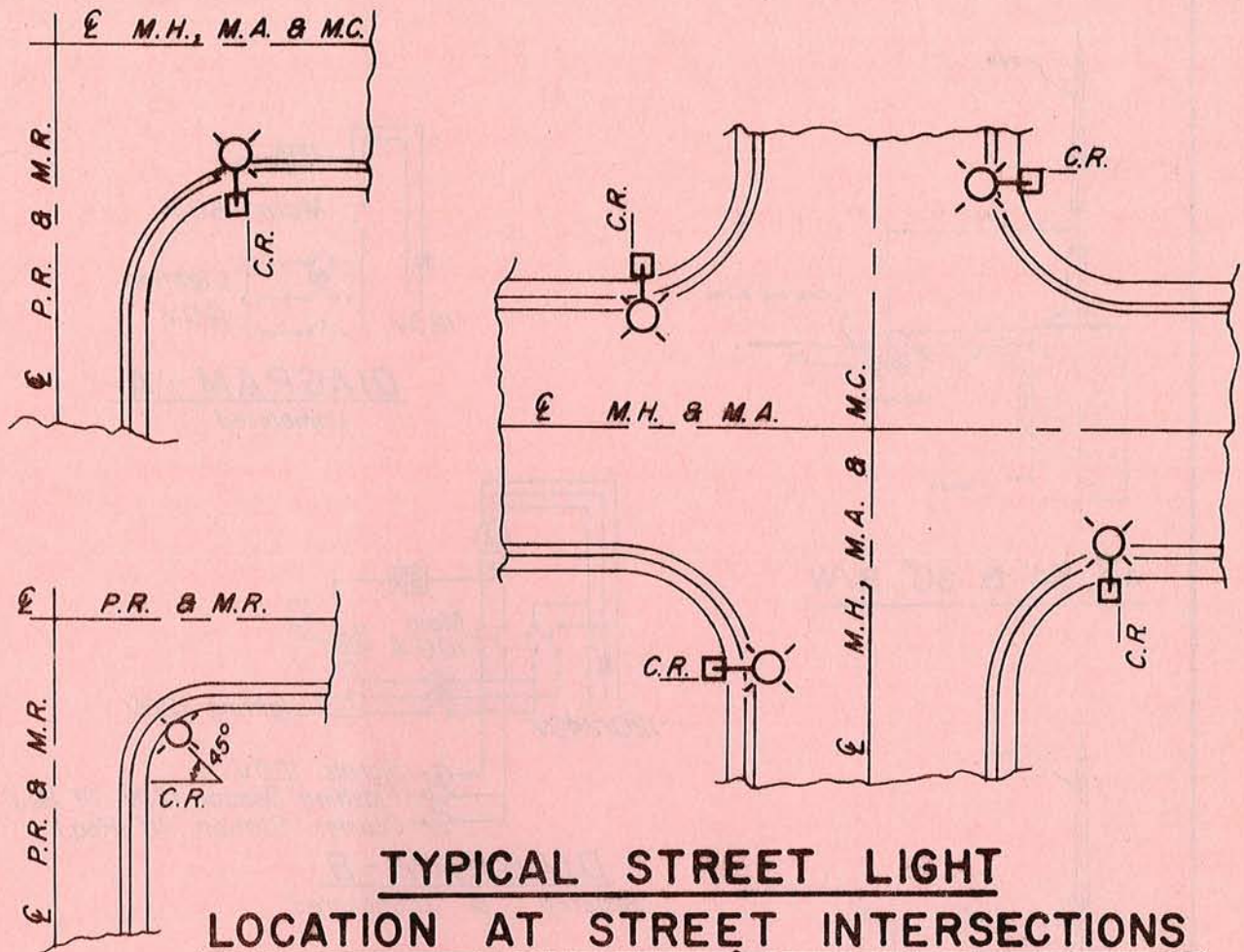


POST SETTING DETAIL



Note: - Guard posts shall be 4" galvanized iron pipe.

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
PEDESTRIAN LANE BIKE BARRIER	
SCALE: NO SCALE DATE: MARCH, 1972 DRAWN BY: R.N.	SDNO.53

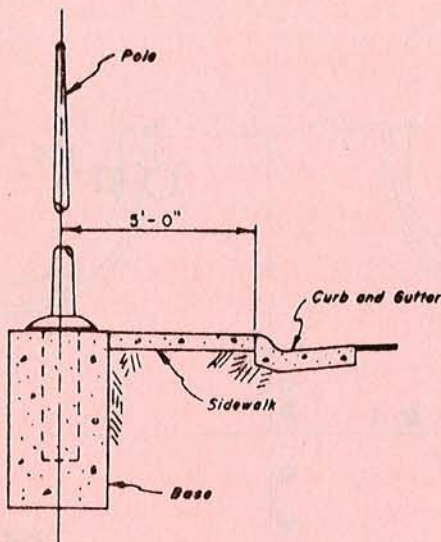


Street Classification	Type of Luminaire	Minimum Mounting Height	Avg. Maint. fc	Uniformity Ratio	Maint. Factor
Major Highway (100' R/W)	A	30'	.70	3:1	.65
Major Arterial (80' R/W)	A	30'	.70	3:1	.65
Minor Commercial Residential - R1A to R3 (60' R/W)	B or C	20'	.17	6:1	.70
Minor-Commercial All others (60' R/W)	A	30'	.40	4.5:1	.65
Primary Residential (54' R/W)	B or C	20'	.17	6:1	.70
Minor Residential (42' R/W)	B or C	20'	.17	6:1	.70
Pedestrian Lane	B or C	14'	.17	6:1	.70

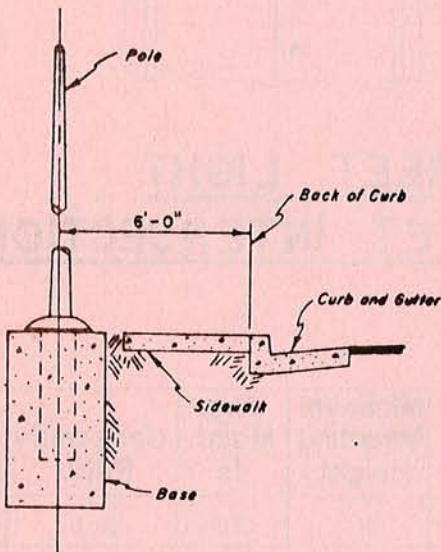
Note: Lumens used to calculate avg. maint. fc shall be 80% of initial lumen value rated by lamp manufacturer.

**DESIGN CRITERIA
FOR ALL
STREET CLASSIFICATIONS**

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
TYPICAL STREET LIGHTING DESIGN STANDARDS	
Scale: NONE Date: MARCH 21, 1973 Drawn By: R.N.	SD NO. 93



42', 54' & 60' R/W



80' & 100'-110' R/W

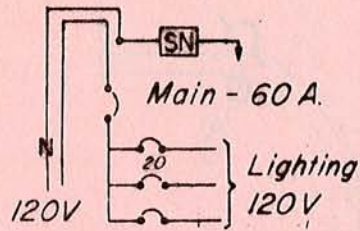


DIAGRAM - A
Unmetered

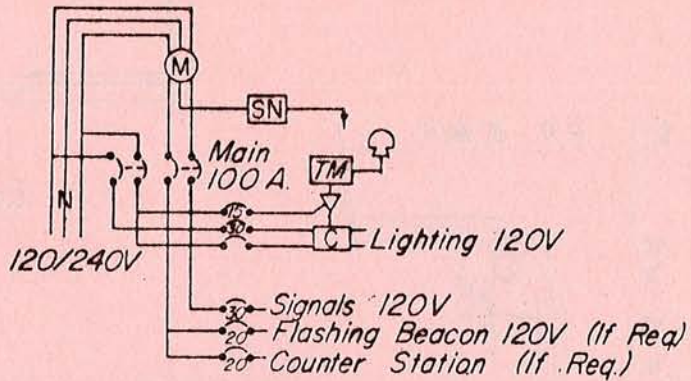


DIAGRAM - B
Metered & Unmetered

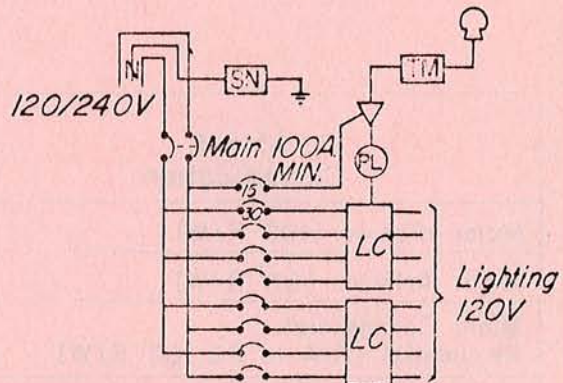
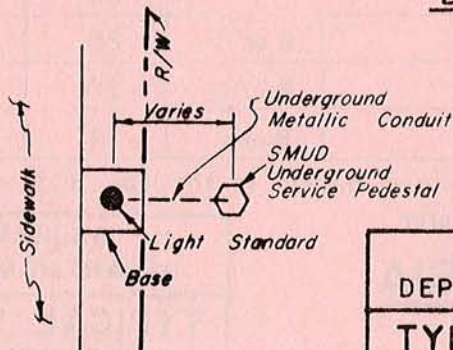
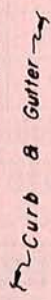


DIAGRAM - C
Street Light

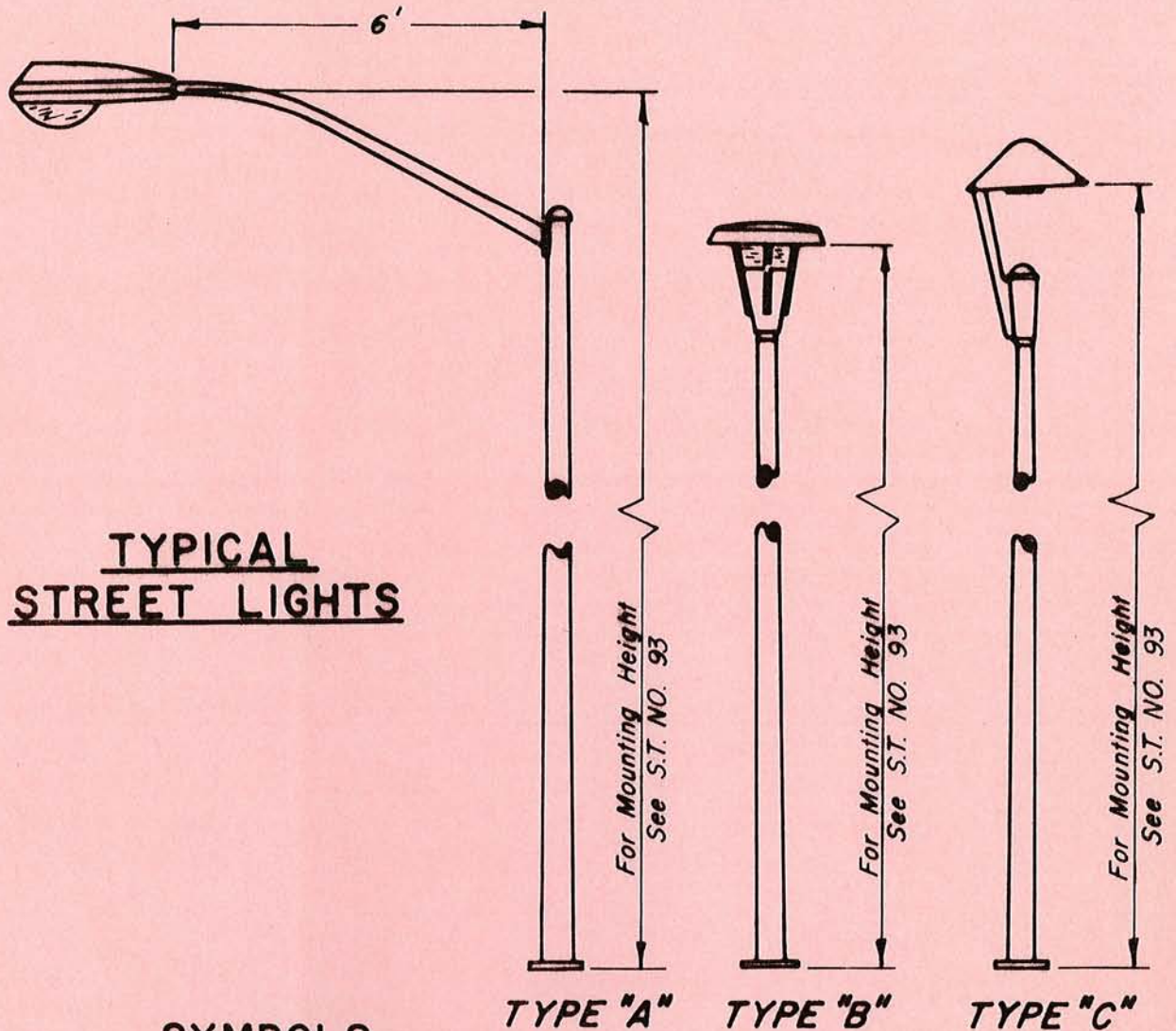


SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TYPICAL STREET LIGHTING
DESIGN STANDARDS

SCALE: NONE
DATE: 3/73
DRAWN BY: RN & DS

SD NO. 94



SYMBOLS

PROPOSED

EXISTING

		Type "A"
		Type "B"
		Type "C"
		Pullbox
		Conduit
		Pedestal and Service Can
		Utility Service Pedestal
		Wood Pole

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TYPICAL STREET LIGHTING DESIGN STANDARDS

Scale: NONE
Date: MARCH 21, 1973
Drawn By: R.N.

SD NO. 95

TYPICAL STREET LIGHTS

SYMBOLS

EXISTING	PROPOSED
—	—
—	—
—	—
—	—
—	—
—	—
—	—
—	—
—	—

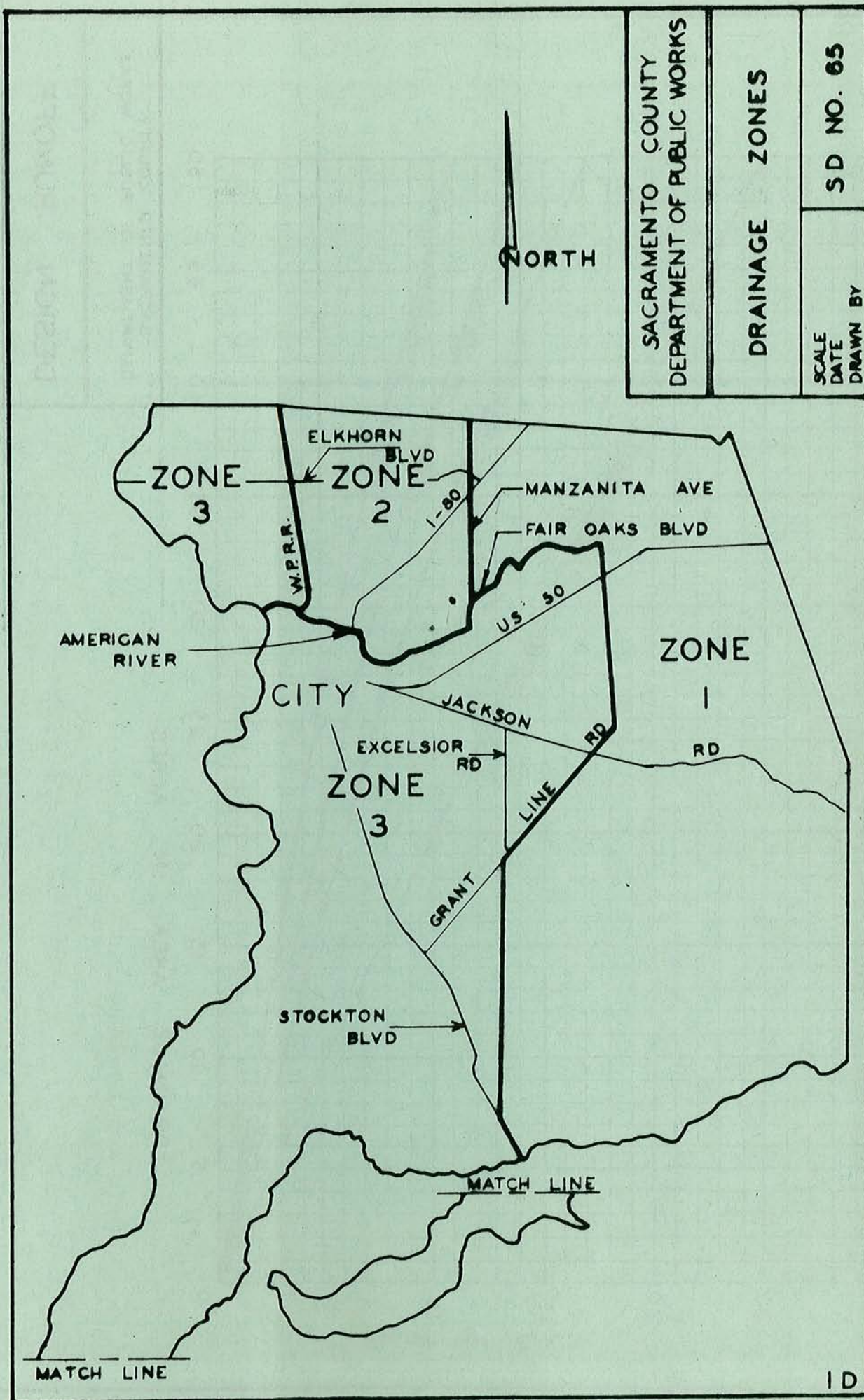
Wood pole
Utility service (existing)
Power and service cap

Standard
Existing
Type 2
Type 1

DESIGN STANDARDS
TYPICAL STREET LIGHTING
DEPARTMENT OF PUBLIC WORKS
CITY OF LOS ANGELES

ADDITIONAL

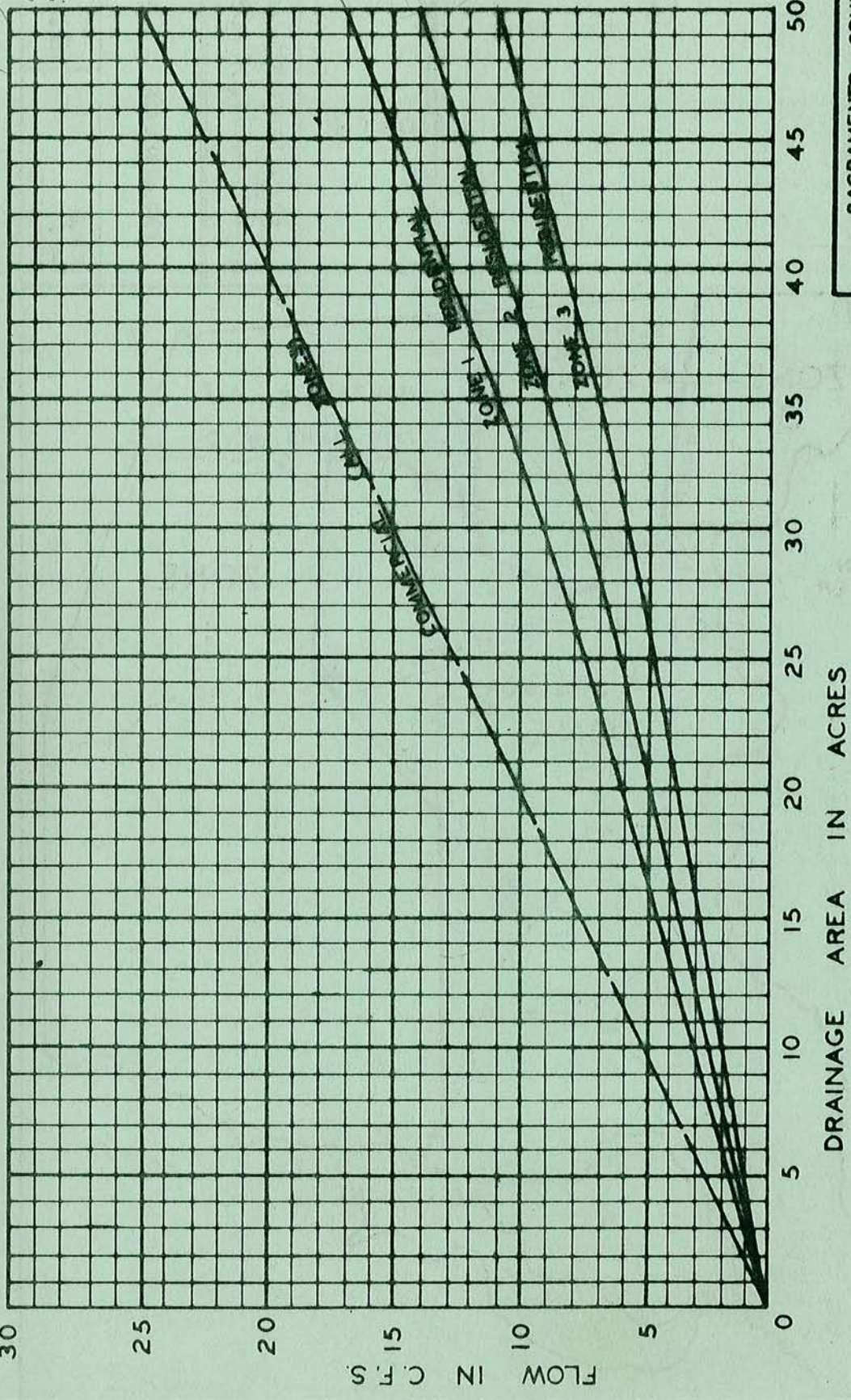
DATE: 11/1/55
BY: [illegible]



SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
DRAINAGE ZONES	
SCALE DATE DRAWN BY	SD NO. 65

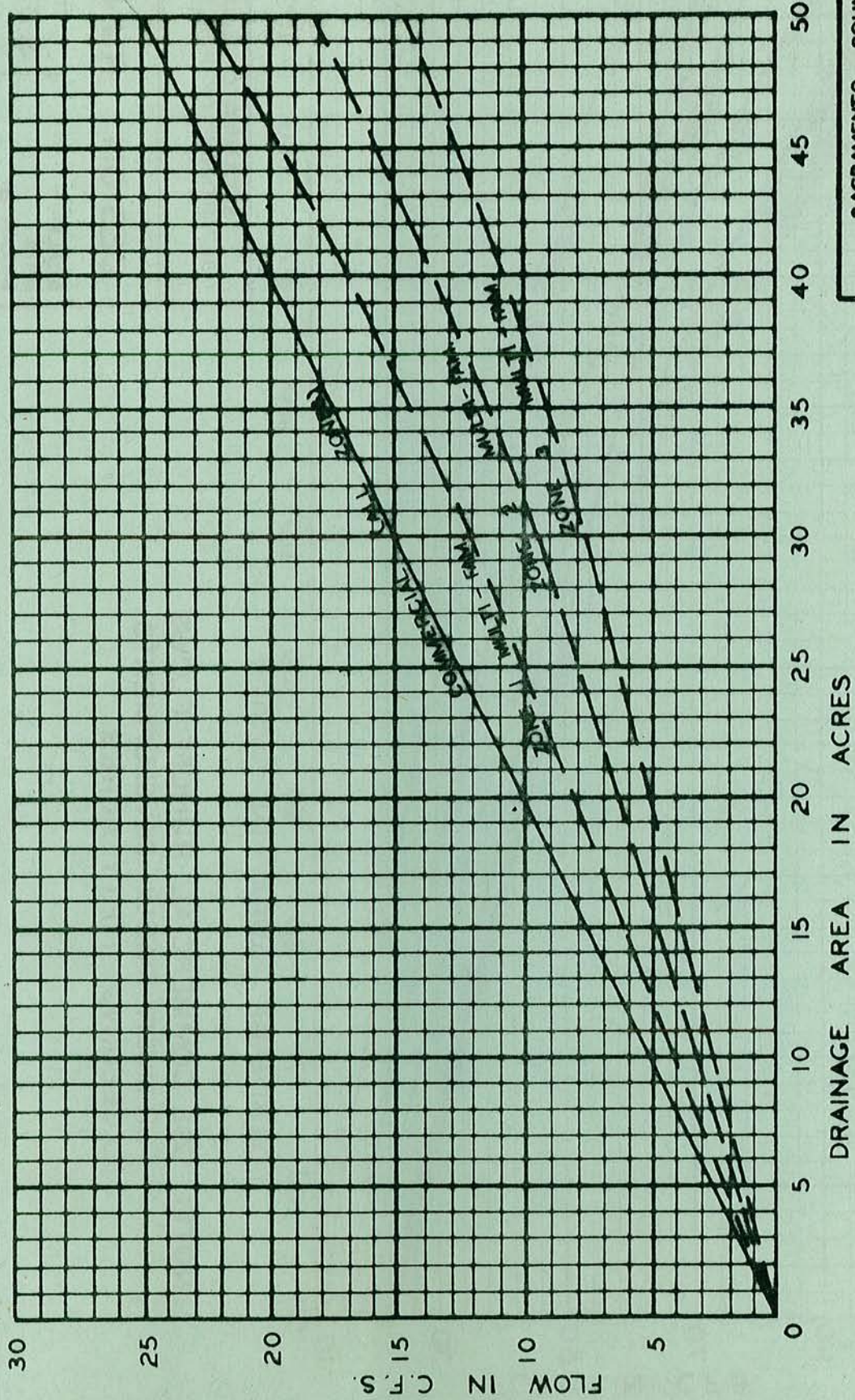
Onoohumnes > 2 ac parcels
 < 160 ac take 100% off

(Medium density)



Low density =
 90% medium density

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
DESIGN RUNOFF	
SCALE: DATE:	S D NO. 66
DRAWN BY:	



SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

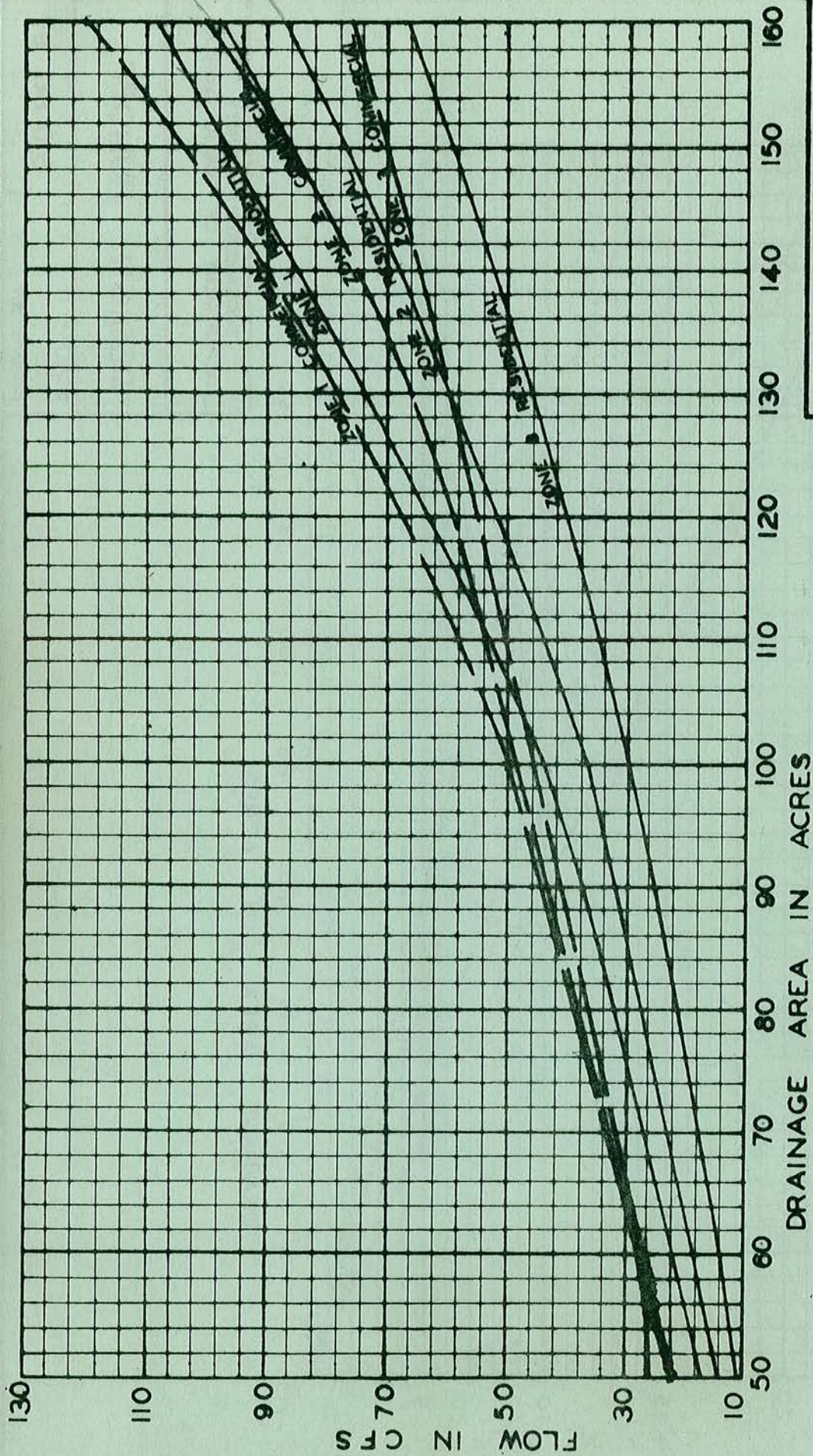
DESIGN RUNOFF

SCALE:

DATE:

DRAWN BY:

S D NO. 67



SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

DESIGN RUNOFF

SCALE
DATE
DRAWN BY

S D NO. 68

MAXIMUM TRENCH DEPTH MEASURED SURFACE TO BOTTOM OF TRENCH IN FEET										MINIMUM COVER MEASURED SURFACE TO TOP OF PIPE IN INCHES				
DIAMETER	CONC PIPE C-14		REINFORCED CONCRETE PIPE & ASBESTOS CEMENT PIPE -CLASS-					VCP ES	CAST IN PLACE	TYPE	CLASS	MIN COVER		
	S.S.	E.S.	I	II	III	IV	V					STREET	OFF ST	
10	13	30	NOT PERMITTED					30	LIMIT	REIN. CONCRETE AND ASBESTOS CEMENT	33 EXTRA STRENGTH	27	12	
12	12	26						26		I	33	24	12	
15	12	26						26		II				
18	12	25						29		III				
21	12	25						29		IV				
24	12	24						24		V				
27	NOT PERMITTED		13	14	17	20	27	19	LIMIT	VCP	ES	24	12	
30			14	14	19	36	36	19						
33			14	14	20	36	36	20						
36			13	13	17	27	69	NOT PERMITTED		CAST IN PLACE CONC PIPE	—	12	12	
42			14	14	18	29	62							
48			15	15	19	30	60							
54			16	16	20	31	58			SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS				
60			16	16	21	31	57							
66			15	15	22	32	56			CONCRETE PIPE, REINFORCED CONCRETE PIPE, ASBESTOS CEMENT PIPE, VITRIFIED CLAY PIPE, AND CAST-IN-PLACE CONCRETE PIPE COVER REQ				
72			15	15	23	33	56							
NOTES: All depths shown for flexible pavement and trench width equal to O.D. of pipe plus 16" for pipe 33" and smaller in inside diameter. Trench width equals O.D. of pipe plus 24" for pipe 36" and larger in inside diameter. Trench width measured at top of pipe.										DATE 1-2-72		SD NO. 69		

MAXIMUM TRENCH DEPTH MEASURED SURFACE TO BOTTOM OF TRENCH IN FEET										MINIMUM COVER MEASURED SURFACE TO TOP OF PIPE IN INCHES			
CORRUGATED METAL "C.M.P."					CORRUGATED ALUMINUM "C.A.P." □					C.M.P.		C.A.P. □	
GAGE DIA.	16	14	12	10	8	16	14	12	10	8	42' TO 60' R/W STREETS	MAJOR STREETS	OFF STREET ONLY
10						40					6	9	9
12	60	80				35	40	50				9	9
15	50	70				32	35	40					10
18	40	60	100			28	30	35					10
21	35	50	80	100		21	25	30					12
24	17	47	72	82		13	21	30					15
27	19*	40	60	72		13	20	27					18
30	17*	32	47	72		12	19	25	30				20
								20	27				24
								18	25	30			
								15	20	29			
								15	18	27	6	9	
								13	15	25	6	10	
									10	20	8	12	
									10	18	8	14	
										15	8	16	

Thickness, inches

in parenthesis

CAP

CSP

.064
.079
.109
.138
.168
.060
.075
.105
.135
.165

NOTE:

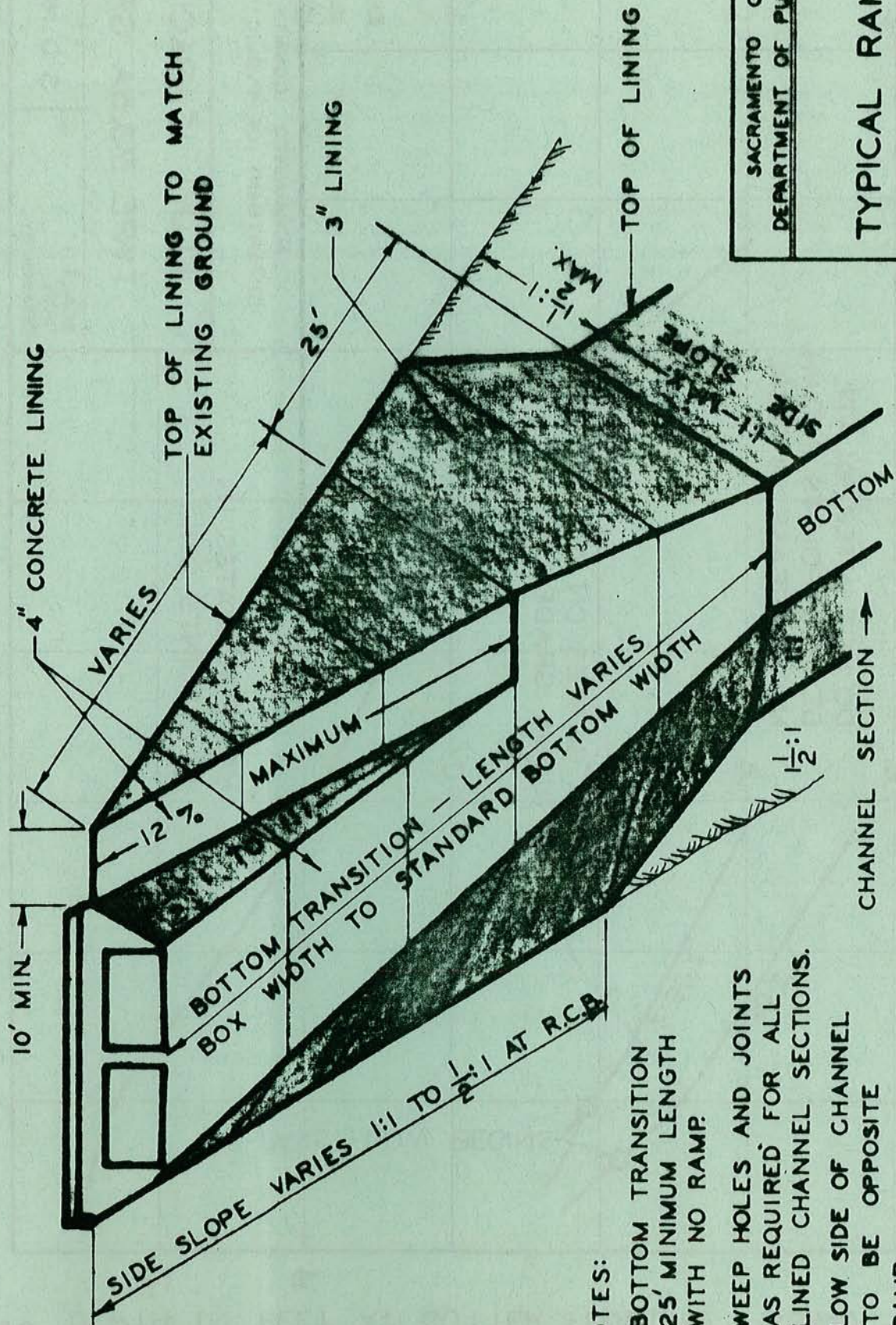
* ONLY UNDER MINOR (42' TO 60') ROADS

□ ALUMINUM PIPE NOT PERMITTED IN PUBLIC STREETS

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

CORRUGATED STEEL
AND ALUMINUM PIPE
COVER REQUIREMENTS

S D NO. 70



NOTES:

- BOTTOM TRANSITION 25' MINIMUM LENGTH WITH NO RAMP.
- WEEP HOLES AND JOINTS AS REQUIRED FOR ALL LINED CHANNEL SECTIONS.
- LOW SIDE OF CHANNEL TO BE OPPOSITE RAMP.
- SIDE SLOPE LINING MAY BE DELETED ON CHANNELS WITH BOTTOM LINING ONLY.

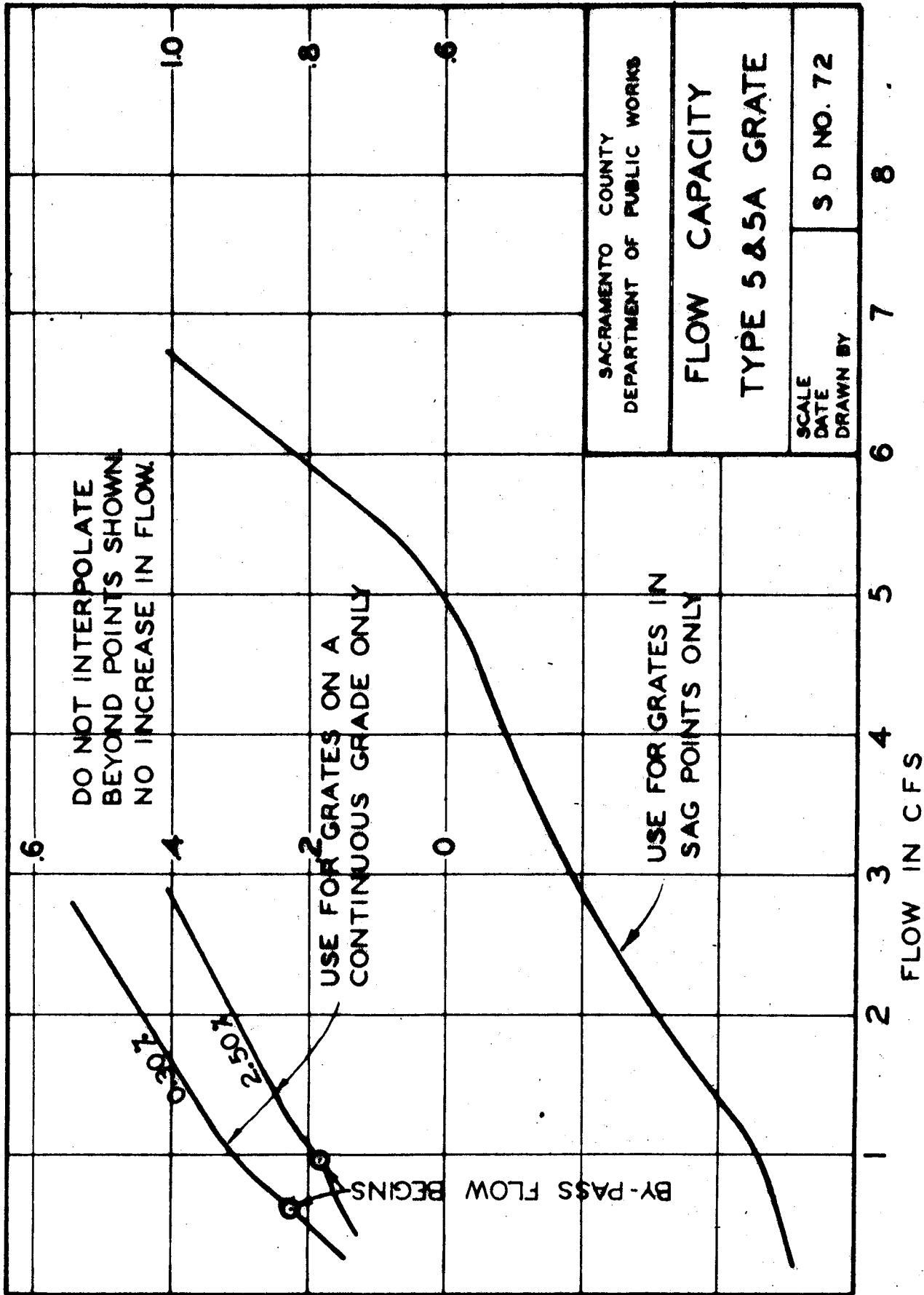
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

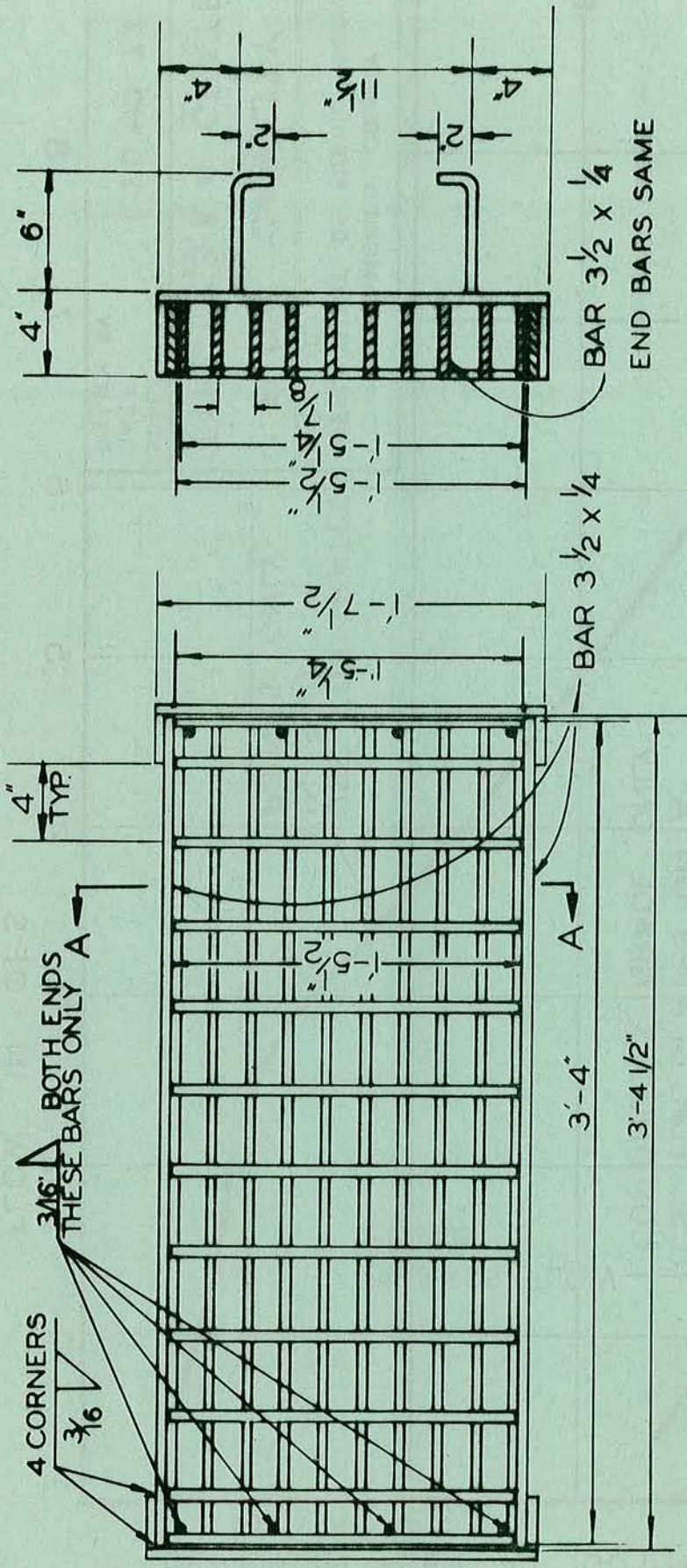
TYPICAL RAMP &
TRANSITION DETAIL

SCALE NONE
DATE 1/2/72
DRAWN BY

S D NO. 71

08 DEPTH IN FEET AT GUTTER FLOWLINE (SUMP)





SECTION A-A

NOTE:

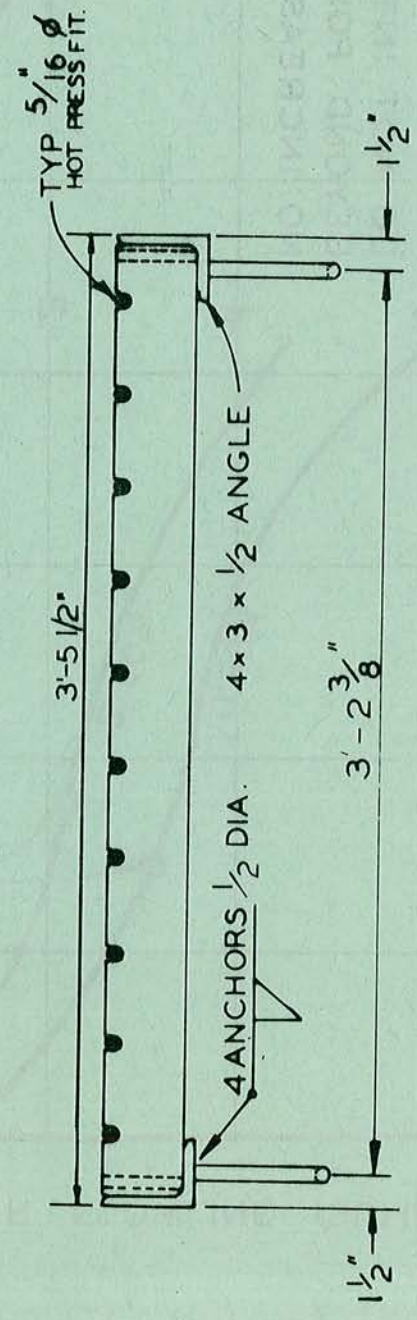
ALL EXPOSED PARTS TO BE ASPHALT COATED OR GALVANIZED

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

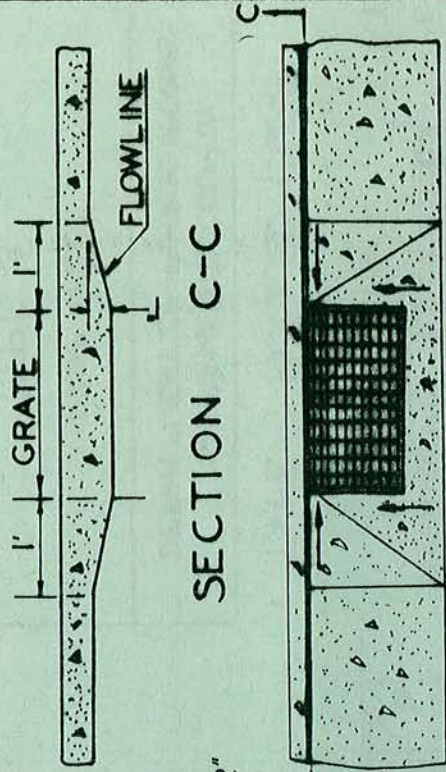
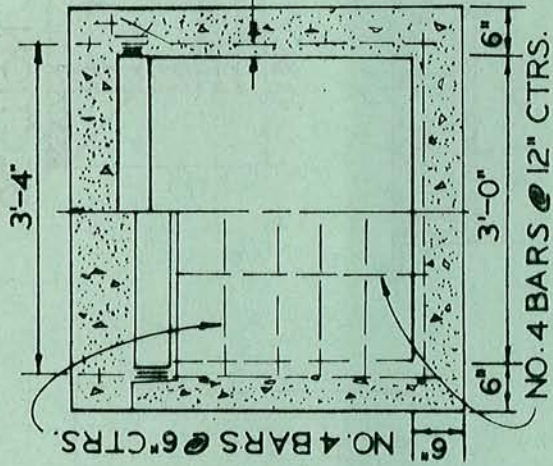
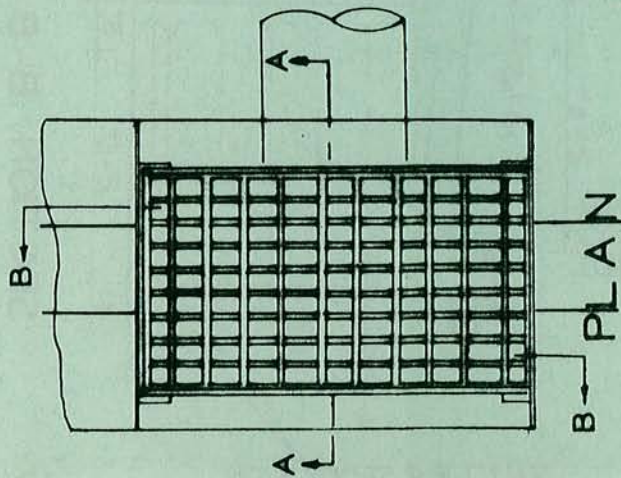
DROP INLET FRAME & GRATE
FOR TYPE 1, 2, 3, AND 4
DROP INLETS

SCALE:
Date: 1-2-70
DRAWN BY:

S D NO. 17



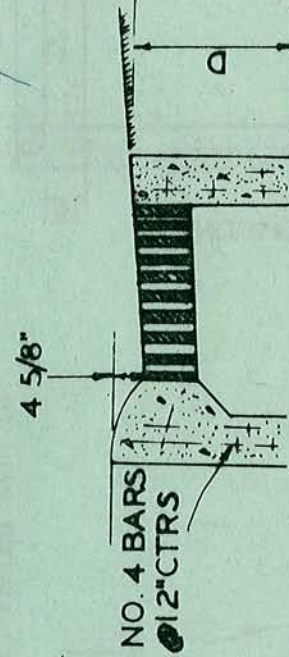
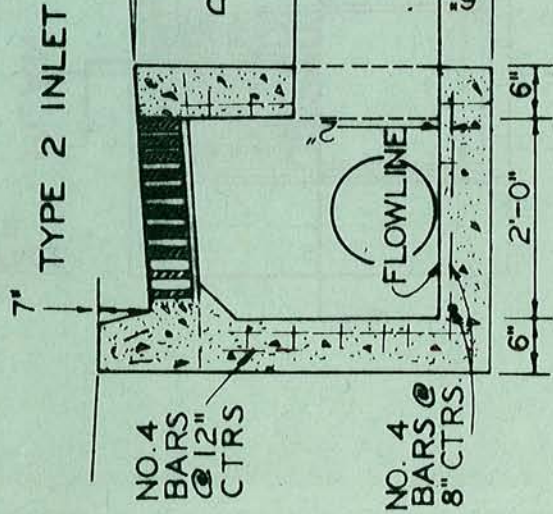
SD



PLAN STANDARD DEPRESSION

NOTES

1. DIMENSIONS D & E MAY VARY WITH EACH LOCATION
2. DEPRESSION IS STANDARD FOR ALL INLETS
3. SEE FRAME & GRATE DETAIL STANDARD DRAWING NO. 17



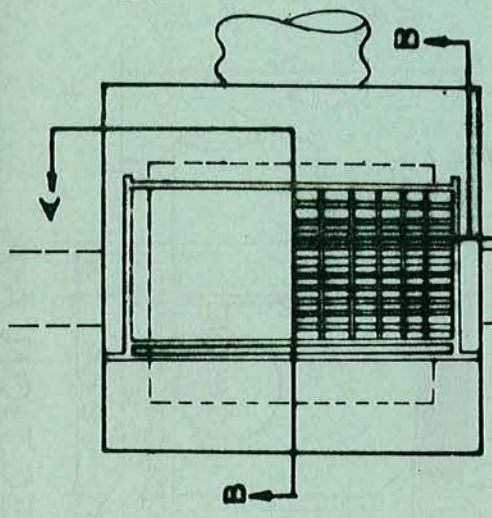
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

DROP INLET
TYPE 1 AND 2

SCALE:
DATE: 1-2-70
DRAWN BY:

SD NO. 18

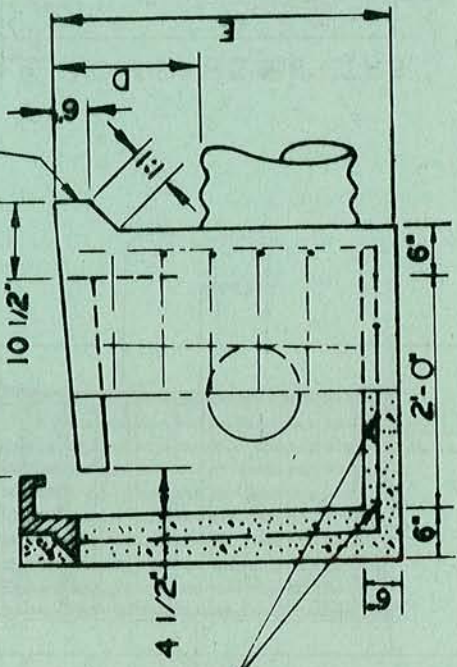
NOTES:
SEE NOTES STD.
DRAWING NO. 18



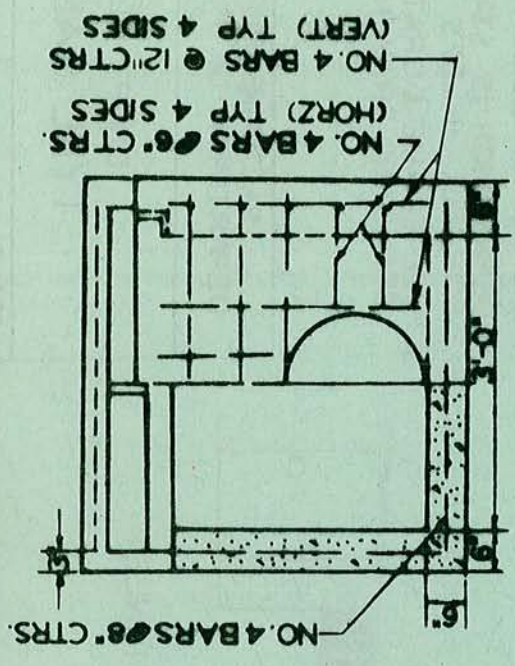
IF LARGER BOX IS
DESIRED FILLET CAN
BE MOVED TO INSIDE
OF BOX

PLAN
TOP OF
CURB FACE
BATTER
2'-6"

NO. 4 BARS @ 8" CTRS.

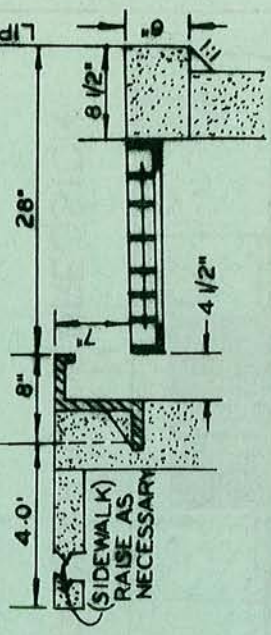


SECTION B-B

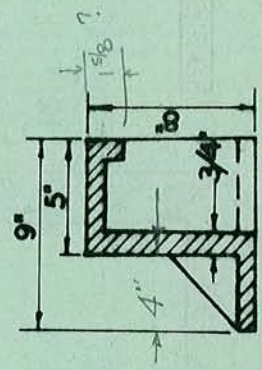
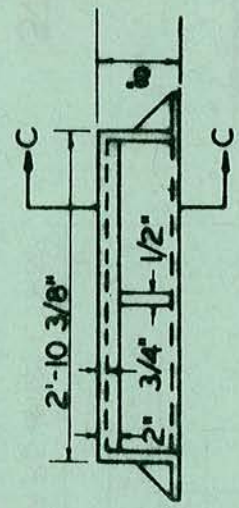


SECTION A-A

BACK OF CURB
3'-0"

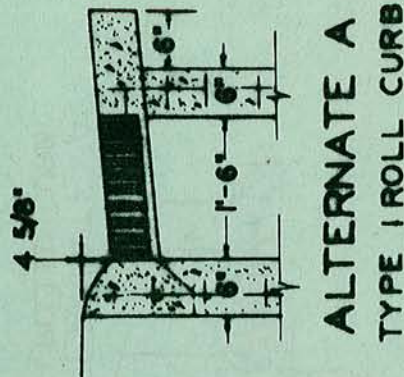
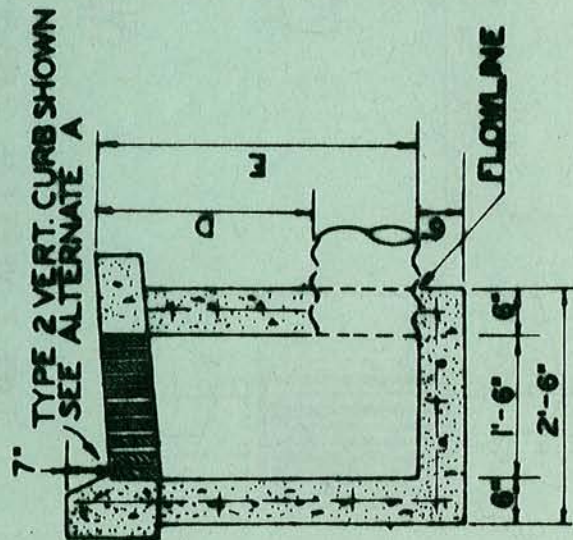
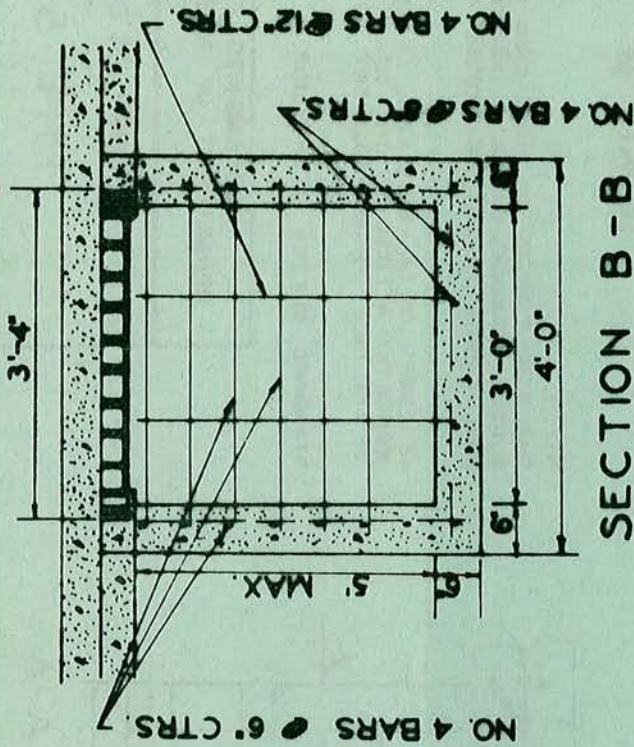
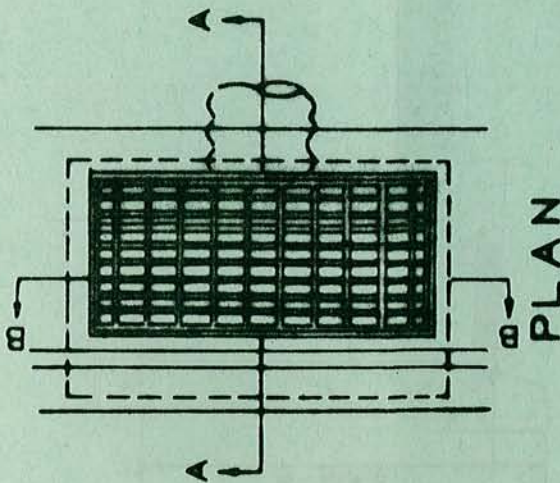


TYPE 1 ROLLED CURB



SECTION C-C

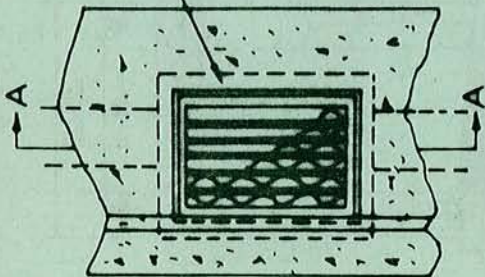
SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
DROP INLET TYPE 3	
SCALE: DATE: 1-2-70 DRAWN BY:	SD NO. 19



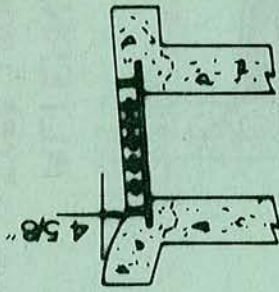
NOTES
SEE NOTES STD. DRAWING
NO. 18

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
DROP INLET TYPE 4	
SCALE: DATE: 1-2-70 DRAWN BY:	S D NO. 20

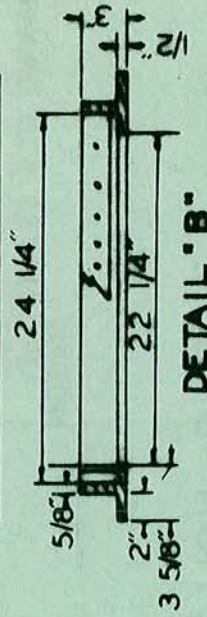
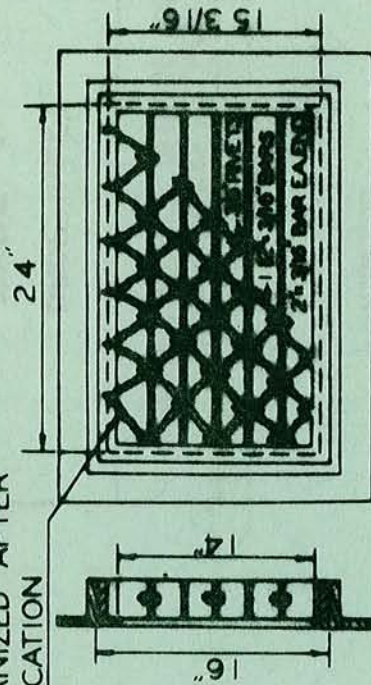
STD. AASHO BRIDGE DECKING
2 1/2" X 3/16" BEARING BAR
GALVANIZED AFTER
FABRICATION



SEE DETAIL "B"

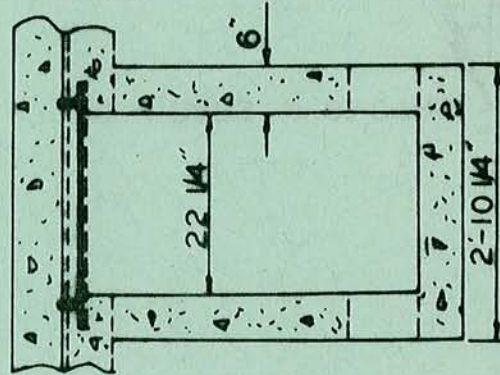
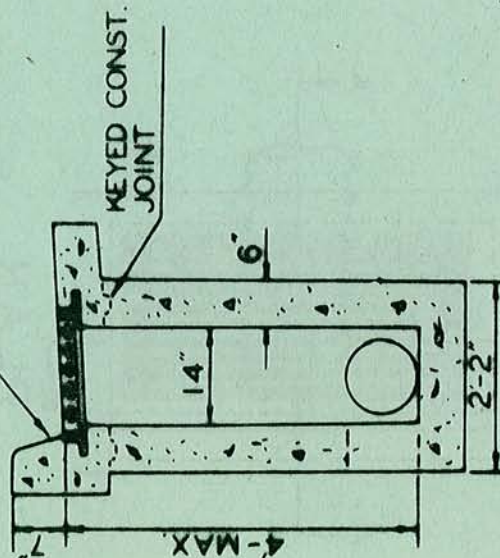


ALTERNATE "A"
TYPE 1 ROLLED CURB



DETAIL "B"

TYPE 2 VERTICAL CURB SHOWN
SEE ALTERNATE "A"



SECTION A-A

NOTES:

THIS STRUCTURE IS TO SERVE ONLY TO PICK UP
GUTTER DRAINAGE OR AS A JUNCTION BOX FOR
SMALL PIPES IN A LONGITUDINAL DIRECTION ONLY.

12" LENGTH OF 1/4" GALVANIZED CHAIN TO BE PER-
MANENTLY AFFIXED TO THE GRATE AND ONE CORNER
OF THE INLET FRAME ADJACENT TO THE CURB

STANDARD GUTTER DEPRESSION

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

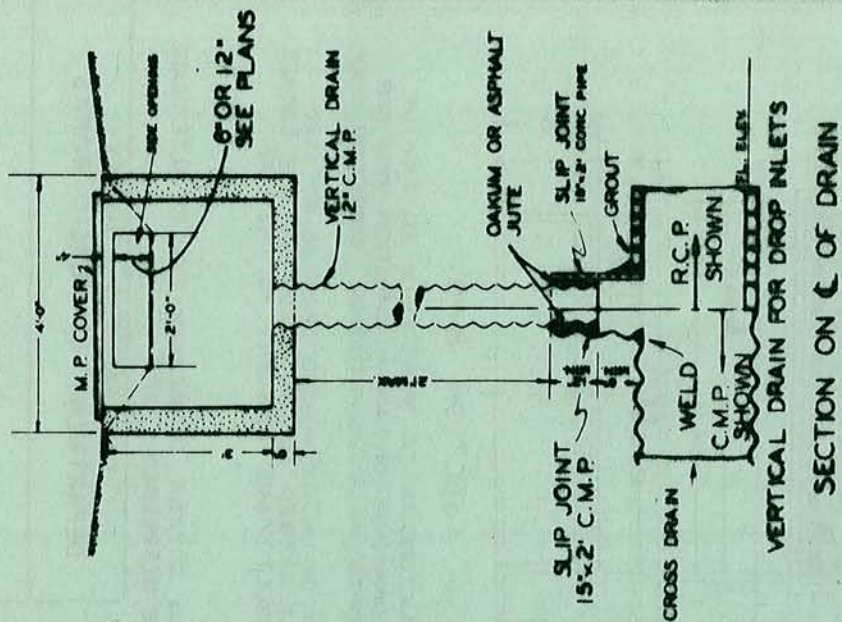
DROP INLET

TYPE 5

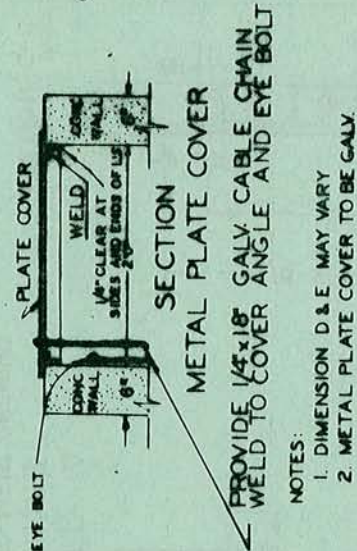
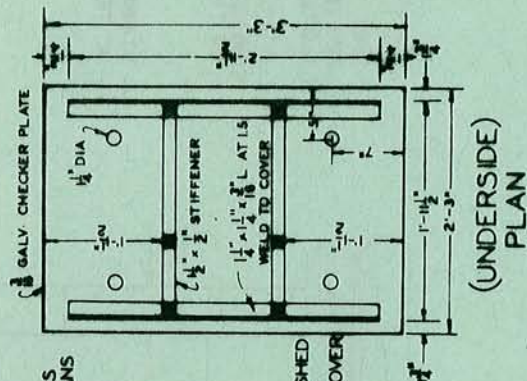
Scale:
Date: 1-2-70
Drawn By:

S D NO. 21





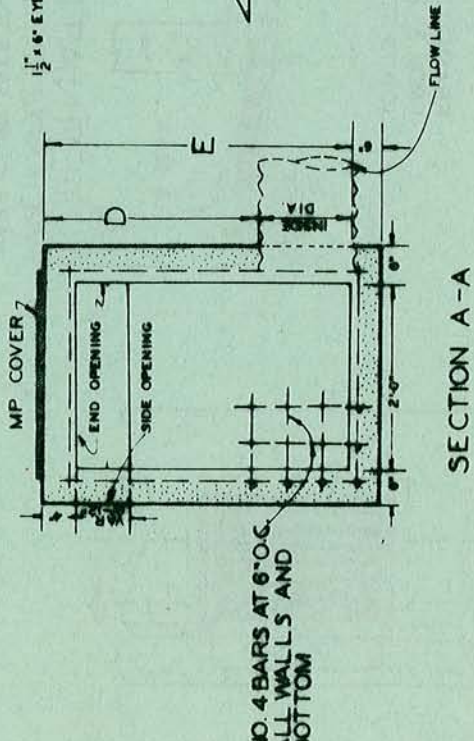
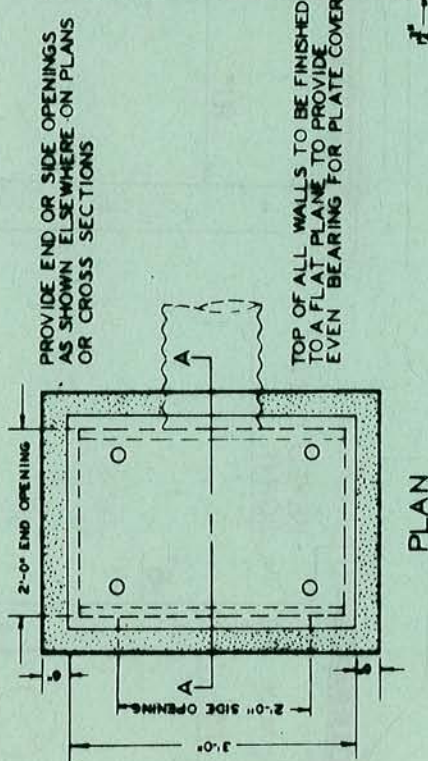
SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	SD NO. 23
DROP INLET	
TYPE 6	
SCALE: DATE: 1-2-70 DRAWN BY:	



PROVIDE 1/4" x 18" GALV. CABLE CHAIN WELD TO COVER ANGLE AND EYE BOLT

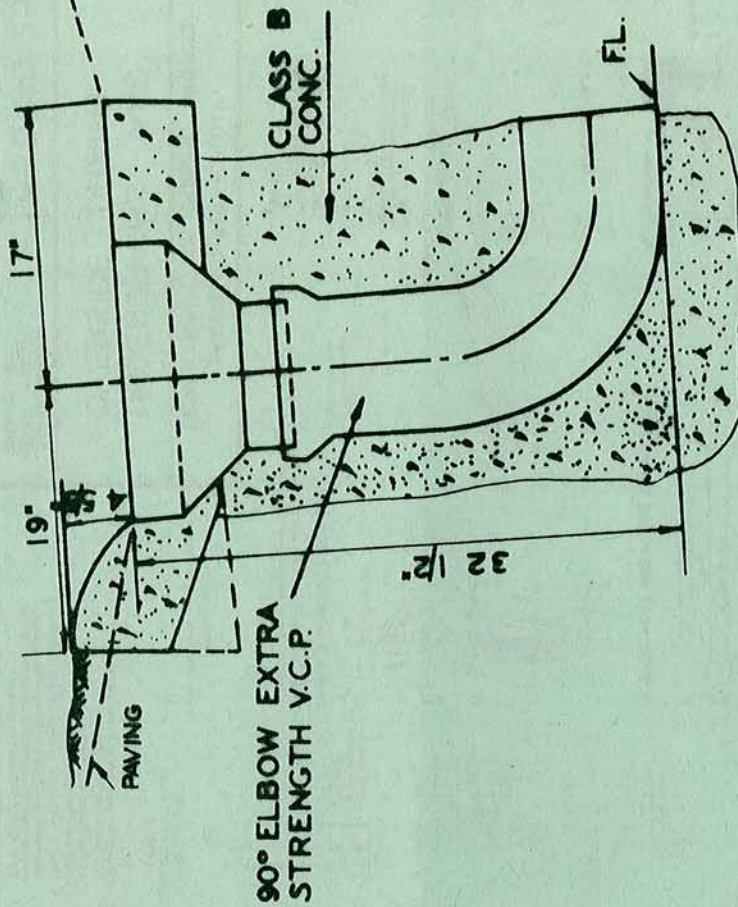
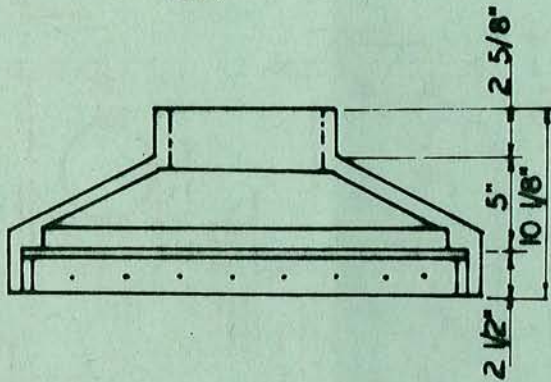
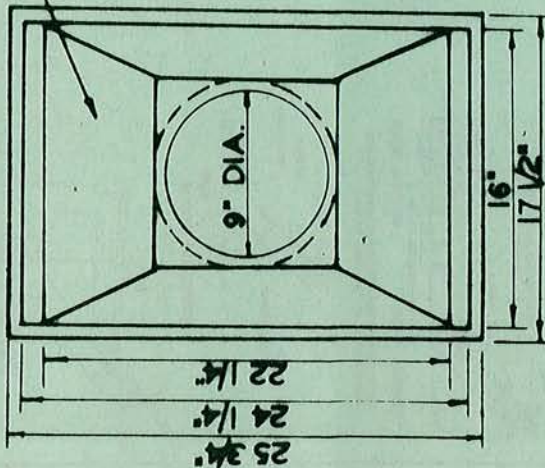
NOTES:

1. DIMENSION D & E MAY VARY
2. METAL PLATE COVER TO BE GALV.

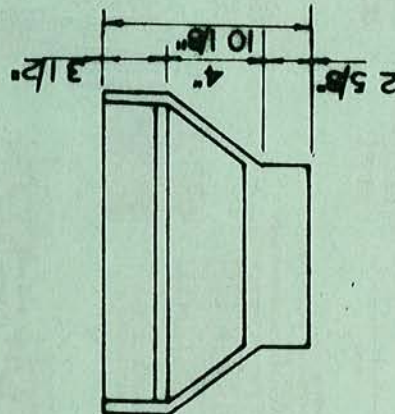


NO. 4 BARS AT 6" O.C. ALL WALLS AND BOTTOM

STD. A ASHO BRIDGE DECKING
GRATE SEE STD. DRAWING NO. _____



NOTE: THIS STRUCTURE TO BE USED ONLY TO PICK UP
ON SITE DRAINAGE

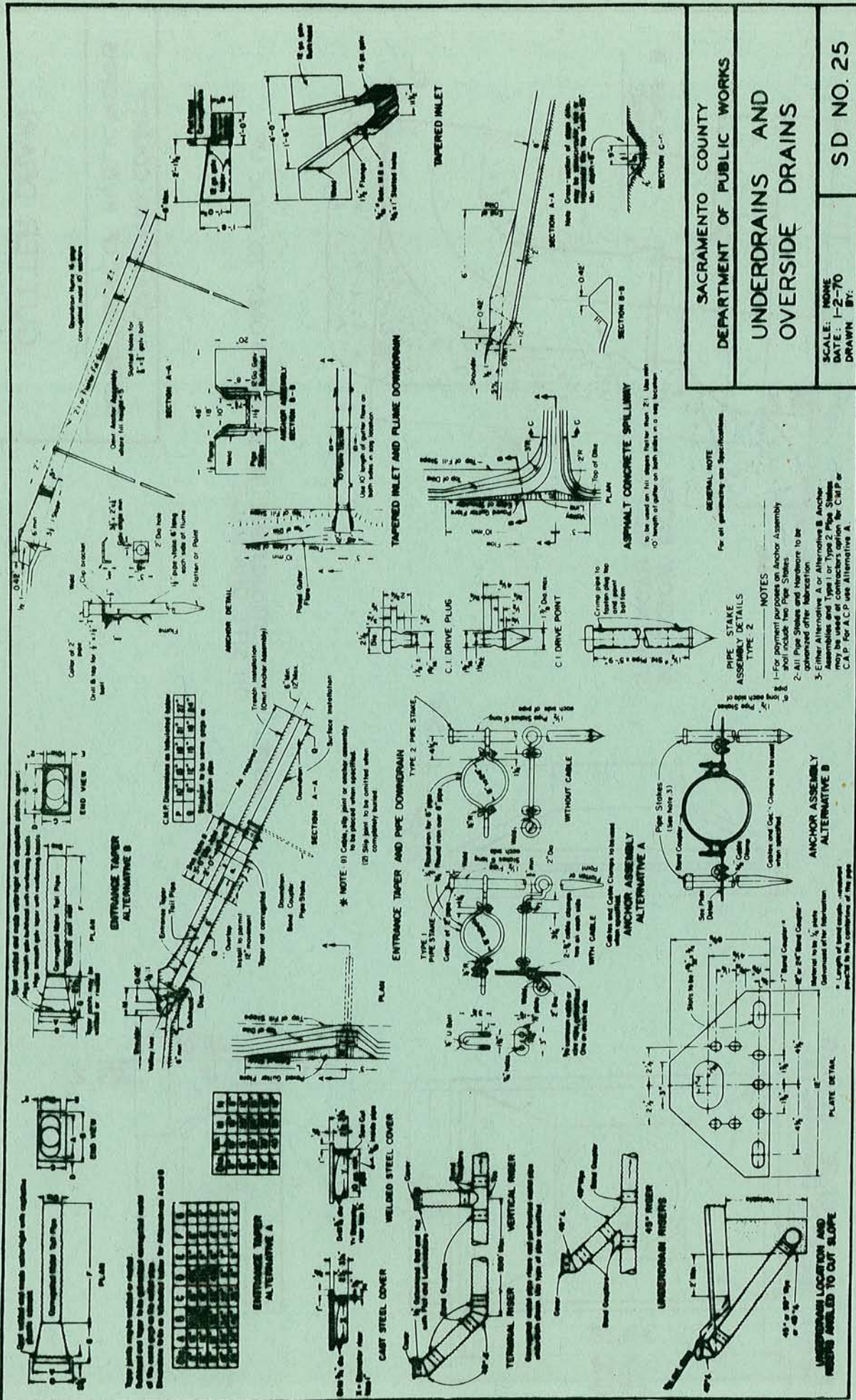


SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

GUTTER DRAIN

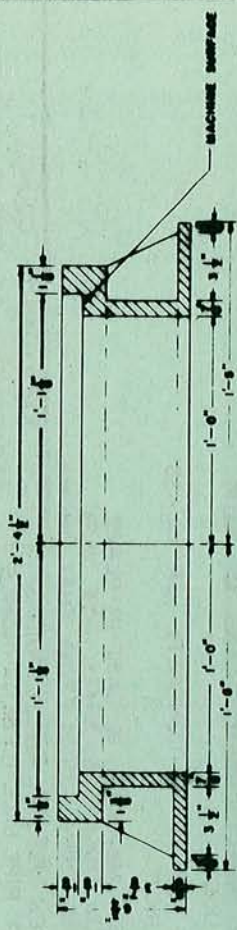
SCALE:
DATE: 1-2-70
DRAWN BY:

SD NO. 24

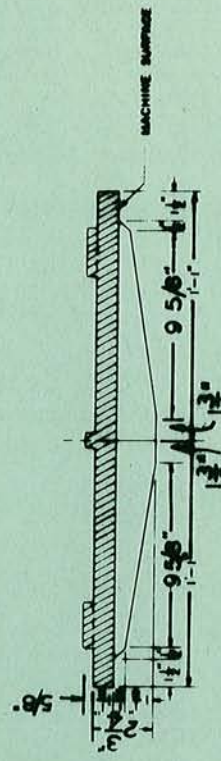


SACRAMENTO COUNTY
 DEPARTMENT OF PUBLIC WORKS
 UNDERDRAINS AND
 OVERSIDE DRAINS
 SCALE: NONE
 DATE: 1-2-70
 DRAWN BY:

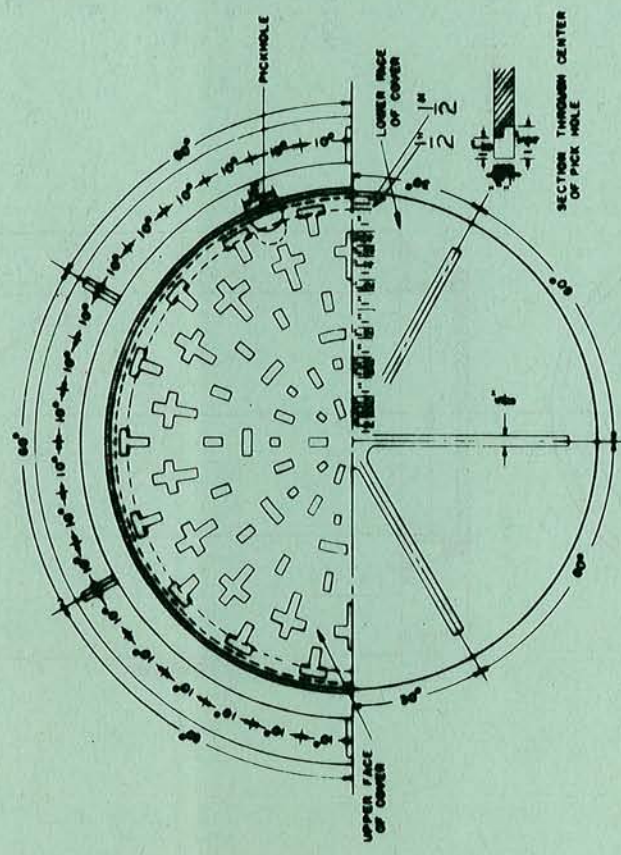
SD NO. 25



SECTION ON C THROUGH FRAME



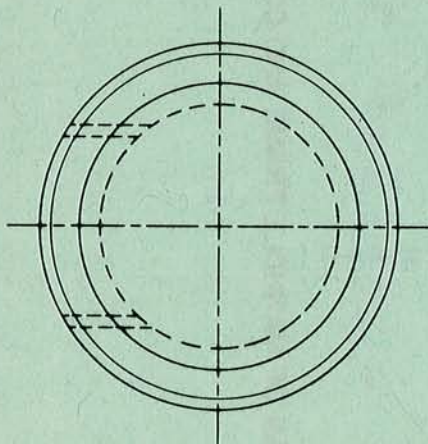
SECTION ON E THROUGH COVER



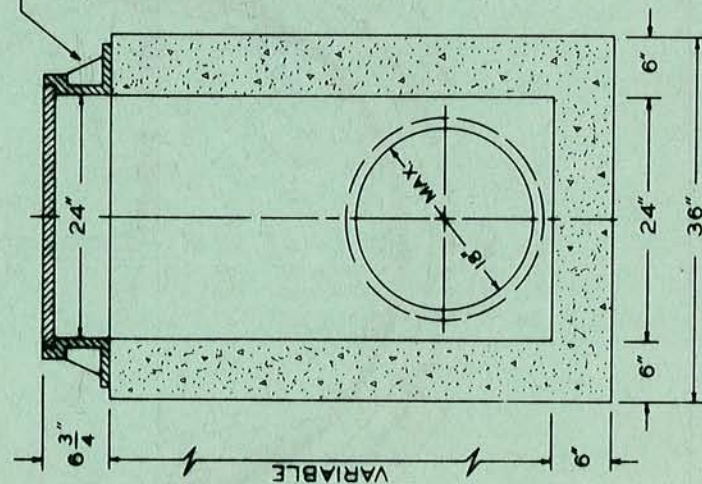
HALF PLAN OF MANHOLE FRAME AND COVER

FRAME WT Approx. 211 LBS.
COVER WT Approx. 174 LBS.

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
STANDARD 24" MANHOLE FRAME AND COVER	
NO SCALE DATE: DRAWN BY:	SD NO. 11



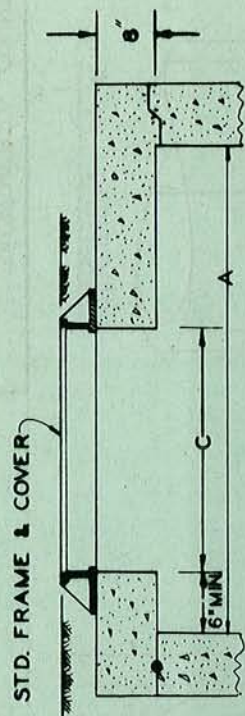
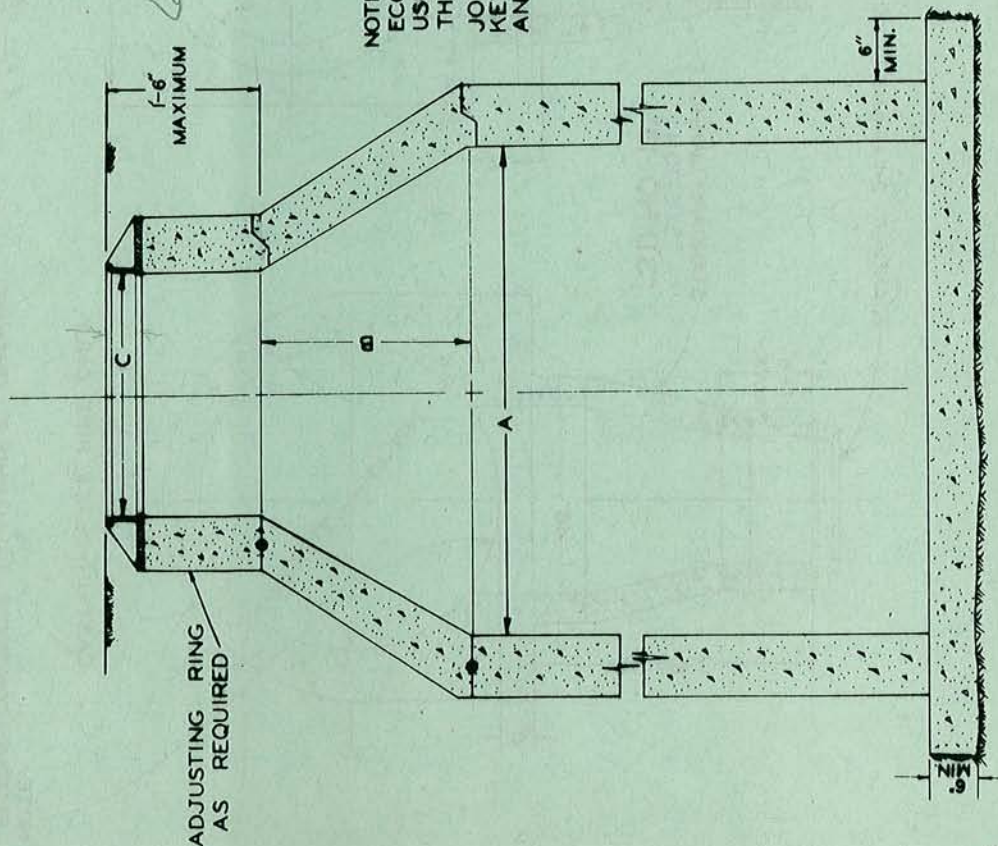
—STANDARD MANHOLE COVER



NOTES:

1. USED WHERE TOP OF PIPE IS LESS THAN 30" BELOW SURFACE.
2. WALL THICKNESS OF MANHOLE DOES NOT APPLY WHEN CLASS II R.C.P. IS USED.
3. USE CLASS "B" CONCRETE OR CLASS II R.C.P.
4. WHEN MANHOLE IS CAST-IN-PLACE, WALL THICKNESS SHALL NOT VARY MORE THAN 1 INCH FROM THAT SHOWN
5. WHEN USED AT ANGLE POINTS, MAX. PIPE SIZE TO BE 12 INCHES.

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
24" MANHOLE	
SCALE: NONE DATE: 1-2-70 DRAWN BY:	SD NO. 12



FLAT SLAB SHALL BE USED WHEN
DEPTH DOES NOT PERMIT USE OF TAPER UNIT

NOTE:
ECCENTRIC CONES SHALL BE
USED WHERE SPECIFIED ON
THE PLANS.

JOINTS MAY BE EITHER
KEYED OR TONGUE
AND GROOVE.

TABLE OF DIMENSIONS

M.H	A	B	C
48"	48"	18"	24"
60"	60"	30"	24"
72"	72"	42"	24"

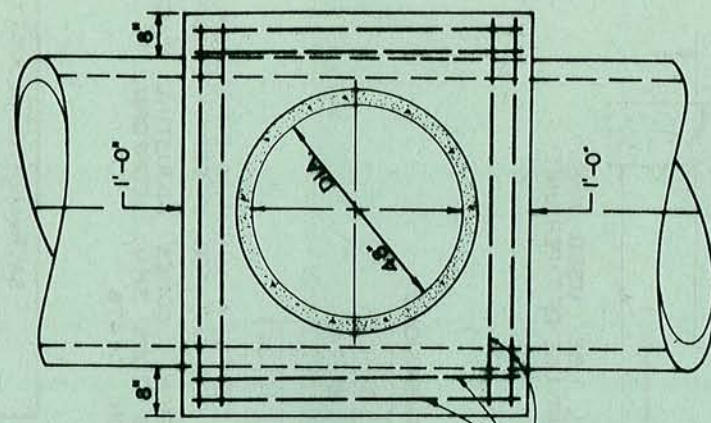
DIMENSION 'B' IS A MINIMUM DIMENSION
AND MAY BE GREATER IF DEPTH PERMITS.
RISER SECTIONS CONES ADJUSTING RINGS AND
FLAT SLAB TOPS SHALL CONFORM TO ASTM
DESIGNATION: C-478

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

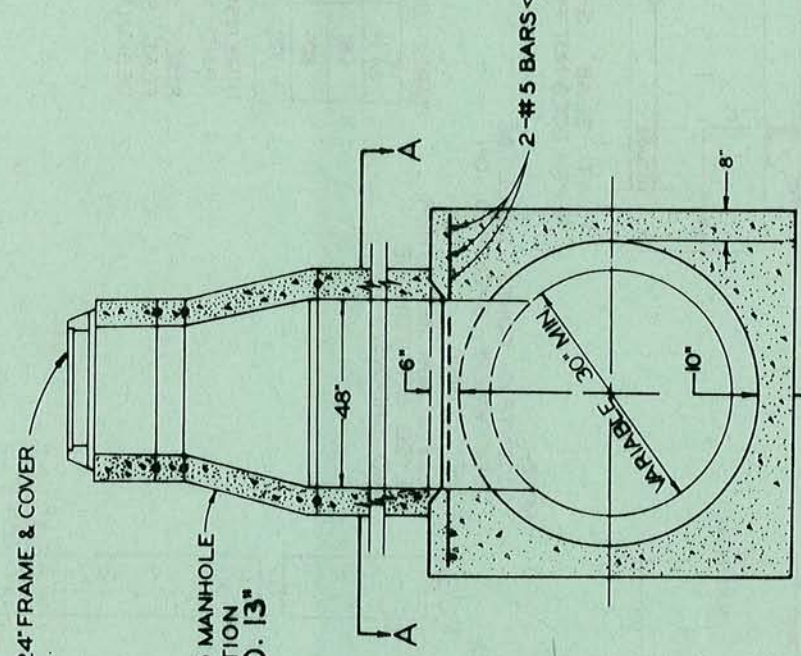
STANDARD PRECAST MANHOLE

SCALE: NONE
DATE: 1-2-70
DRAWN BY:

SD NO. 13

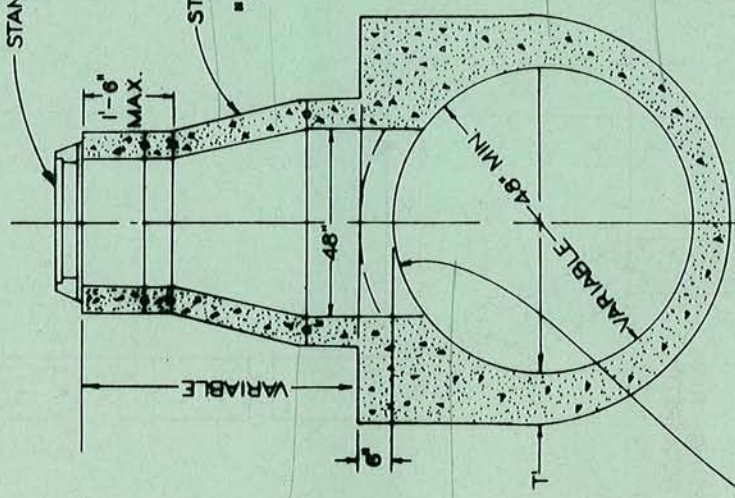


SECTION A-A



TYPE B

1. ALL PIPE OTHER THAN CAST-IN-PLACE PIPE.
2. CAST-IN-PLACE PIPE LESS THAN 48" DIA.



TYPE A

CAST-IN-PLACE PIPE ONLY

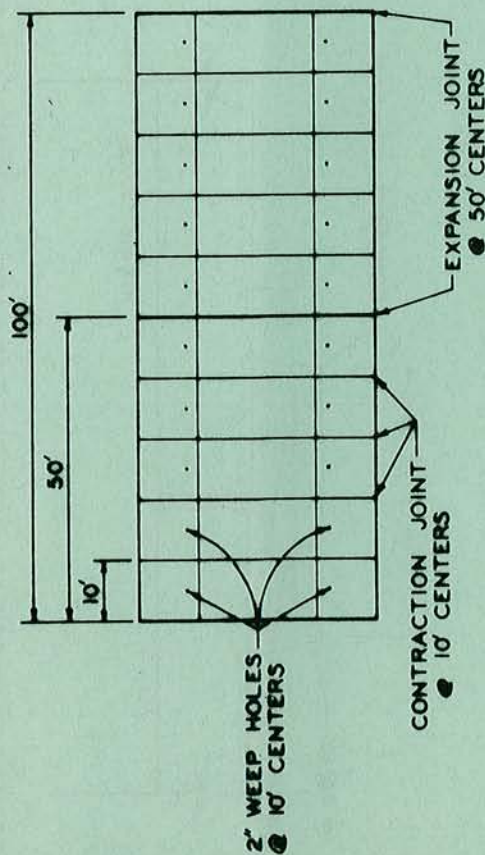
NOTE:
REMOVE CONCRETE IN MANHOLE OPENING AND CONSTRUCT RISER BASE WHILE CONCRETE IS STILL FRESH.
PLACE RISER SECTION AFTER CONCRETE HAS SET.

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TYPE A & B
SADDLE MANHOLE

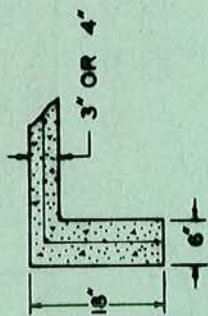
SCALE: NONE
DATE: 1-2-70
DRAWN BY:

SD NO. 16



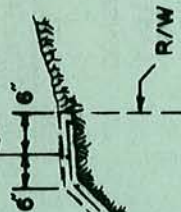
PLAN

CUTOFF WALL



TO BE PLACED ALONG ENTIRE LINED SECTION AT BEGINNING AND AT END OF LINING.

6' CHAIN LINK FENCE



ALTERNATE FOR LINING TO R/W WHEN REQUESTED BY ENGINEER

WIRE MESH REINFORCED THROUGHOUT

4" POURED-IN-PLACE CONCRETE

VARIABLE

VARIABLE

5' MIN.

WEEP HOLE WITH SACK OF PERVIOUS MATERIAL BEHIND THE WEEP HOLE (1 C.F. MIN.) HOLE TO BE 2" DIAMETER GALVANIZED PIPE, OR P.V.C. CUT TO FIT.

IN CHANNEL WITH BOTTOM LINING ONLY LINING SHALL EXTEND UP SIDE SLOPES 12" MEASURED VERTICALLY FROM THE FLOW LINE

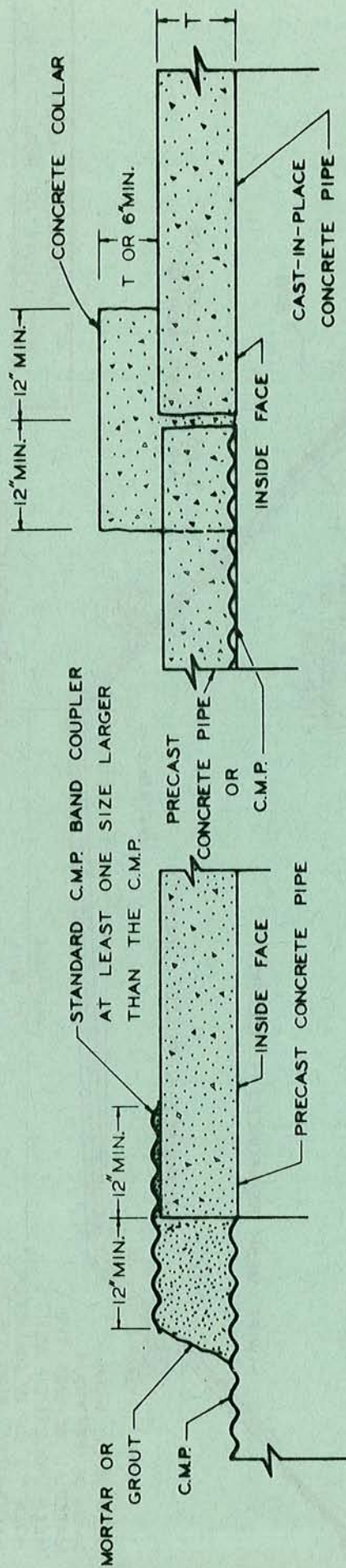
SECTION

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

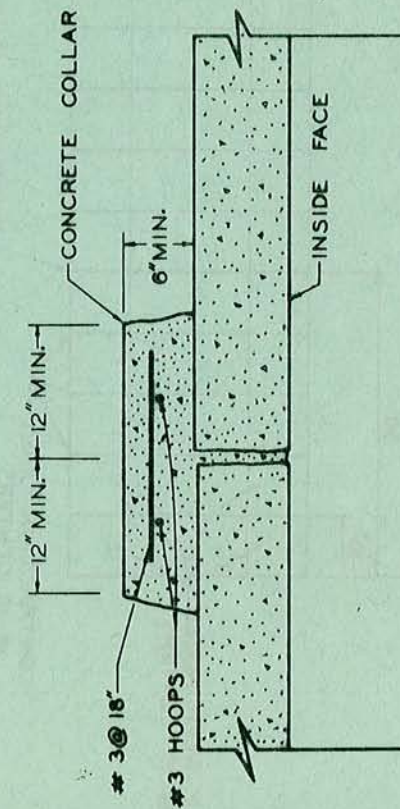
LINED CHANNEL
SECTION

SCALE: NONE
DATE: 1-2-70
DRAWN BY:

SD NO. 6

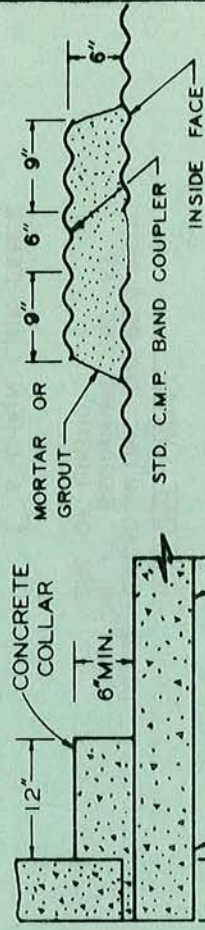


C.M.P. TO PRECAST CONCRETE PIPE



PRECAST CONCRETE PIPE TO PRECAST CONCRETE PIPE
WITHOUT STANDARD JOINT

CAST-IN-PLACE CONCRETE PIPE TO
C.M.P. OR PRECAST CONCRETE PIPE



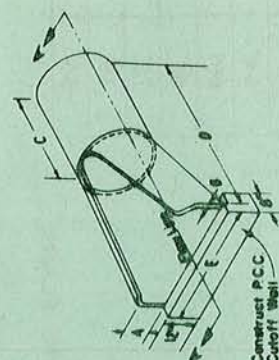
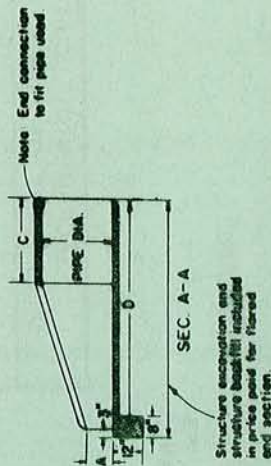
PIPES OF
DISSIMILAR METALS

CONCRETE PIPE OR C.M.P.
INTO EXISTING
STRUCTURE

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

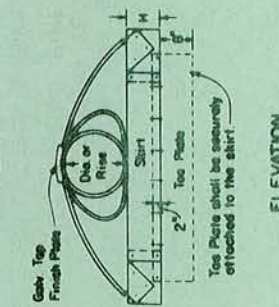
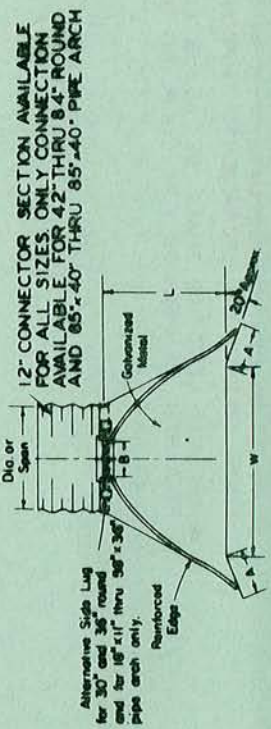
**PIPE
CONNECTIONS**

SCALE: NONE
DATE: 1-2-70
DRAWN BY: SD NO. 7



MINIMUM DIMENSIONS									
PIPE DIA.	A	B	C	D	E	F	G	H	I
12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
24"	24"	24"	24"	24"	24"	24"	24"	24"	24"
30"	30"	30"	30"	30"	30"	30"	30"	30"	30"
36"	36"	36"	36"	36"	36"	36"	36"	36"	36"
42"	42"	42"	42"	42"	42"	42"	42"	42"	42"
48"	48"	48"	48"	48"	48"	48"	48"	48"	48"
54"	54"	54"	54"	54"	54"	54"	54"	54"	54"
60"	60"	60"	60"	60"	60"	60"	60"	60"	60"
66"	66"	66"	66"	66"	66"	66"	66"	66"	66"
72"	72"	72"	72"	72"	72"	72"	72"	72"	72"

PRECAST CONCRETE
FLARED END SECTION



NOTES

Connector section, corner plate and toe plate to be same gauge as shirt.

Length of top plate

If required by special provisions

W x 10" for pipe dia 12" to 36" incl

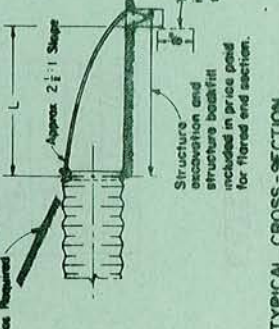
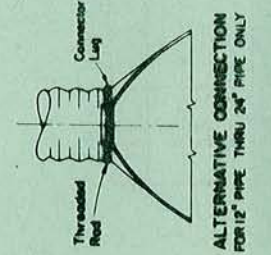
W x 22" for pipe dia 36" to 48" incl

W x 10" for pipe arch rise 11" to 27" incl

W x 18" for pipe arch rise 31" to 44" incl

PIPE ARCHES		DIMENSIONS - INCHES	
INCHES	GA	W	H
18	11	16	4 1/2
22	13	16	5 1/2
25	16	16	6 1/2
29	18	14	7 1/2
36	22	14	8 1/2
43	27	12	10 1/2
50	31	12	12 1/2
58	36	12	14 1/2
65	40	12	16 1/2
72	44	10	17 1/2

CIRCULAR PIPES		DIMENSIONS - INCHES	
PIPE DIA.	GA	W	H
12"	16	4 1/2	6
18"	16	6	8
24"	16	8	10
30"	16	9 1/2	12
36"	14	12	15
42"	12	15	18
48"	12	18	21
54"	12	21	24
60"	12	24	27
66"	12	27	30
72"	12	30	33



TYPICAL CROSS-SECTION

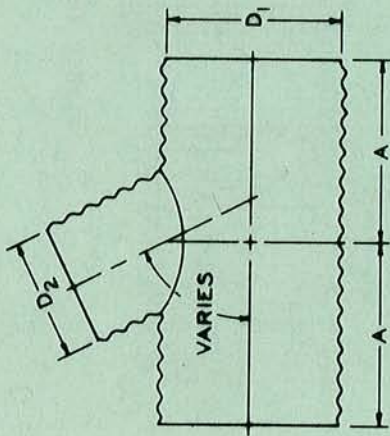
FLARED END SECTIONS FOR C.M.P. CULVERTS

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

PIPE END SECTIONS

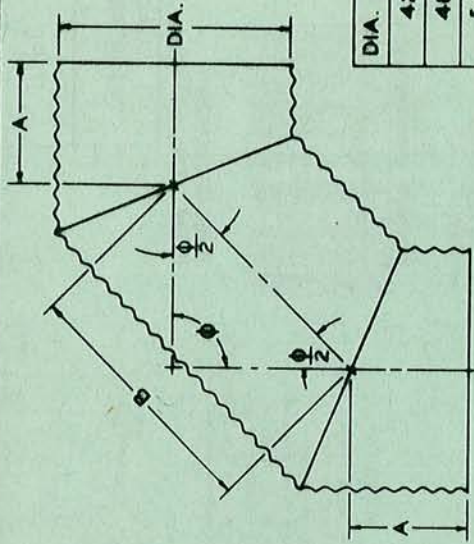
Scale: 1-2-70
Date: 1-2-70
Drawn By:

SD NO. 8



LATERALS

D ₁	A (IN.)
24" TO 36"	$\frac{D_1 + 14}{2}$
42"	"
48"	"
60"	"
66"	"
72"	"
78"	"
84"	"



ELBOWS

DIA. (IN.)	A (IN.)	B (IN.)
42"	24"	48"
48"	"	"
54"	"	"
60"	"	60"
66"	36"	"
72"	"	"
78"	"	"
84"	"	"

- NOTES:
1. LATERALS MAY BE FABRICATED TO MATCH TOPS, FLOWLINES, OR CENTERS OF MATING PIPES AS INDICATED ON THE PLANS.
 2. LENGTHS SHOWN ARE MINIMUM LENGTHS.
 3. PIPE STRENGTH REQUIREMENTS TO BE DETERMINED FROM COUNTY OF SACRAMENTO IMPROVEMENT STANDARDS.
 4. MINIMUM LENGTHS SHALL BE ADJUSTED AS REQUIRED TO PROVIDE FOR COUPLING BANDS.

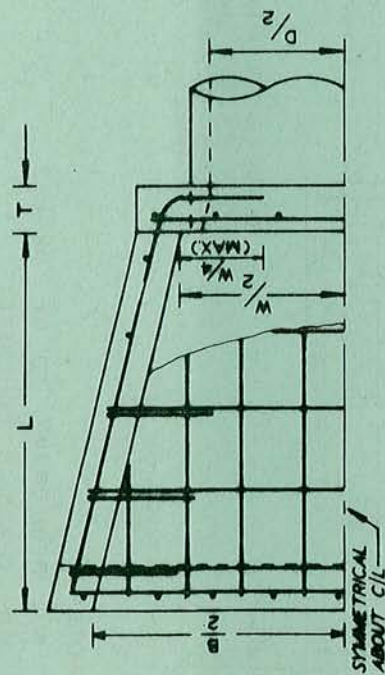
$$\frac{180 - \theta}{2} = 90 - \frac{\theta}{2}$$

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

CORRUGATED METAL PIPE FITTINGS

SCALE: NONE
DATE: 1-2-70
DRAWN BY:

SD NO. 9

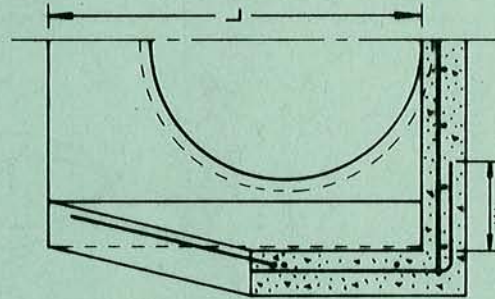


DIMENSIONS & REINFORCING

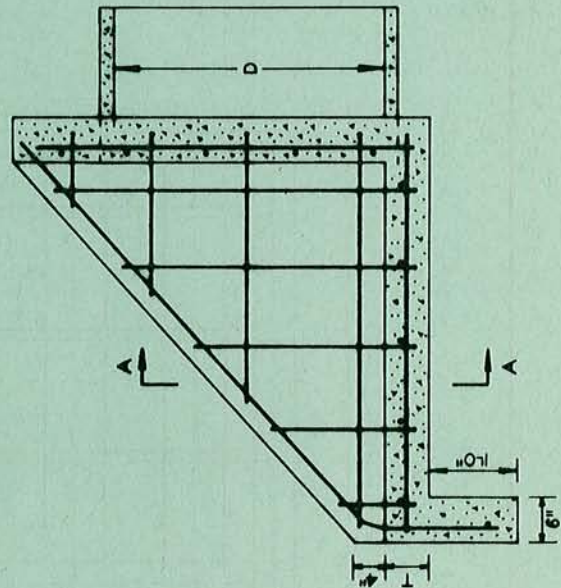
D	W	B	L	T	ALL REINFORCING
33"	3'-5"	5'-3"	4'-0"	6"	#5 @ 12"
36"	3'-8"	5'-8"	4'-2"	6"	#5 @ 12"
42"	4'-4"	6'-4"	4'-8"	6"	#5 @ 12"
48"	4'-10"	7'-2"	5'-2"	8"	#6 @ 12"
54"	5'-4"	8'-0"	6'-0"	8"	#6 @ 12"
60"	6'-0"	8'-10"	6'-6"	8"	#6 @ 12"

NOTES:

1. "B" MAY BE REDUCED IF REQUIRED BY CHANNEL DIMENSIONS.
2. REINFORCING BAR SPACING SHOWN IS MAXIMUM SPACING.
3. USE CLASS 'B' CONCRETE.



HALF SECTION A-A

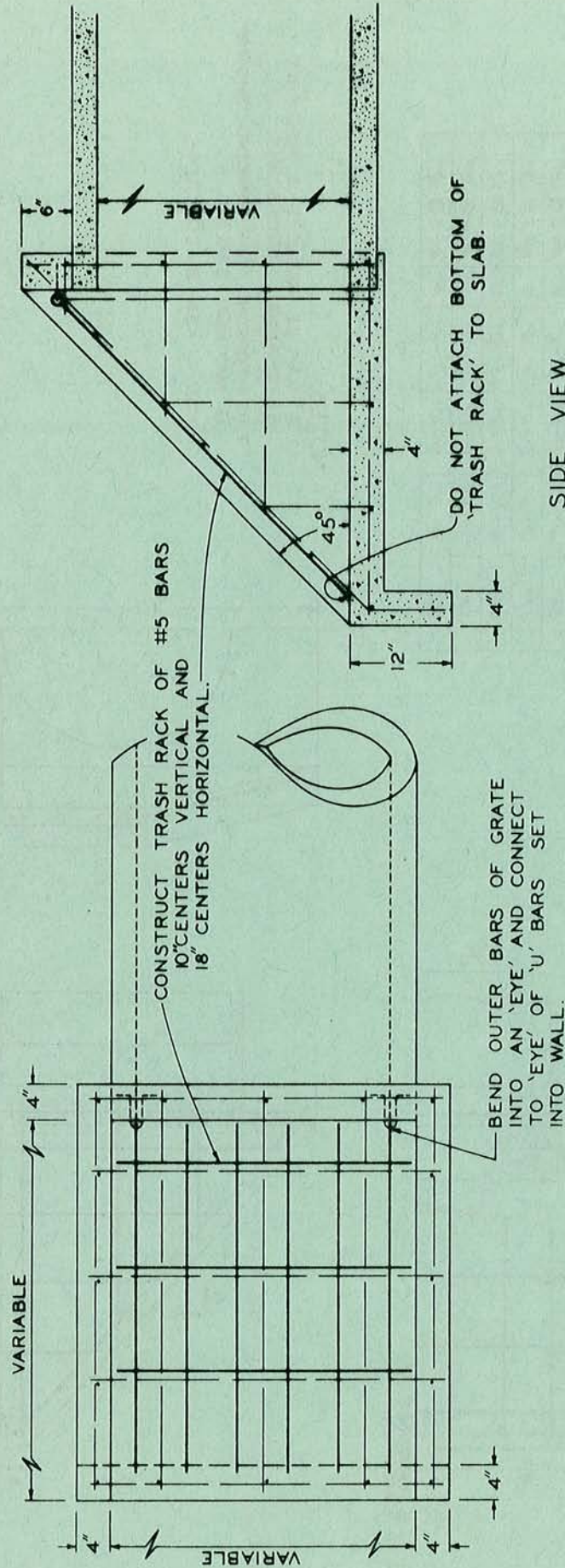


SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

PIPE INLET STRUCTURE

SCALE: NONE
DATE: 1-2-70
DRAWN BY:

SD NO. 26



SIDE VIEW

TOP VIEW

NOTE:

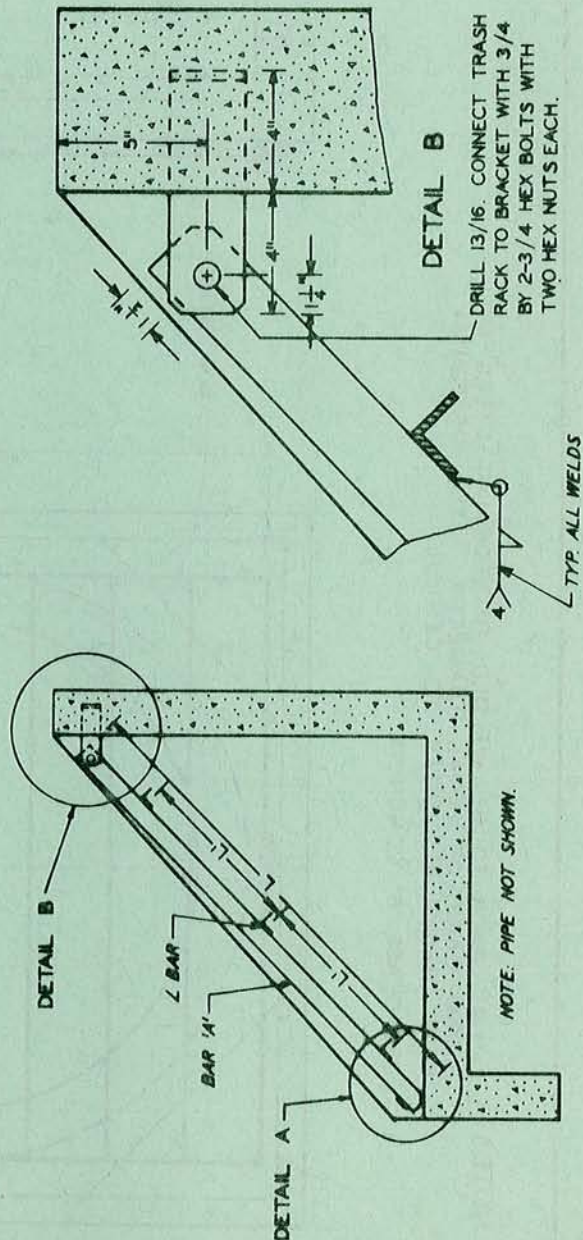
ALL REINFORCING TO BE #4 @ 12"
USE CLASS 'B' CONCRETE

SACRAMENTO COUNTY	SD NO. 27
DEPARTMENT OF PUBLIC WORKS	
PIPE INLET STRUCTURE AND TRASH RACK	
30" PIPE & SMALLER	
SCALE: NONE DATE: 1-2-70 DRAWN BY:	

[illegible]

DIA.	NUMBER & SIZE		L	L'	S	H
	BAR A	L BAR				
33"	$8 - \frac{1}{2} \times 2 \frac{1}{2}$	$3 - 2 \times 2 \frac{1}{2}$	$5' - 11"$	$1' - 10"$	$8"$	$3' - 8"$
36"	"	"	$5' - 4"$	$1' - 11"$	$8"$	$3' - 10"$
42"	$9 - \frac{1}{2} \times 2 \frac{1}{2}$	"	$5' - 11"$	$2' - 3"$	$9"$	$4' - 4"$
48"	"	$4 - 2 \times 2 \frac{1}{2}$	$6' - 7"$	$1' - 9"$	$10"$	$4' - 10"$
54"	$10 - \frac{1}{2} \times 3$	$4 - 3 \times 3 \times \frac{1}{4}$	$7' - 9"$	$2' - 1 \frac{1}{2}"$	$10 \frac{1}{2}"$	$5' - 8"$
60"	$11 - \frac{1}{2} \times 3 \frac{1}{2}$	"	$8' - 5"$	$2' - 4"$	$11"$	$6' - 2"$

1. THIS TRASH RACK IS TO BE USED WITH PIPE INLET STRUCTURES.
2. MATERIAL TO CONFORM TO ASTM DESIGNATION A-36.
3. 'S' MAY VARY WITH 'B'. SEE PLATE
4. ALL FILLET WELDS TO BE $\frac{1}{16}$ "
5. 2 HINGES REQUIRED FOR 33, 36 & 42 INCH PIPES. 3 HINGES REQUIRED FOR 48, 54 & 60 INCH PIPES.



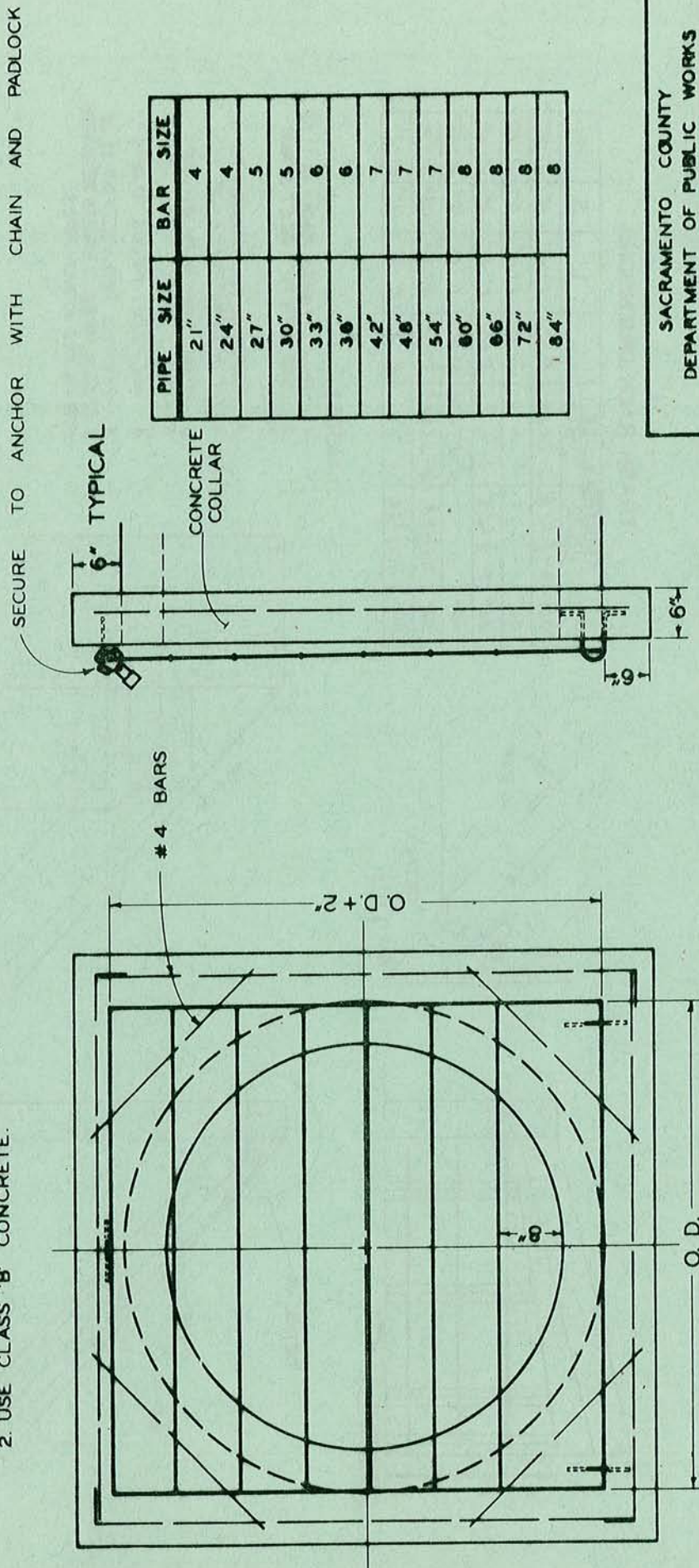
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

**TRASH RACK
33" PIPE & LARGER**

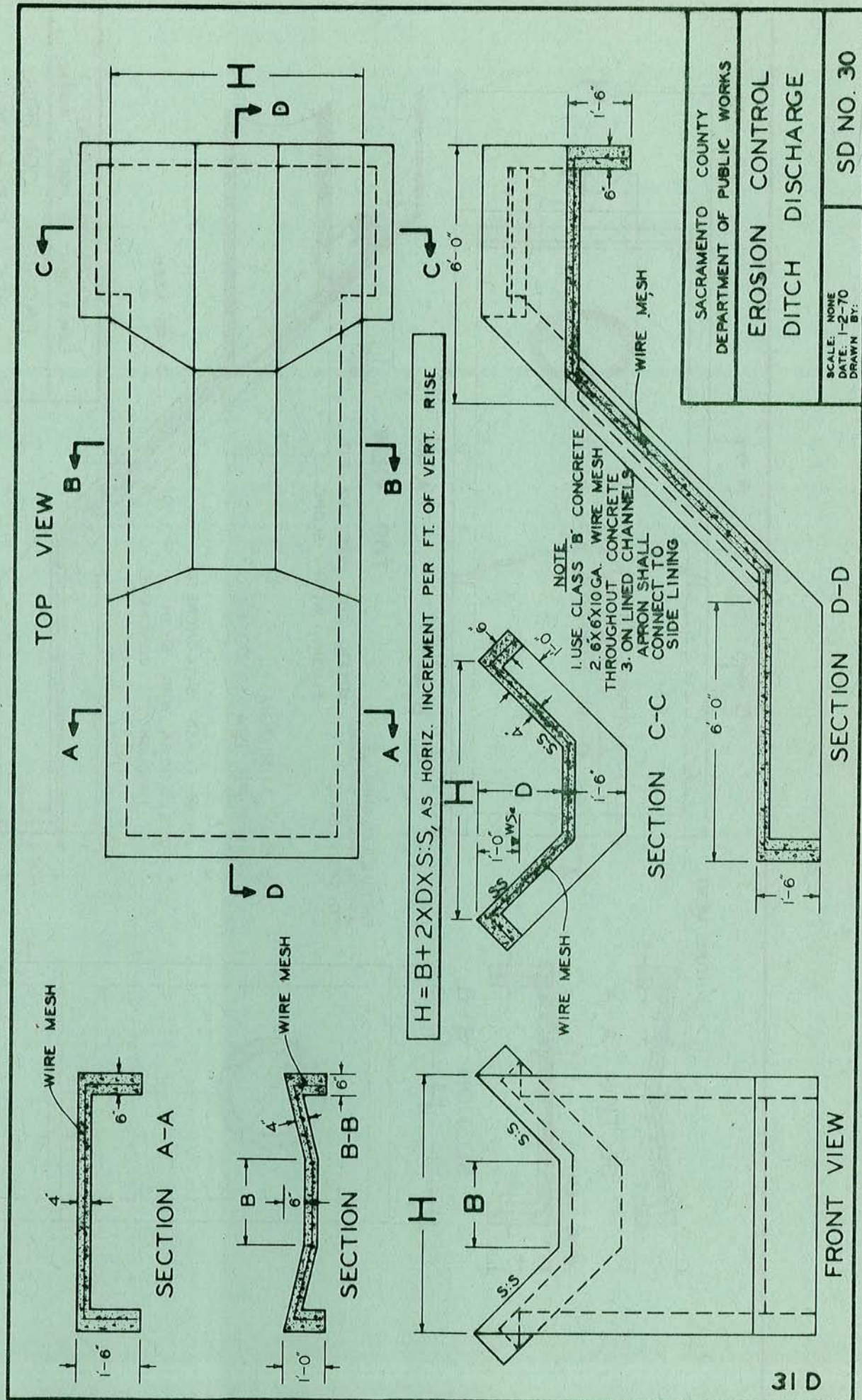
SCALE: NONE
DATE: 1-2-70
DRAWN BY:

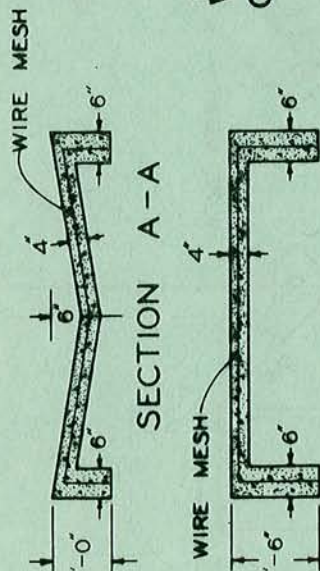
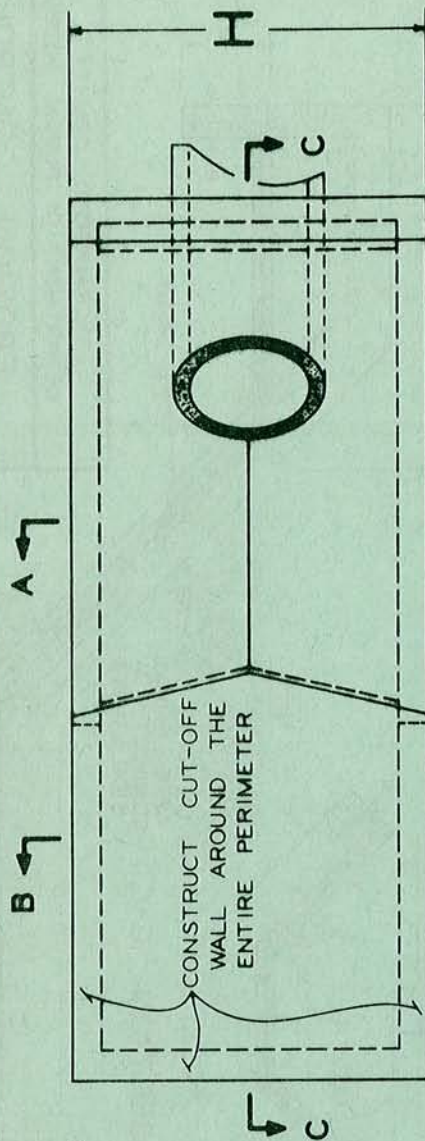
SD NO. 28

- NOTES: 1. ENTIRE RACK TO BE WELDED REINFORCING STEEL OR ROUND BARS OF EQUAL DIAMETER WITH HORIZONTAL BARS BEING 8" CENTER TO CENTER.
2. USE CLASS 'B' CONCRETE.

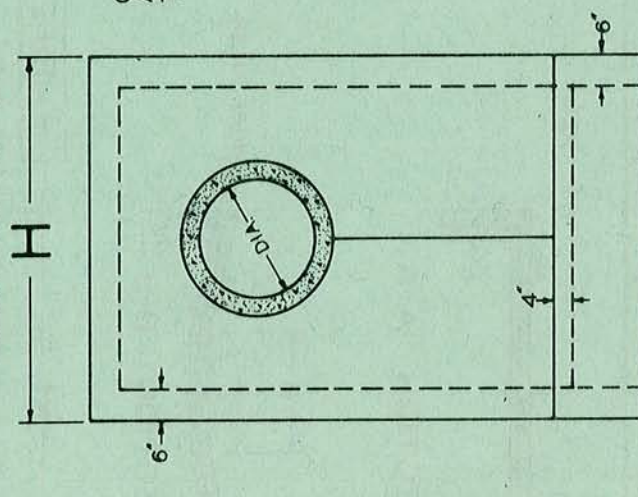


SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
ACCESS CONTROL RACK	
SCALE: NONE DATE: 1-2-70 DRAWN BY:	SD NO. 29

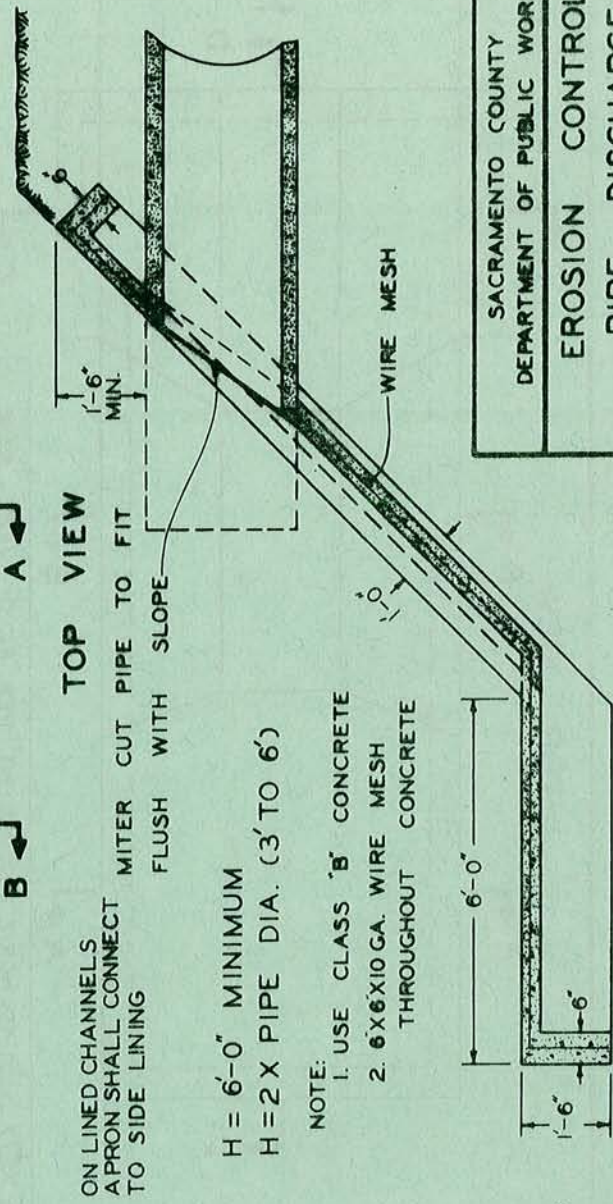




SECTION B-B



TOP VIEW

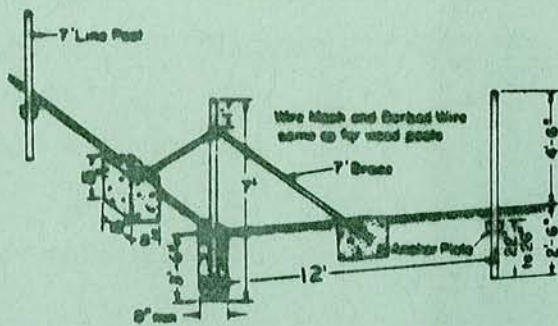


H = 6'-0" MINIMUM
H = 2 X PIPE DIA. (3' TO 6')

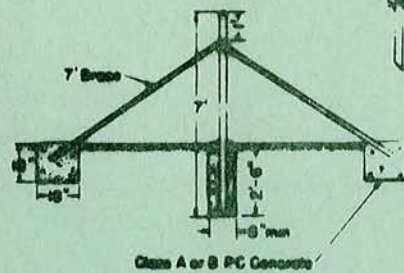
- NOTE:
1. USE CLASS 'B' CONCRETE
 2. 6 X 6 X 10 GA. WIRE MESH THROUGHOUT CONCRETE

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS
EROSION CONTROL
PIPE DISCHARGE

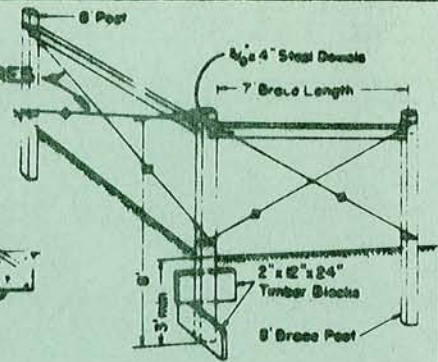
SCALE: NONE
DATE: 1-2-70
DRAWN BY: SD NO. 31



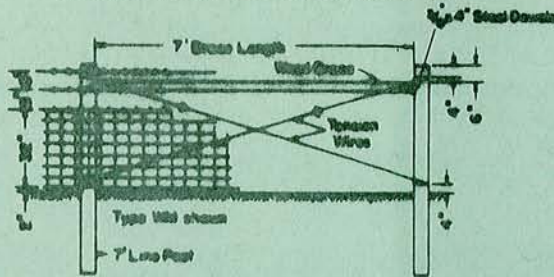
END, CORNER AND GATE POST ASSEMBLY



PULL POST ASSEMBLY
of 300' maximum intervals

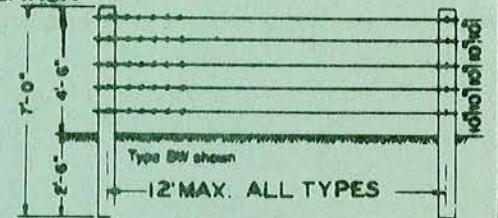


END, CORNER AND GATE POST ASSEMBLY

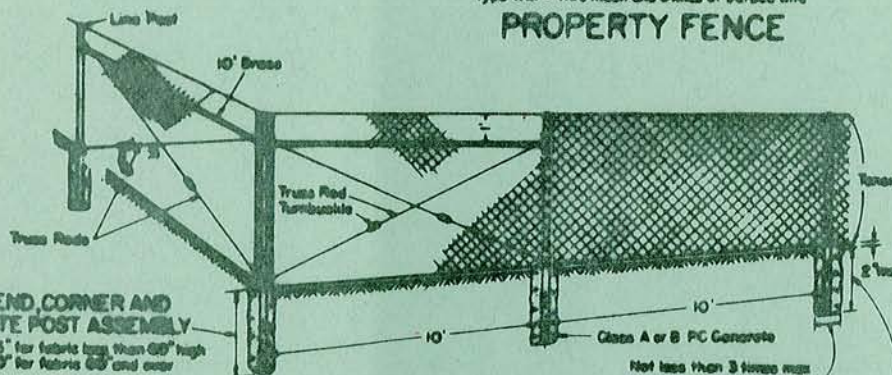


PULL POST ASSEMBLY
of 300' maximum intervals
(for both BW and WMA)

METAL POST INSTALLATION



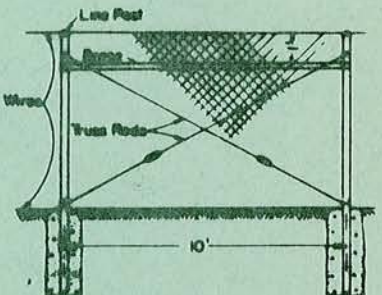
LINE POSTS
WOOD POST INSTALLATION



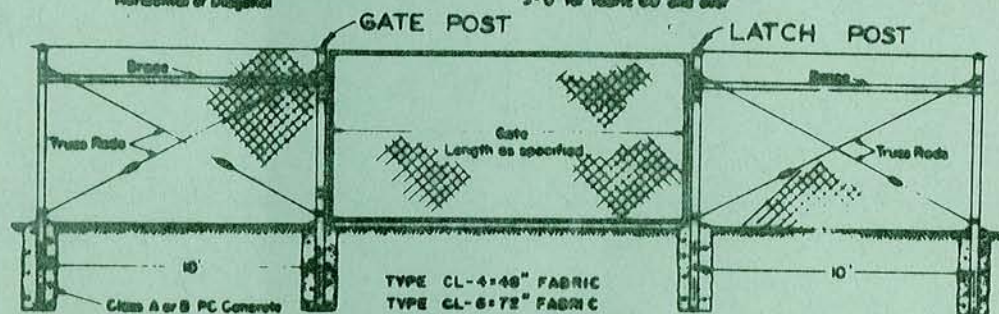
END, CORNER AND
GATE POST ASSEMBLY

End, Corner and Gate Posts
compression braces may be either
Horizontal or Diagonal

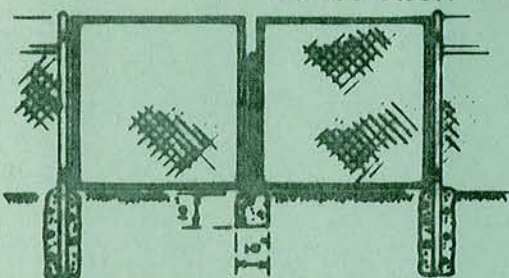
PROPERTY FENCE



Line posts of 1,000' maximum intervals
braced and trussed in both directions



TYPE CL-4x48" FABRIC
TYPE CL-6x72" FABRIC
CHAIN LINK FENCE
FREEWAY OR PROPERTY



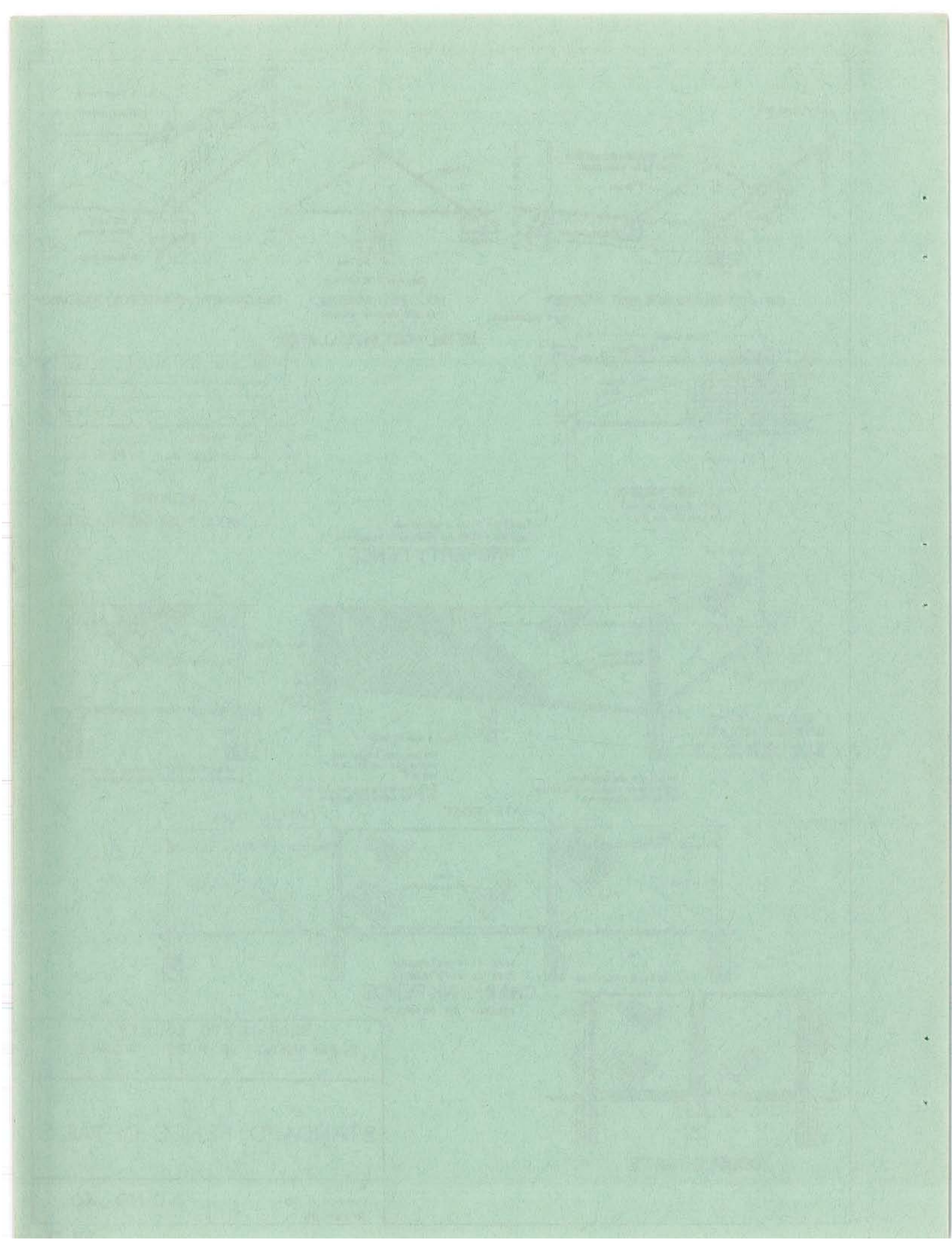
DOUBLE GATE

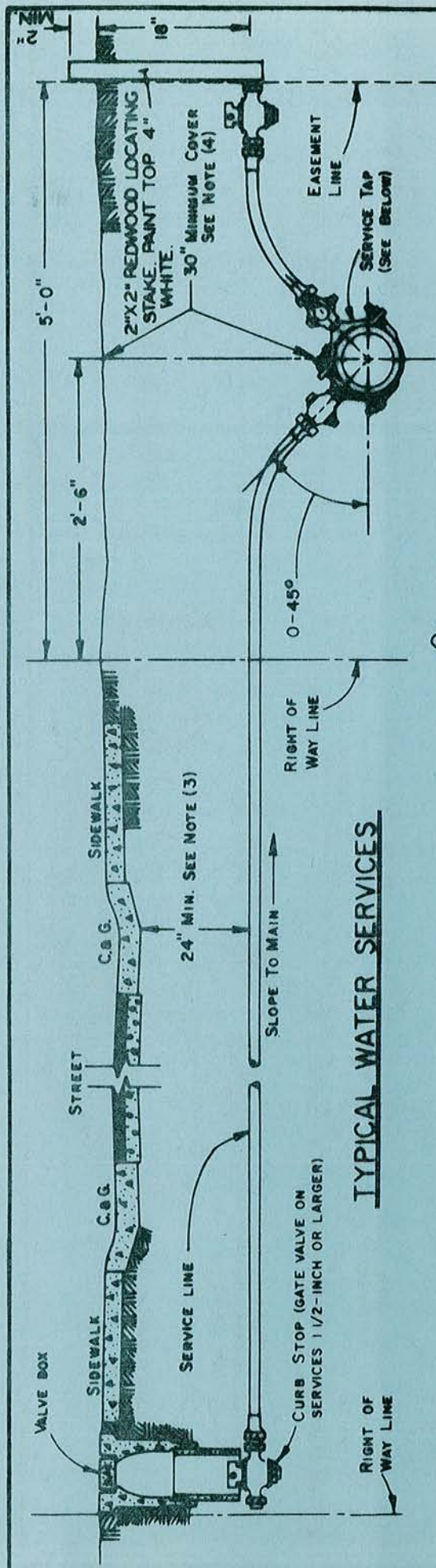
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD FENCE DETAILS

Scale
Date 1-2-70
Drawn By

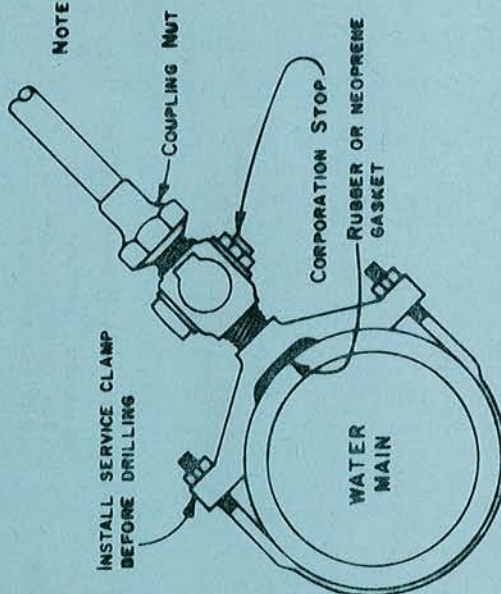
SD NO. 40





TYPICAL WATER SERVICES

- NOTES: (1) CORPORATION STOP, CURB STOP (OR GATE VALVE), AND SERVICE LINE TO BE SAME SIZE.
- (2) SERVICE CLAMPS SHALL BE SINGLE STRAP FOR UP TO 1" SERVICES, DOUBLE STRAP FOR LARGER SIZES, EXCEPT WHERE SIZE OF TAP EXCEEDS MANUFACTURERS' RECOMMENDED LIMIT FOR SIZE OF MAIN. FOR THIS SITUATION, A SPECIAL FITTING WILL BE SPECIFIED.
- (3) INCREASE MIN. CLEARANCE OF WATER SERVICE UNDER COG TO 30" WHERE SERVICE LINE CROSSES SELECT SYSTEM ROADWAY, WHICH WILL BE SO SPECIFIED.
- (4) INCREASE MIN. COVER OF MAIN TO 36" WHERE INSTALLED IN SELECT SYSTEM ROADWAY, WHICH WILL BE SO SPECIFIED.



SERVICE TAP

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

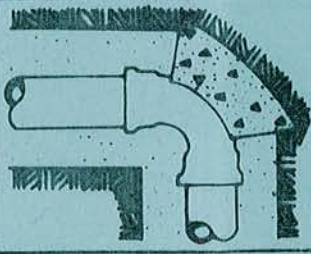

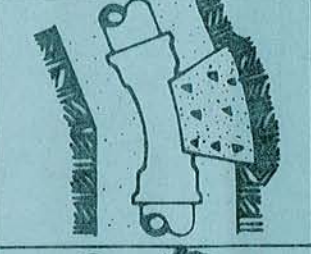
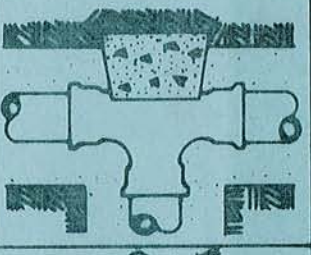
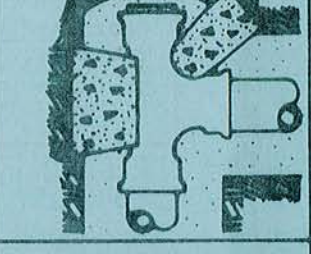
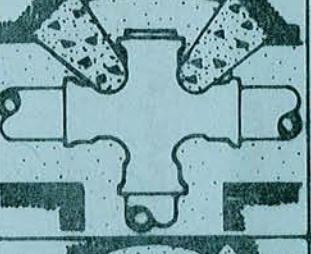
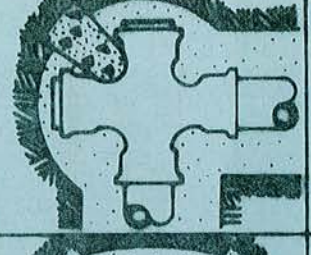
WATER SERVICE INSTALLATION

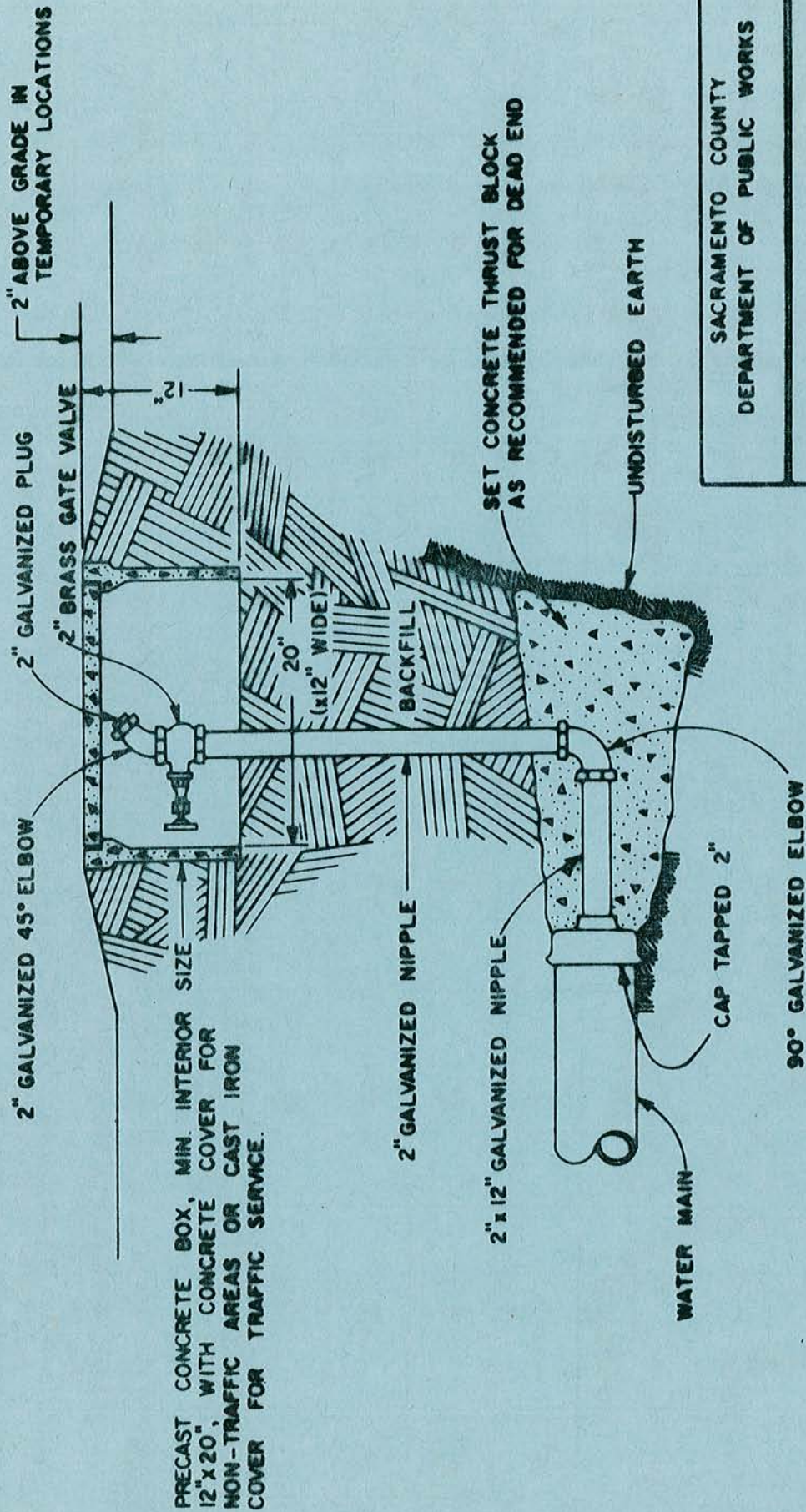
NO SCALE
DATE: 1-2-70
DRAWN BY:

S.D. NO. 35



S.D. NO. 36

REQUIRED BEARING AREA — TOTAL SQUARE FEET									
TYPE OF FITTING	90° BEND	45° BEND	11 1/4° OR 22 1/2° BEND	TEE OR DEAD END	TEE w/PLUG	CROSS w/PLUG	CROSS w/PLUGS		
TYPICAL INSTALLATION									
SIZE OF PIPE	4"	2	1	2	2	2	2		
	6"	4	2	3	4	4	4		
	8"	7	4	5	7	7	7		
	10"	12	6	8	12	12	12		
	12"	16	10	12	16	16	16		
NOTES: (1) THRUST BLOCKS TO BE CONSTRUCTED OF CLASS "B" CONCRETE. (2) AREAS GIVEN ARE FOR CLASS 150 PIPE AT TEST PRESSURE OF 150 P.S.I. IN SOIL WITH 2,000 P.S.F. BEARING CAPACITY. INSTALLATIONS USING DIFFERENT PIPE, TEST PRESSURES, AND/OR SOIL TYPES SHOULD ADJUST AREAS ACCORDINGLY, SUBJECT TO APPROVAL OF ENGINEER. (3) BLOCKS TO BE POURED AGAINST UNDISTURBED SOIL. (4) JOINTS AND FACE OF PLUGS TO BE KEPT CLEAR OF CONCRETE.								SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS	
								THRUST BLOCK BEARING AREA	
								NO SCALE DATE: 1-2-70 DRAWN BY:	S.D. NO. 37



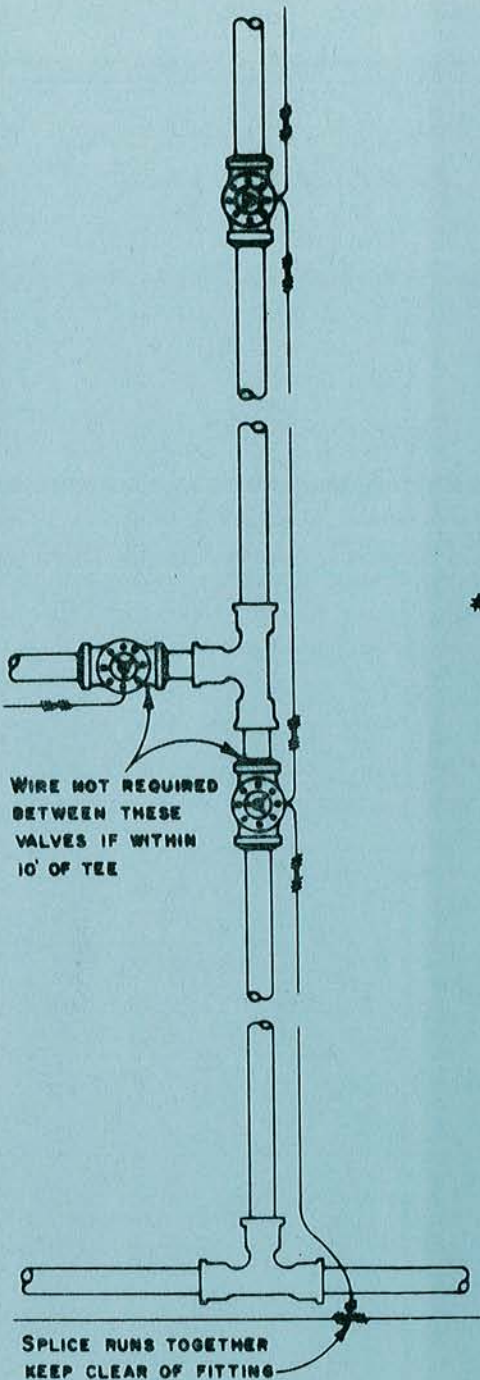
ELEVATION

BLOWOFF VALVE

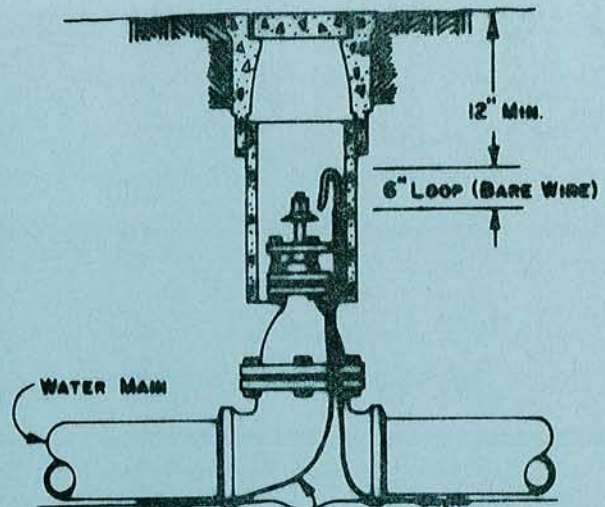
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

NO SCALE
DATE: 1-2-70
DRAWN BY:

S.D. NO. 38



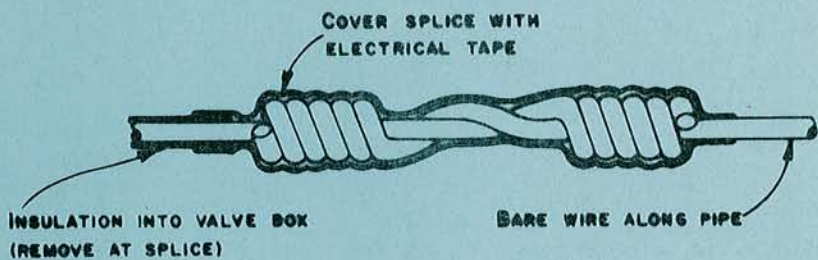
TYPICAL LAYOUT



*10 AWG, SINGLE STRAND, SOFT DRAWN COPPER WIRE; BARE ALONG PIPE, 4/84" POLYVINYL CHLORIDE INSULATION INTO VALVE BOX.

SEE DETAIL BELOW

VALVE DETAIL



SPLICE DETAIL

NOTES:

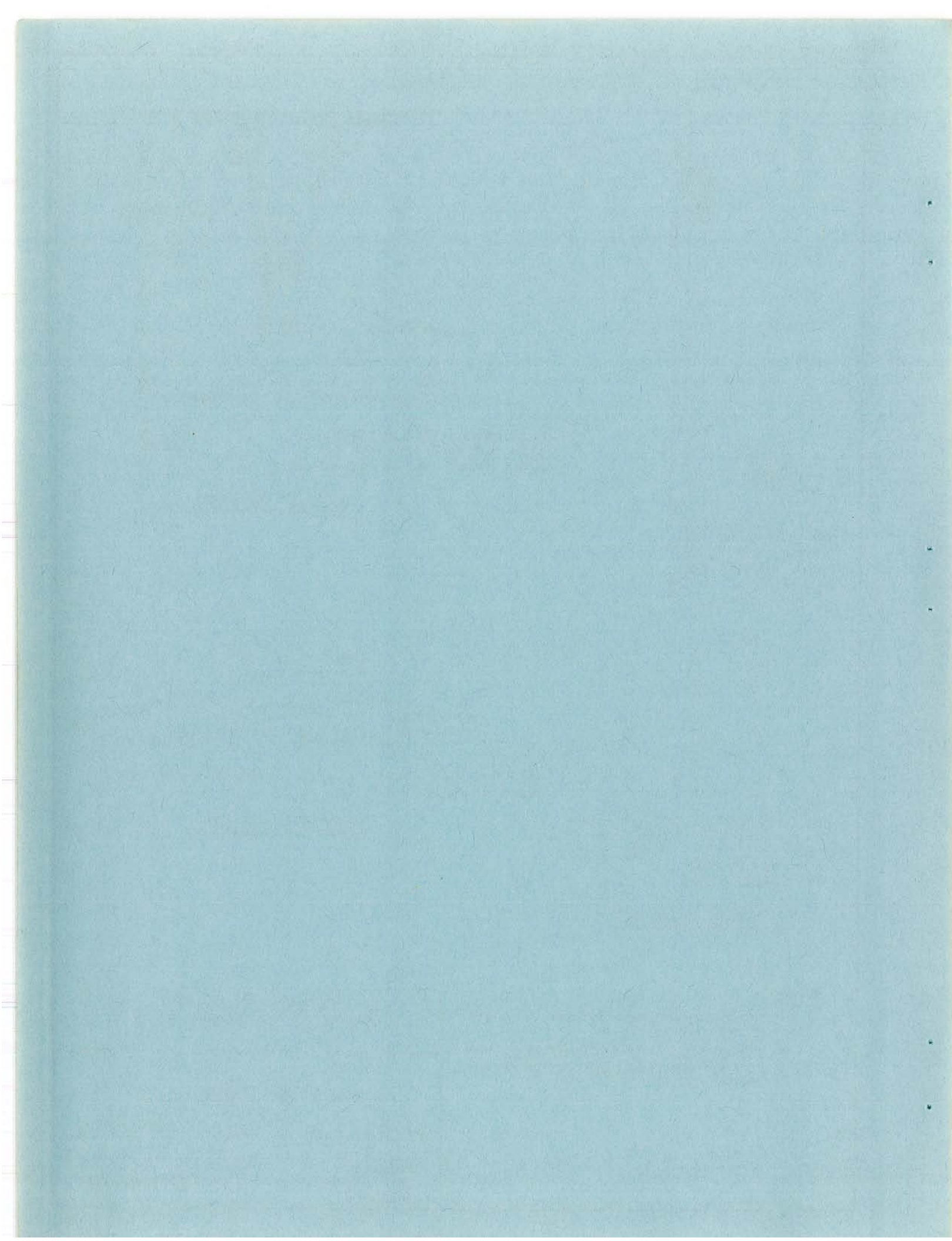
- (1) WIRE TO BE CONTINUOUS BETWEEN VALVE BOXES, EXCEPT AS NOTED.
- (2) BARE WIRE NOT TO TOUCH VALVES OR FITTINGS.
- (3) LOCATING WIRE TO BE LAID AT BOTTOM OF TRENCH, NEXT TO PIPE.

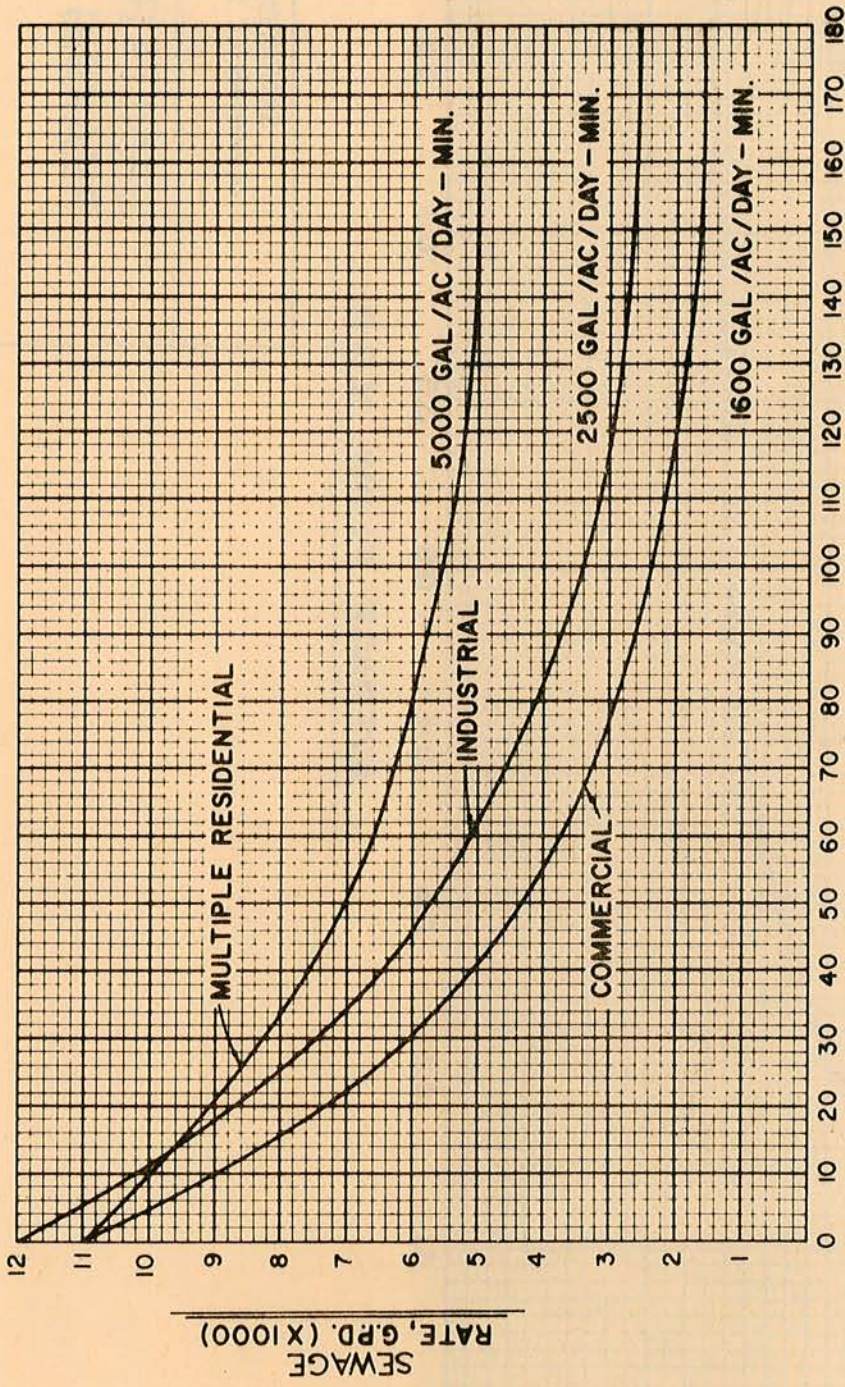
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

LOCATING WIRE FOR
WATER MAINS AND SERVICES

NO SCALE
DATE: 1-2-70
DRAWN BY:

S.D. NO. 39



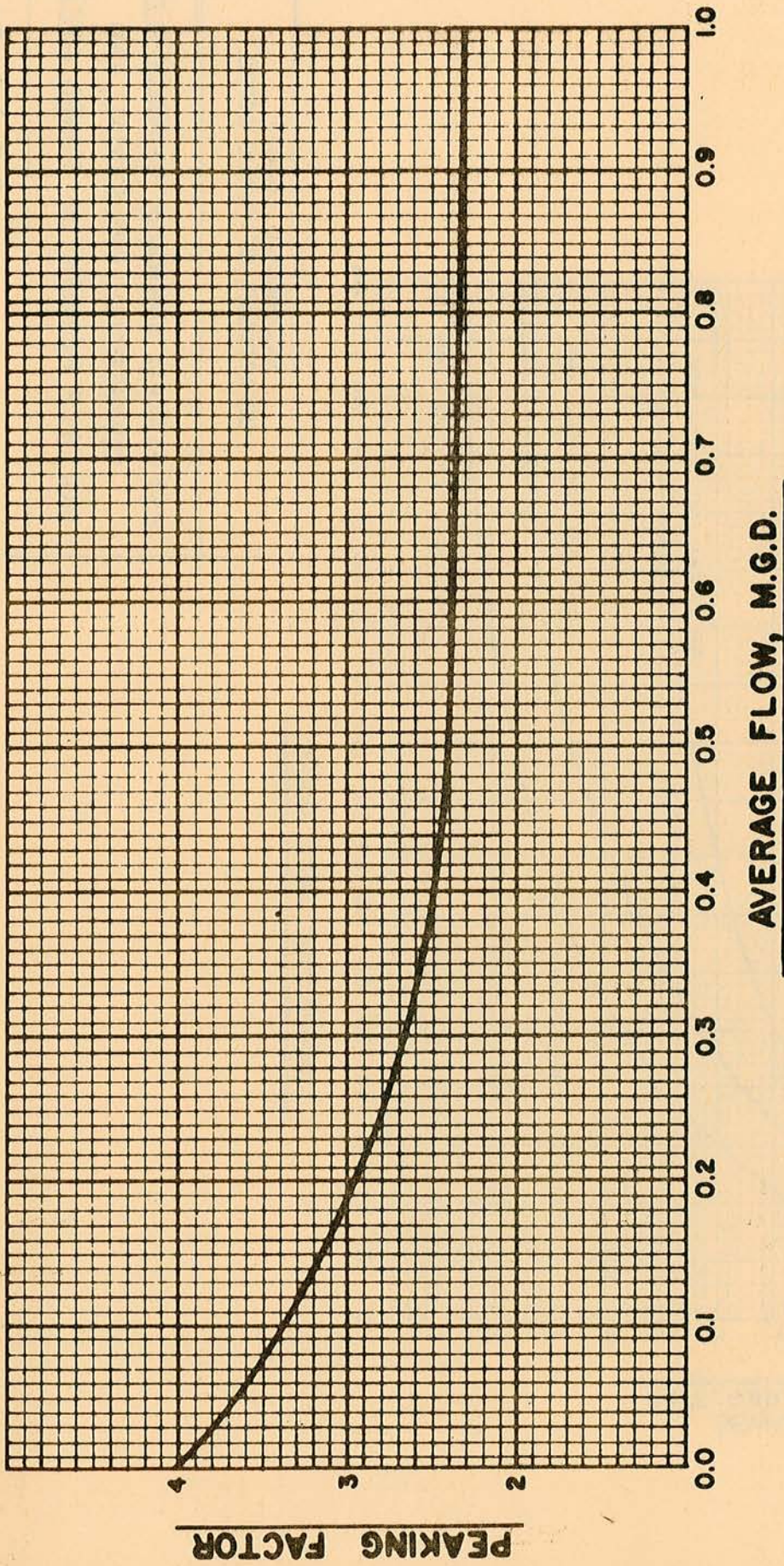


CONTRIBUTING AREA, ACRES

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

ESTIMATED AVERAGE SEWAGE FLOW
COMMERCIAL, INDUSTRIAL, AND
MULTIPLE RESIDENTIAL ZONED AREAS

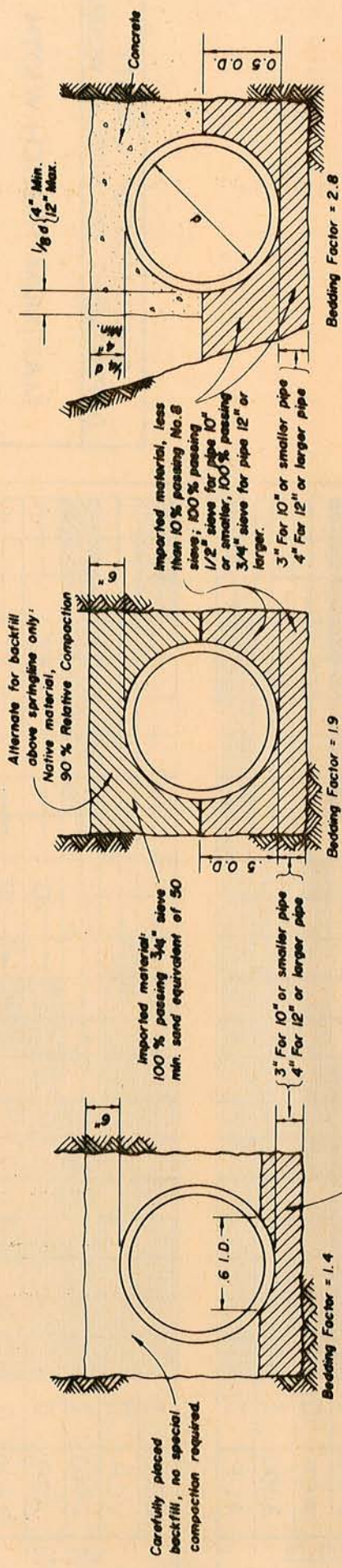
S D NO. 74



SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

SANITARY SEWER PEAKING FACTORS

S D NO. 75



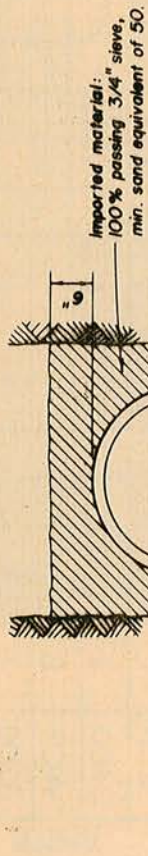
TYPE I

TYPE II

TYPE III

(To be used only with written approval of Department of Public Works.)

Imported material, min. sand equivalent of 50; 100% passing 1/2" sieve for pipe 10" or smaller, 100% passing 3/4" sieve for pipe 12" or larger.



Imported material, 100% passing 3/4" sieve, min. sand equivalent of 50.

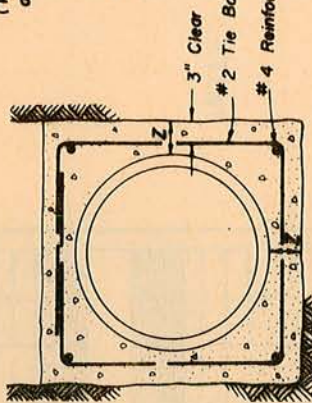
Imported material: 100% passing 3/4" sieve, min. sand equivalent of 50.

Type III A = 0.5 O.D.
Type III B = 0.75 O.D.

3" For 10" or smaller pipe
4" For 12" or larger pipe

Bedding Factor = 2.3 for Type III A; 2.7 for Type III B

TYPE III



COMPLETE ENCASEMENT DETAIL

Z = 4" Min. for Service Sewer
6" Min. for all Sewer Pipes

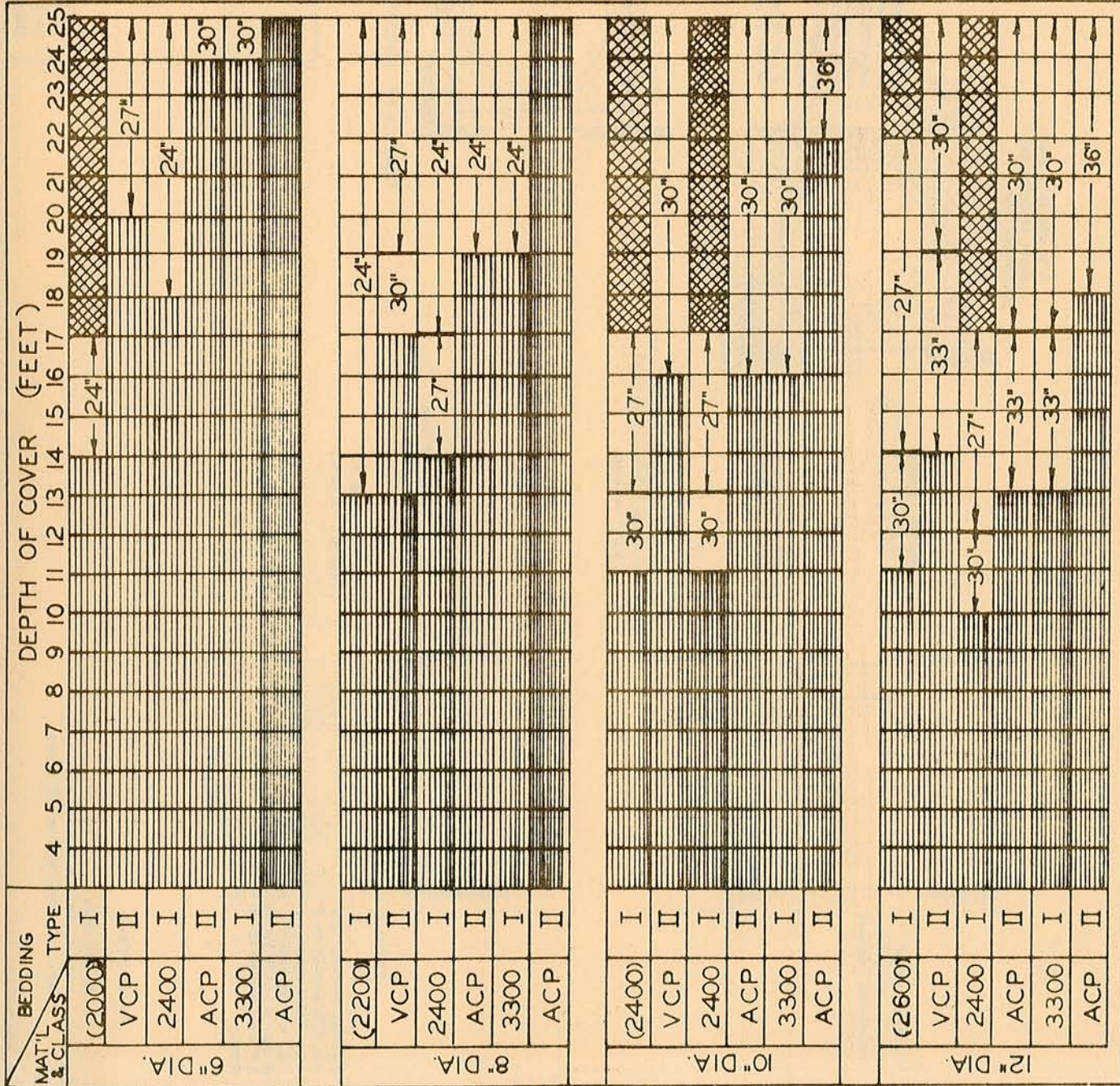
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS




PIPE BEDDING & INITIAL BACKFILL

NO SCALE
DATE 1-2-70
DRAWN BY K L G

S D NO. 5

General Notes:
Backfill limits.
Minimum depth of bedding material under pipe bells shall be 11/2 inches.



 27"
 MAXIMUM TRENCH WIDTH MEASURED AT TOP OF PIPE.

 NO LIMIT ON TRENCH WIDTH.

 PIPE CLASS, BEDDING TYPE AND DEPTH OF COVER NOT ACCEPTABLE

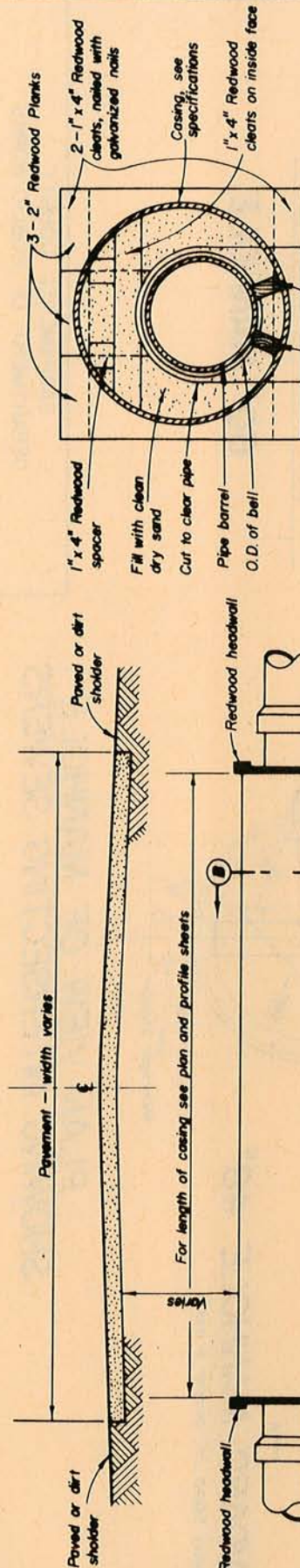
NOTE: FOR DEPTHS LESS THAN 3 FEET OR MORE THAN 25 FEET SEE SECTION 12.05-5
 CALCULATIONS BASED ON SOIL WT=120 lb/ft³ SATURATED CLAY (K_μ=0.110)

SACRAMENTO COUNTY
 DEPARTMENT OF PUBLIC WORKS

MAXIMUM TRENCH WIDTH

SCALE:
 DATE: 2-26-73
 DRAWN BY:

SD NO. 76



PROFILE

SECTION B-B

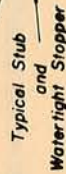
Provide 2 redwood skids, 24 to 30 inches in length, near the center of each section of conducted V.C. sewer pipe. Conducted water pipe or A.C. sewer pipe shall have two pairs of skids, each 24 to 30 inches in length, centered approximately one-fifth the pipe length from each end. Skids to be of size such that bell clears conductor. Skid height not to be more than 50% more than width. Skids are to be secured to pipe by straps, one at each end. Groove skids for strap clearance.

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

CONDUCTOR CASING DETAIL

NO SCALE
DATE: 1-2-70
DRAWN BY K L G

S D NO.10



For Sanitary Sewers 24" diameter or less.

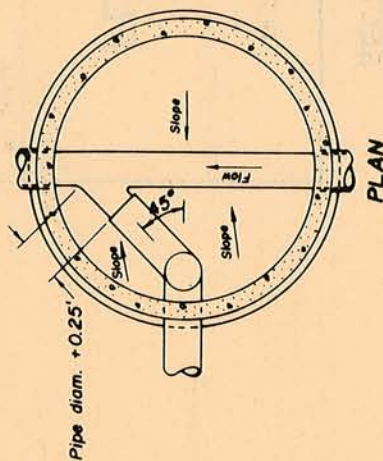
PLAN VIEW OF MANHOLE
SHOWING INTERSECTING SEWERS

2. Pipe may stop at inside face of Manhole or may be continuous thru Manhole. If pipe laid continuous, top half shall be broken away after base is poured.

STANDARD PRECAST MANHOLE (SEWER)

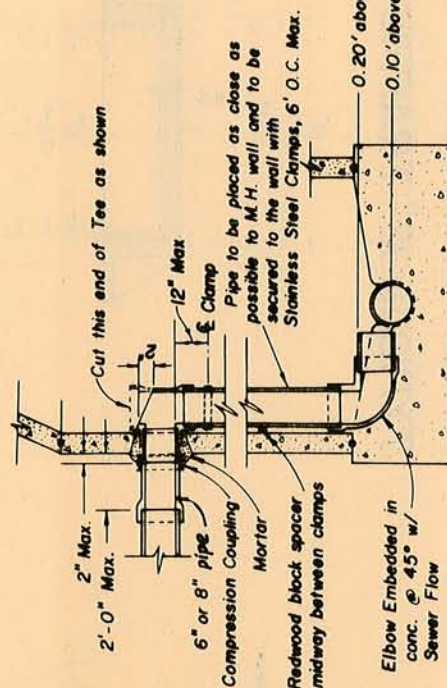
NO SCALE
DATE: 1-2-70
DRAWN BY: K. L. G

SD NO. 14



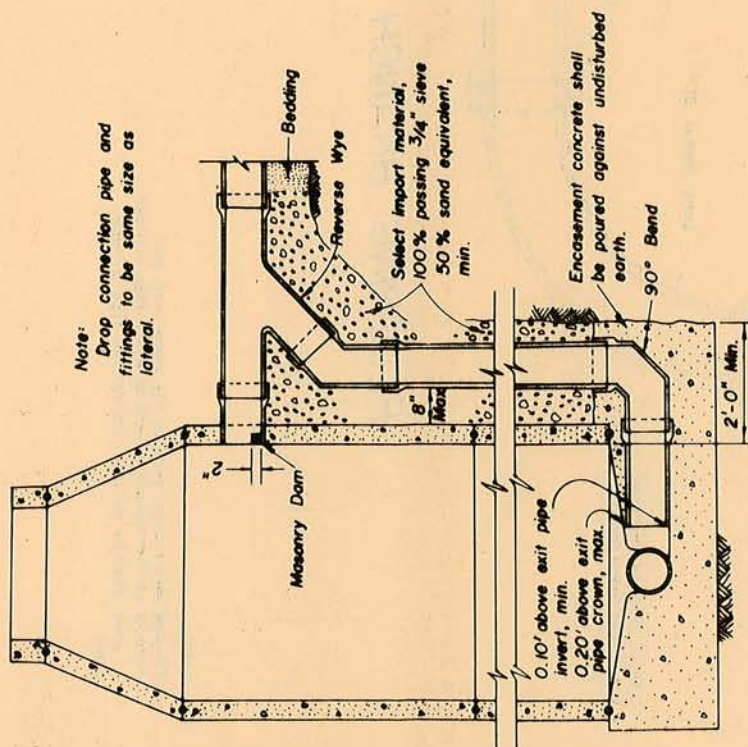
Note:

1. All Inside Drop piping to be P.V.C. or Mod. Styrene.
2. Cement all joints.
3. Drop connection pipe and fittings to be same size as lateral.
4. Clamps to be 1 1/2" x 12 ga stainless steel, anchored to M.H. wall with 2-1/2" cadmium plated bolts.



PROFILE

INSIDE DROP CONNECTION



FOR 10" OR LARGER DROP OR WHERE SPECIFICALLY INDICATED ON THE DRAWINGS

OUTSIDE DROP CONNECTION

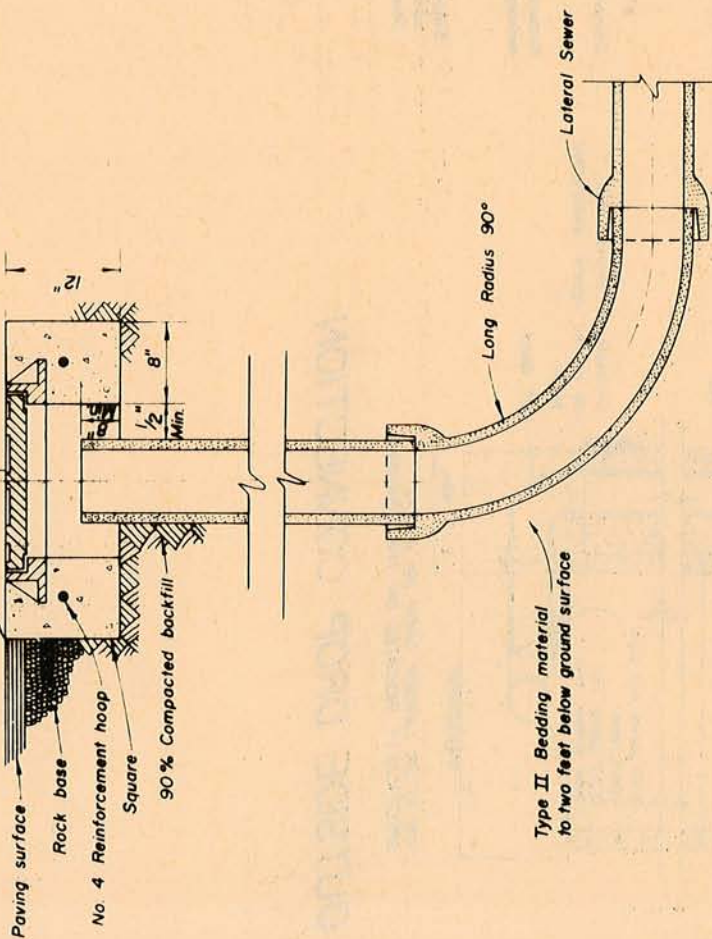
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

DROP CONNECTIONS

NO SCALE
DATE 1-2-70
DRAWN BY K L G

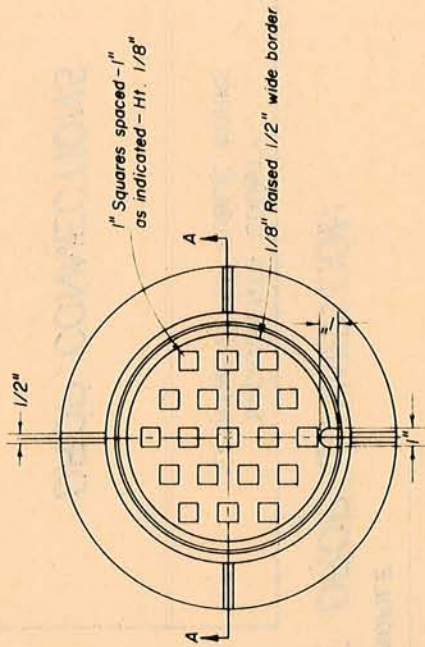
SD NO. 15

Flush with existing paving or sidewalk or 1" above surrounding ground surface.

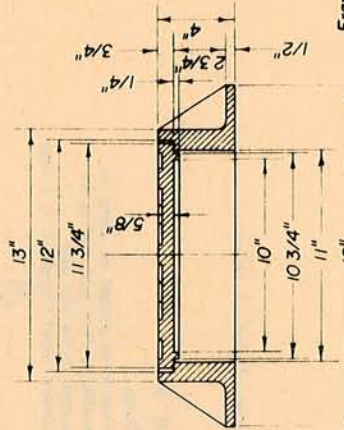


FLUSHING BRANCH

NOTE:
All pipe and fittings shall be the same size and material as the horizontal pipe to which they connect. Joint shall be as specified for the type of pipe used.



TYPICAL 12" TRAFFIC RING & COVER



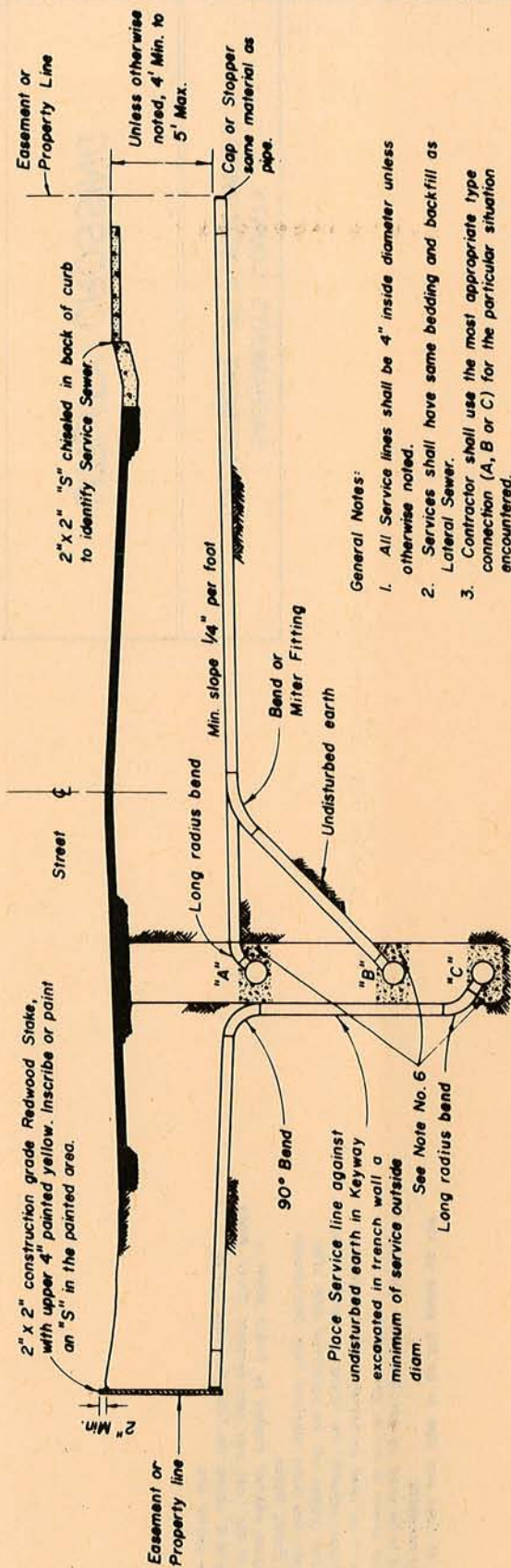
SECTION A-A

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

FLUSHING BRANCH

NO SCALE
DATE 1-2-70
DRAWN BY K L G

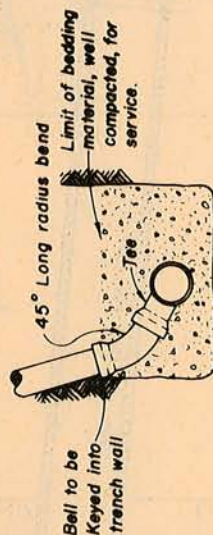
S D NO. 32



General Notes:

1. All Service lines shall be 4" inside diameter unless otherwise noted.
2. Services shall have same bedding and backfill as Lateral Sewer.
3. Contractor shall use the most appropriate type connection (A, B or C) for the particular situation encountered.
4. Service Sewer shall have minimum 4'-0" cover at Property Line whenever Lateral depth and Service Sewer Slope of 1/4" per foot (Minimum) permit.
5. When the Lateral Sewer depth is such that 4'-0" cover at Property Line cannot be met, the minimum slope of 1/4" per foot shall govern the cover.
6. Place concrete 12" wide or well compacted bedding material 18" wide under the Tee branch, the fitting, and unsupported pipe. When bedding material is used, place additional bedding material to top of bend, the full width of the trench.
7. Min. Cover of 4'-0" at the property line shall be measured from existing ground surface or edge of adjacent roadway, whichever is Lower.
8. A specific elevation at the property line, when shown on the plans or designated by the Engineer, shall govern.
9. Miter fittings shall be Max. 45°.

ELEVATIONS



TYPE C



TYPE B

CONNECTION DETAILS

TYPE A

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

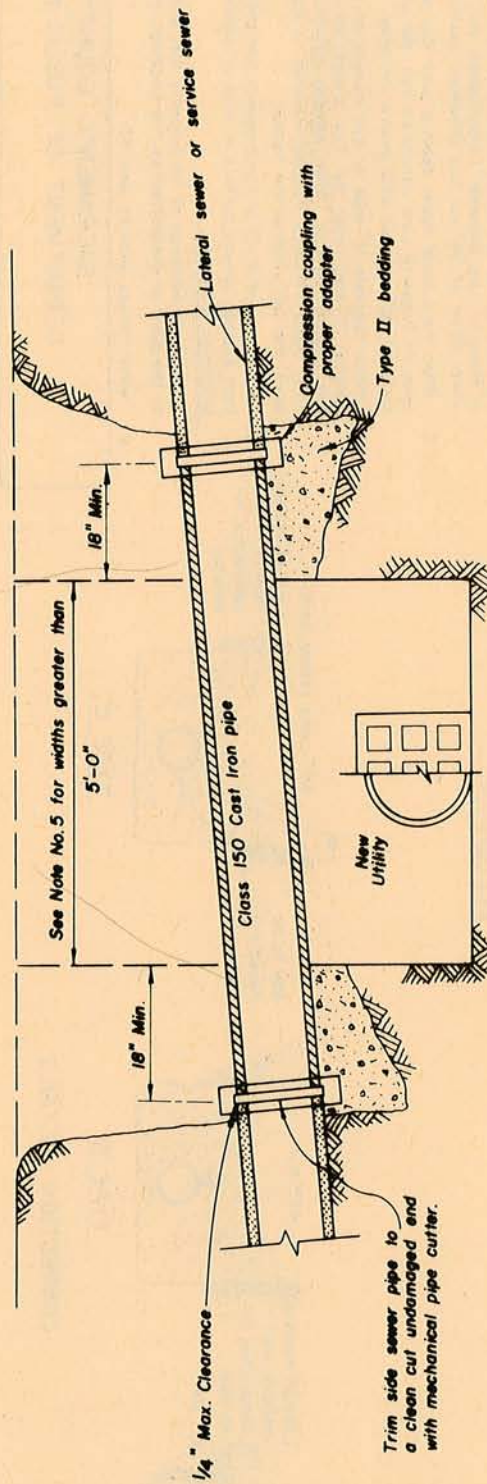
SERVICE SEWERS

NO SCALE

DATE: 1-2-70

DRAWN BY: K. L. G.

SD NO. 33



Notes:

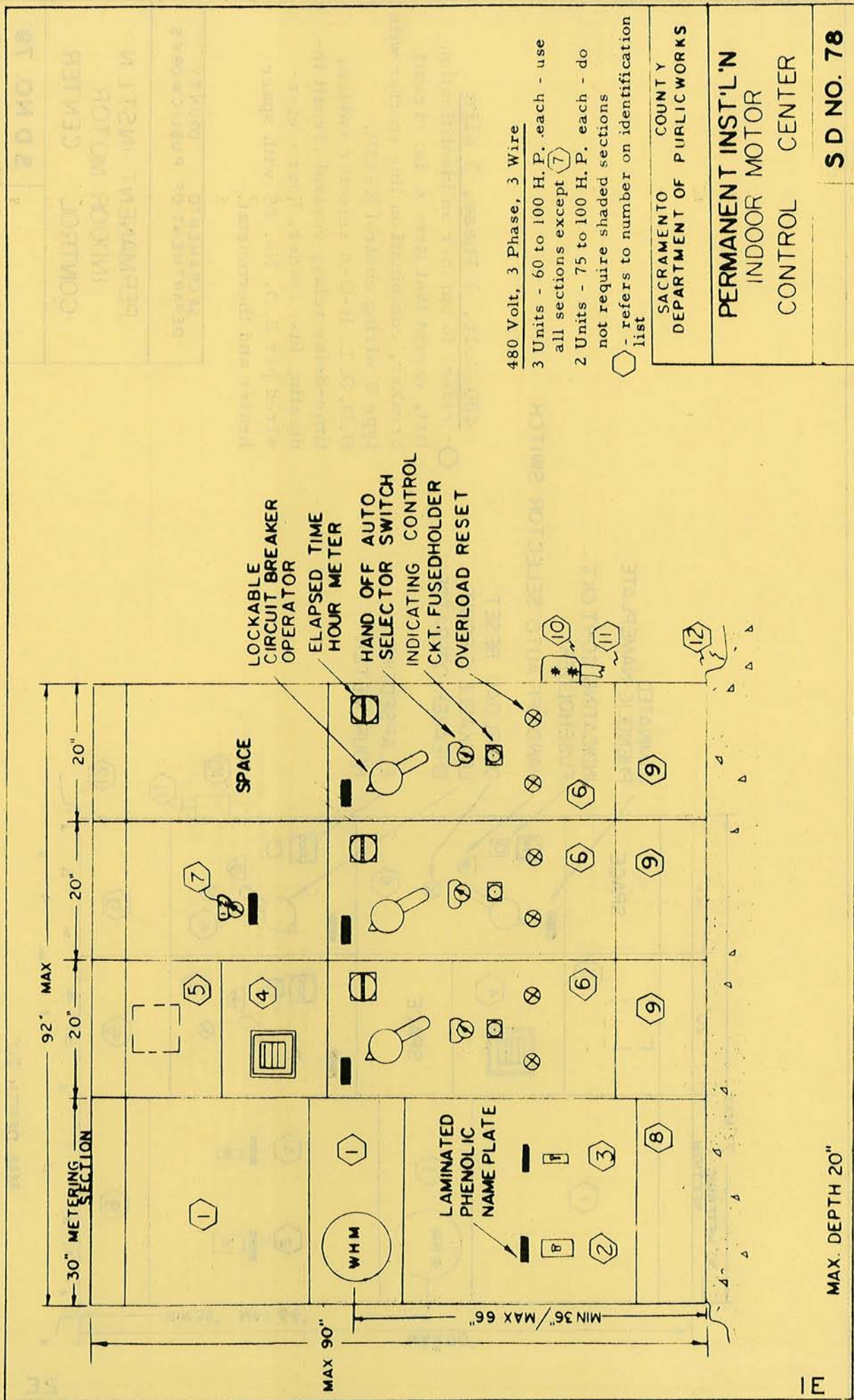
1. Inside diameter of Cast Iron pipe to be the same as the pipe to which it connects.
2. Cast Iron pipe is to be used as per this detail whenever the lateral or service sewer is cut or damaged.
3. Cast Iron pipe is to be used as per this detail whenever construction passes beneath the lateral or service sewer.
4. Alteration of sewer grades will be permitted only after written permission has been received from Sacramento County Dept. of Public Works.
5. Whenever the span, whether caused by trench width or crossing angle, of the Cast Iron pipe exceeds 5'-0", place Type II bedding to 6" above the Cast Iron pipe and 18" each side of its center line.

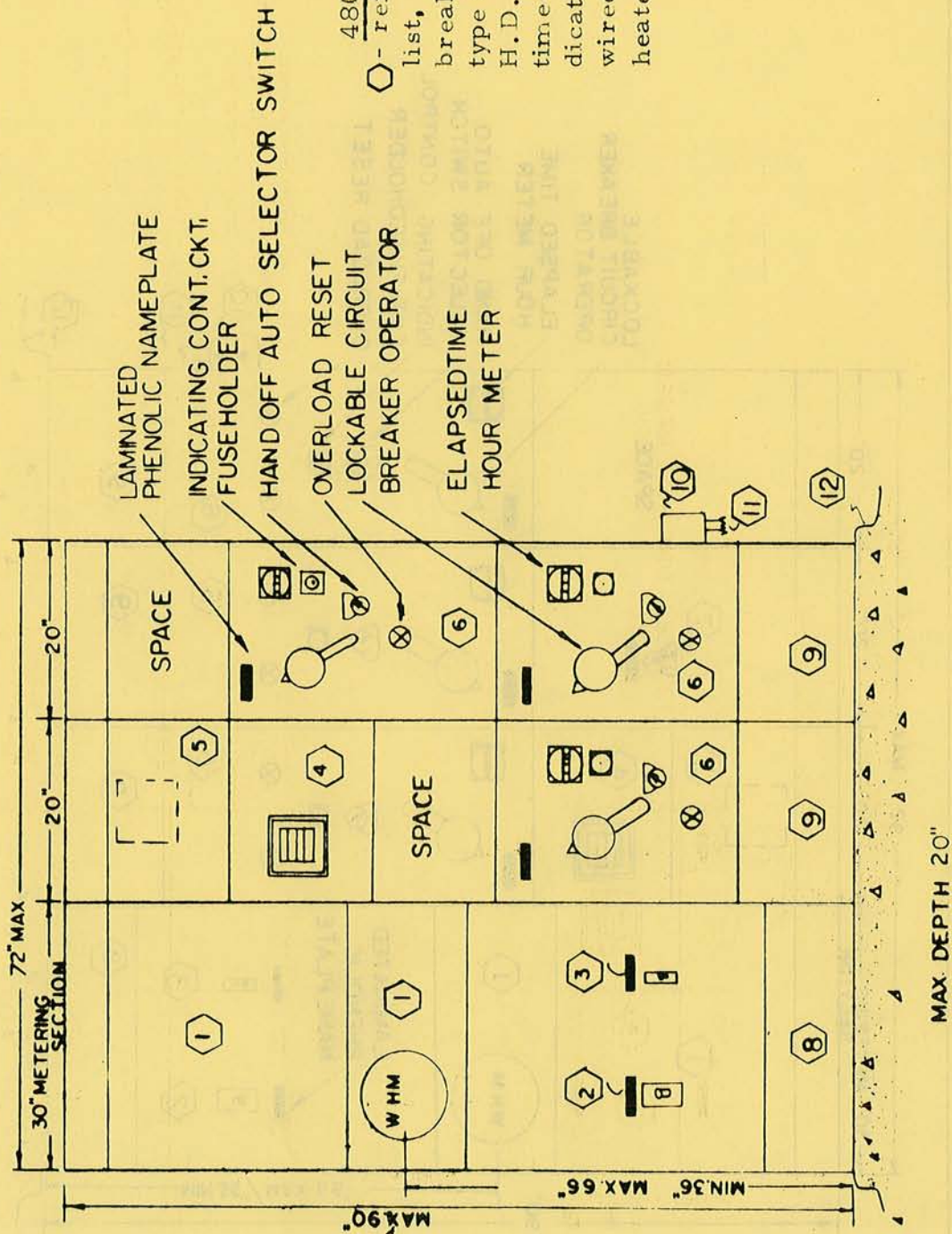
SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

UTILITY CROSSING

NO SCALE
DATE: 1-2-70
DRAWN BY: K. L. G.

SD NO. 34



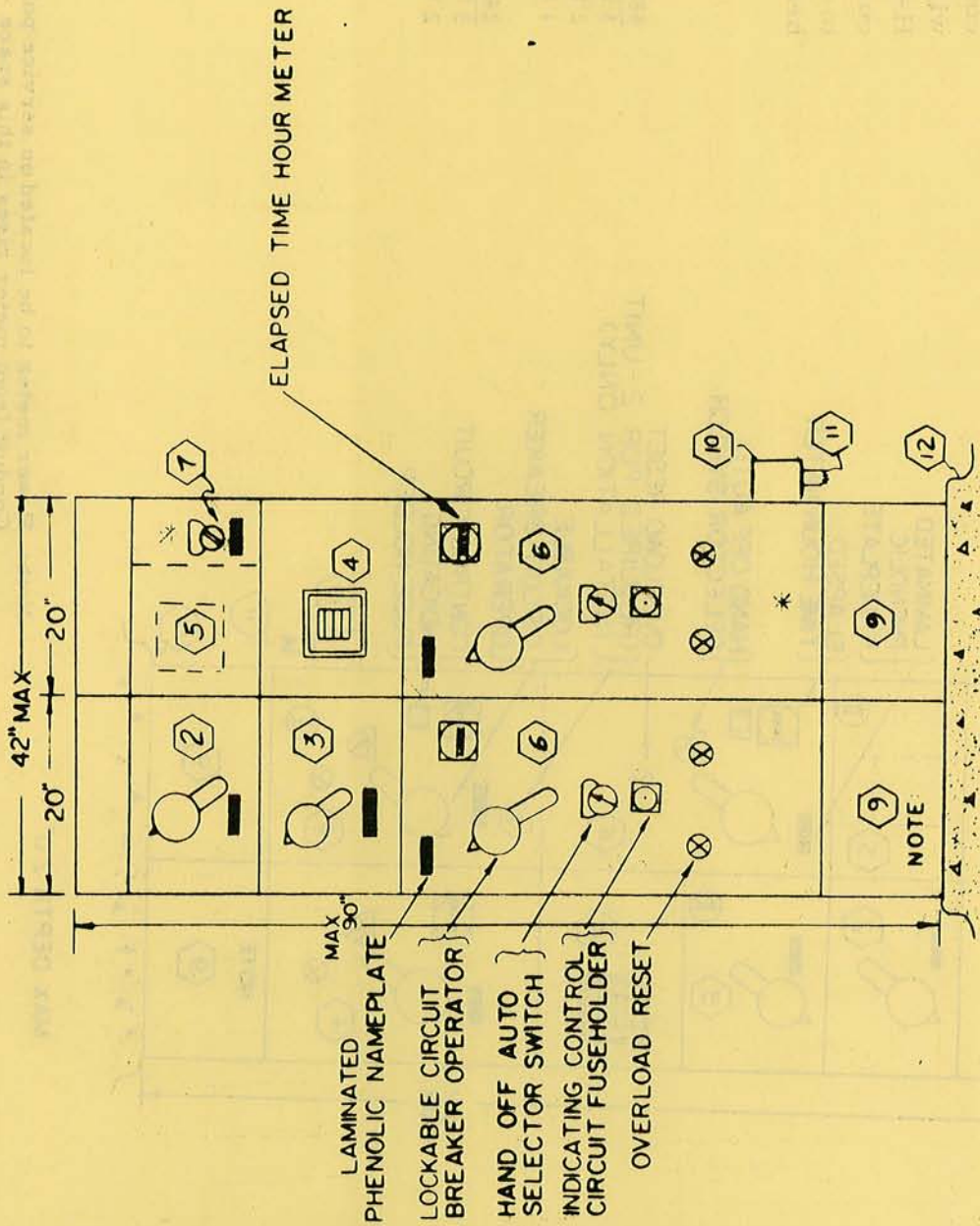


480 Volt, 3 Phase, 3 Wire
 ○ - refers to number on identification list, except that Item 6 is: circuit breaker, combination line starter with type B wiring control XFMR, H.D.O.T. H-O-A selector switch, time-delay relay, control circuit indicating fuse holder, hour meter-wired per S.D. No. 89 with space heater and thermostat.

SACRAMENTO COUNTY
 DEPARTMENT OF PUBLICWORKS

PERMANENT INST'L N
 INDOOR MOTOR
 CONTROL CENTER

S D NO. 79



480 VOLT, 3 PHASE, 3 WIRE

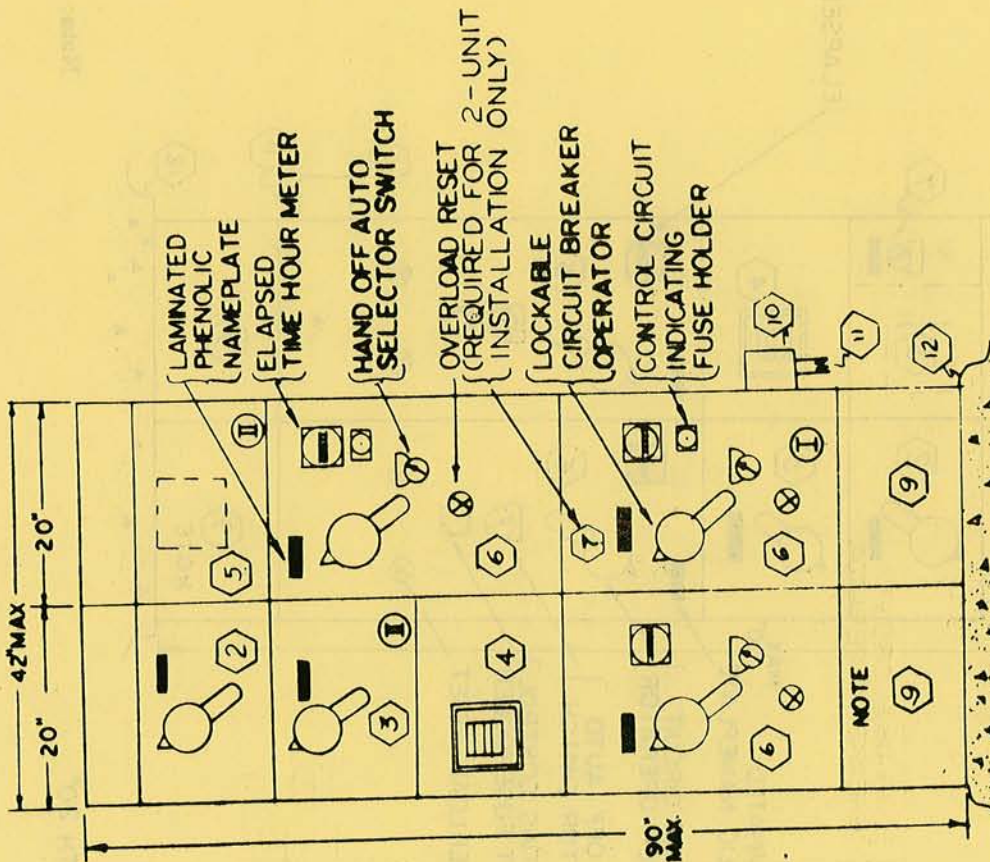
2 UNITS - 60 H. P. each, require all sections shown

1 UNIT - 60 H. P. does not require shaded sections

○ - refers to number on identification list

Note: Power metering to be located on service pole. Conduit from meter rises in this space - provide raceway.

SACRAMENTO COUNTY DEPARTMENT OF PUBLICWORKS	
PERMANENT INST'L'N INDOOR MOTOR CONTROL CENTER	
	S D NO. 80



Note: Power meter to be located on service pole.
Conduit from meter rises in this space -
provide raceway.

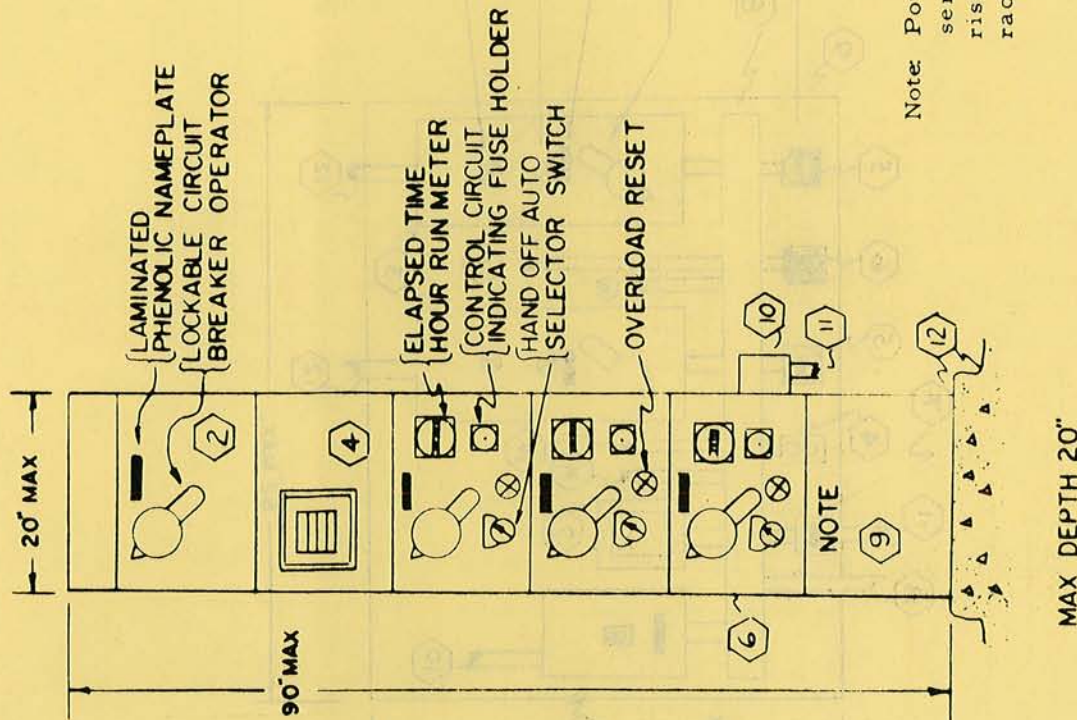
○ - refers to number on identification list except that Item 6 is: circuit breaker, combination line starter with Type B wiring, control XFMR, H.D.O.I.
H-O-A selector switch, time delay relay, control circuit indicating fuseholder, hour meter wired per S.D. No. 89 with space heater and thermostat.

480 VOLT, 3 PHASE, 3 WIRE
3 UNITS - 30 to 40 H.P. require all sections
2 UNITS - 30 to 50 H.P. delete Section ①
1 UNIT - 30 to 50 H.P. use ②, ③, ④, ⑤, ⑥, ⑩ arranged for 20 inch width
240 VOLT, 3 PHASE, 4 WIRE
3 UNITS - 20 to 25 H.P. delete Sections ① and ⑩
2 UNITS - 20 to 25 H.P. delete Sections ① and ⑩

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

PERMANENT INST'L'N
INDOOR MOTOR
CONTROL CENTER

S D NO. 81



○ - refers to number on identification list, except that Item 6 is: circuit breaker, combination linestarter with Type B wiring, control XFMR, H.D.O. . .
 H-O-A selector switch, time delay relay, control circuit with indicating fuseholder, hour meter - wired per S.D. No. 89 with space heater and thermostat.

Note: Power meter to be located on service pole. Conduit from meter rises in this space - provide raceway.

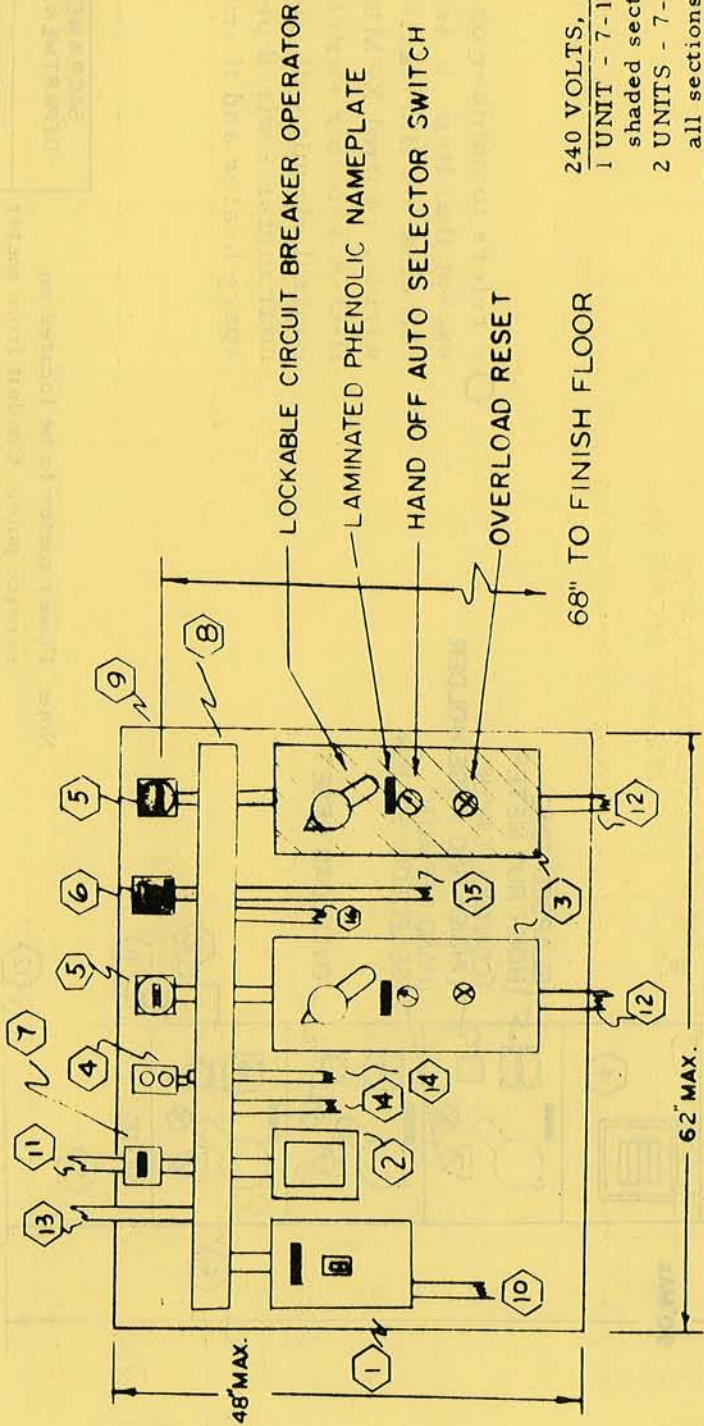
SACRAMENTO COUNTY
 DEPARTMENT OF PUBLIC WORKS

PERMANENT INST'L'N
 INDOOR MOTOR
 CONTROL CENTER

S D NO. 82

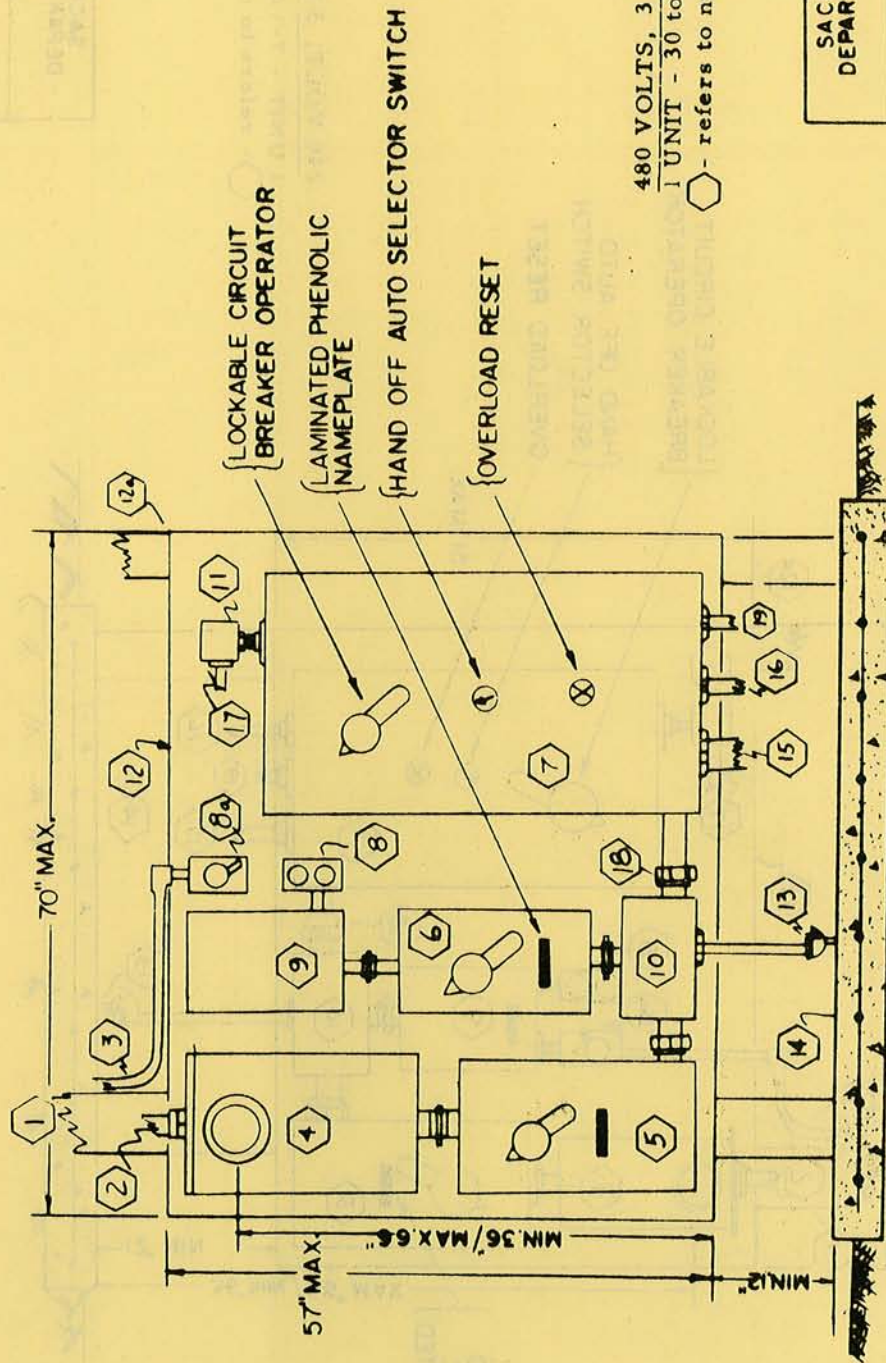
WPA DESIGN 50.

CONTROL CENTER
MOTOR ROOM
PERMANENT INST'L N



240 VOLTS, 3 PHASE, 4 WIRE
1 UNIT - 7-1/2 to 25 H.P. delete shaded sections
2 UNITS - 7-1/2 to 15 H.P. require all sections
○ - refers to number on identification list

SACRAMENTO COUNTY DEPARTMENT OF PUBLIC WORKS
PERMANENT INST'L N INDOOR COMPOSITE CONTROL ASSEMBLY
SD NO. 83



480 VOLTS, 3 PHASE, 3 WIRE
1 UNIT - 30 to 100 H. P.

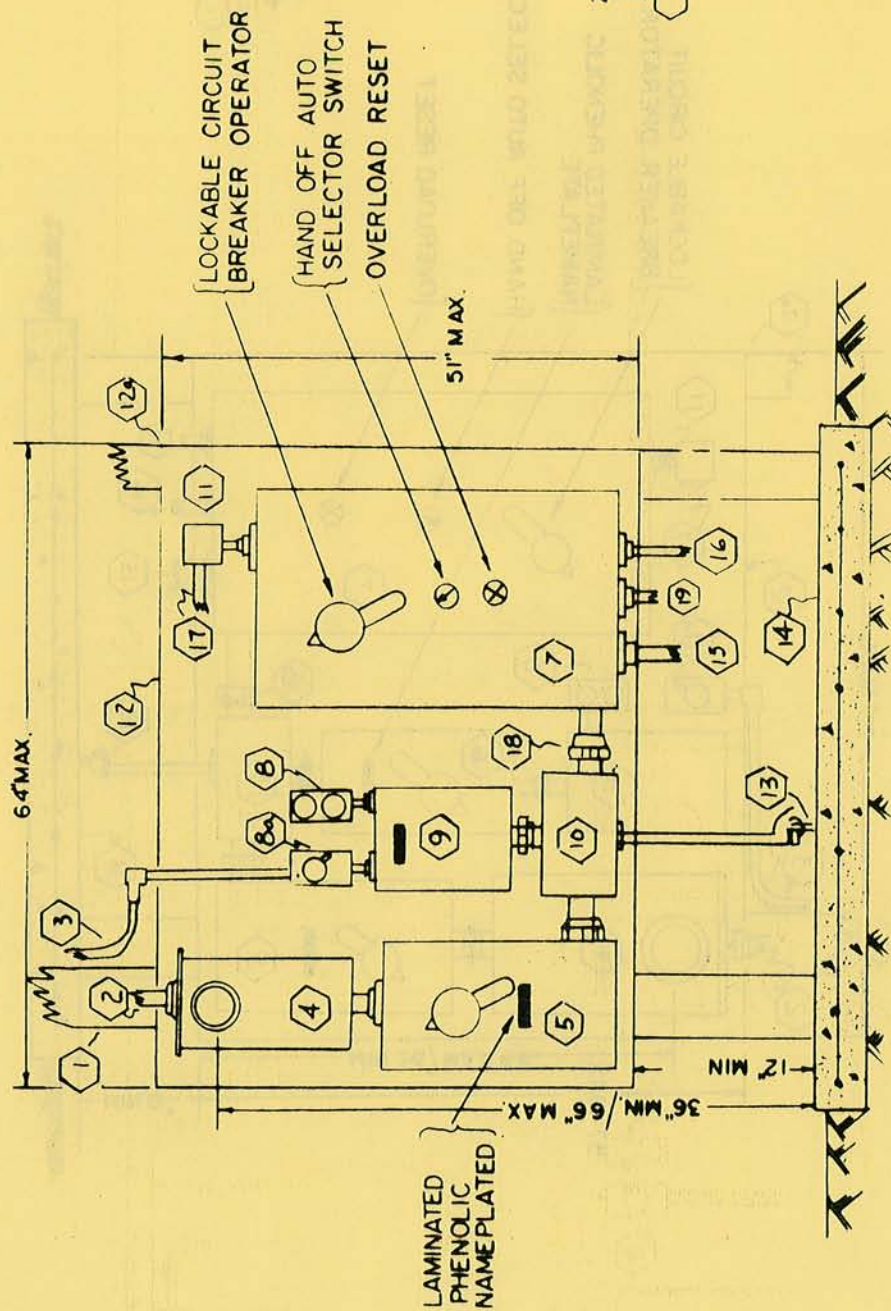
○ - refers to number on identification list

100 HP SHOWN

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TEMPORARY INST'L N
OUTDOOR COMPOSITE
CONTROL ASSEMBLY

S D NO. 84



240 VOLT, 3 PHASE, 4 WIRE

1 UNIT - 7-1/2 to 25 H. P.

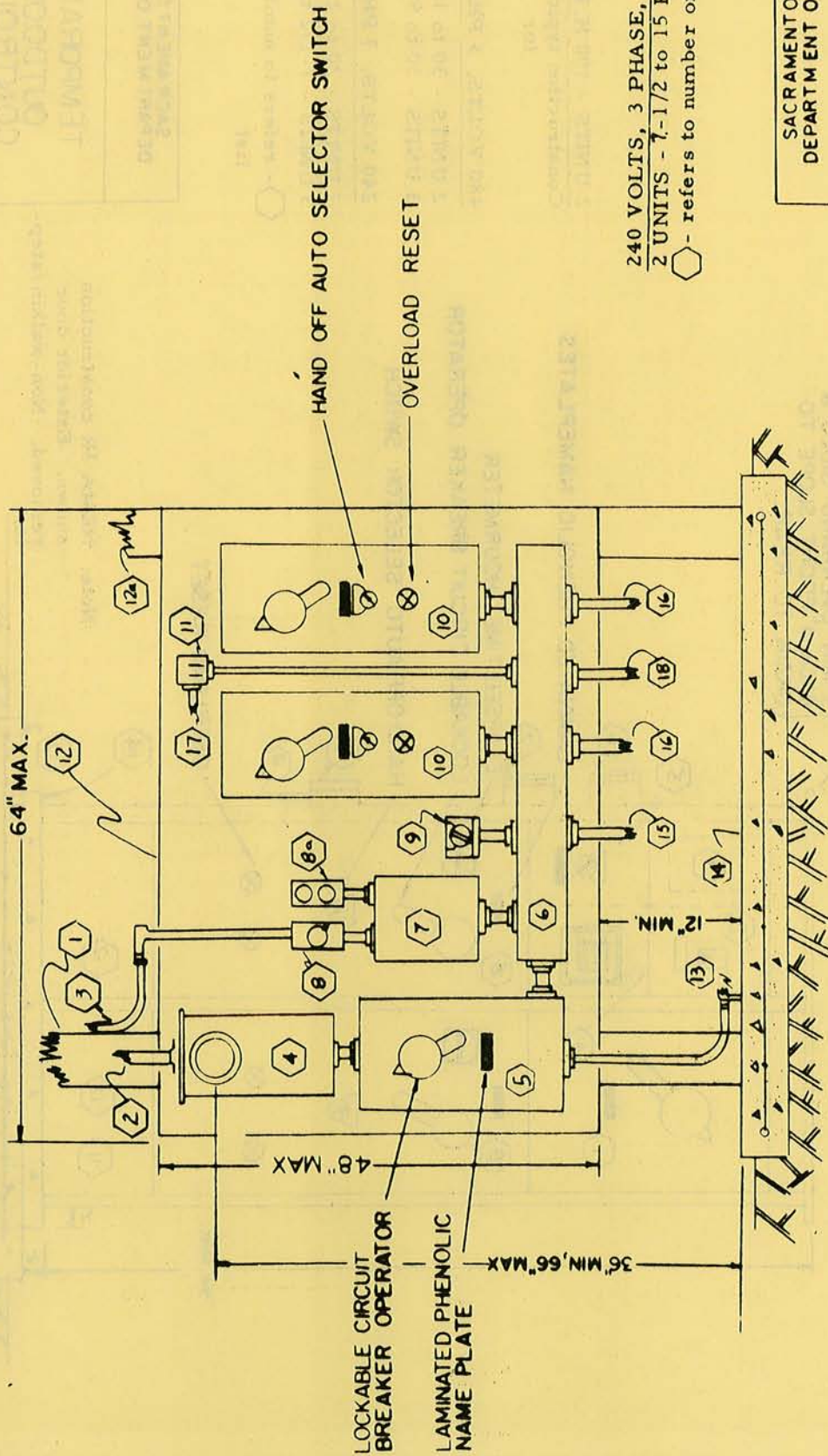
○ - refers to number on identification list

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TEMPORARY INST'L'N
OUTDOOR COMPOSITE
CONTROL ASSEMBLY

SD NO. 85

25 HP. SHOWN

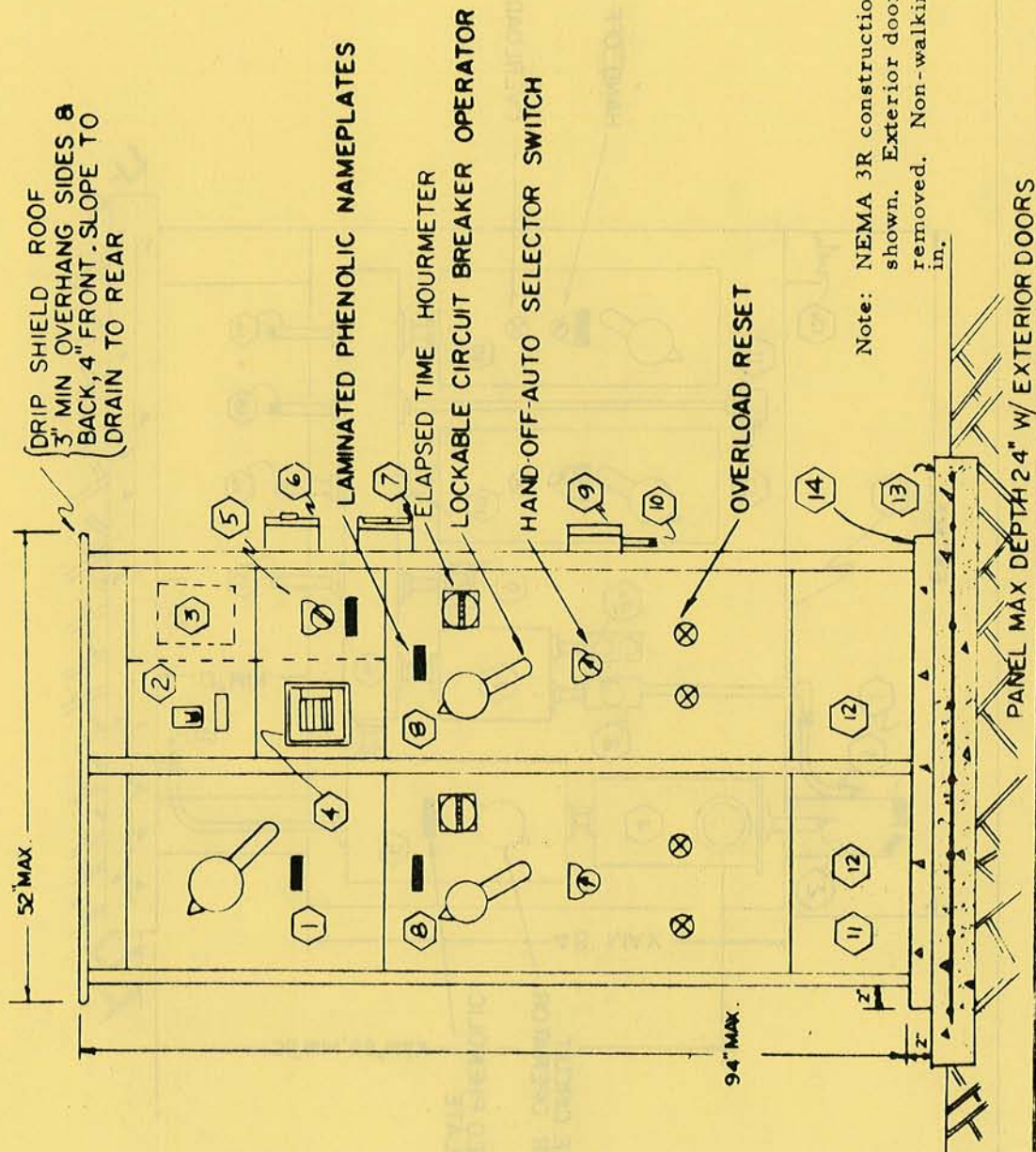


240 VOLTS, 3 PHASE, 4 WIRE
 2 UNITS - 7-1/2 to 15 H.P. Each
 ○ - refers to number on identification list

SACRAMENTO COUNTY
 DEPARTMENT OF PUBLIC WORKS

TEMPORARY INST'L'N
 OUTDOOR COMPOSITE
 CONTROL ASSEMBLY

SD NO. 86



2 UNITS - 100 H. P. EACH SHOWN
Construction typical w/ modification for

480 VOLTS, 3 PHASE, 3 WIRE

2 UNITS - 30 to 100 H. P. each

3 UNITS - 30 to 50 H. P. each

240 VOLTS, 3 PHASE, 4 WIRE

2 UNITS - 20 to 25 H. P. each

3 UNITS - 7-1/2 to 25 H. P. each

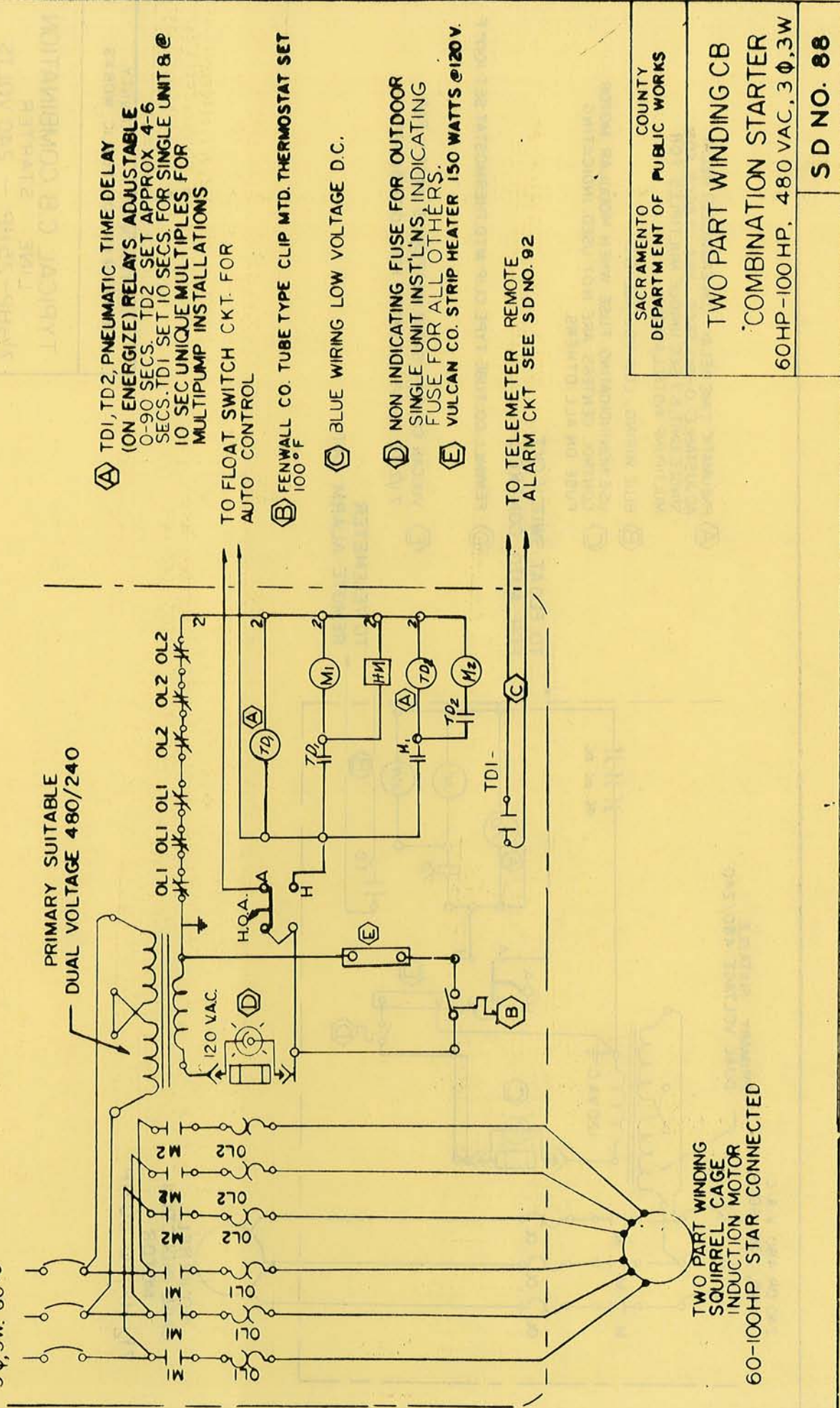
○ - refers to number on identification list

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TEMPORARY INST'L'N
OUTDOOR MOTOR
CONTROL CENTER

SD NO. 87

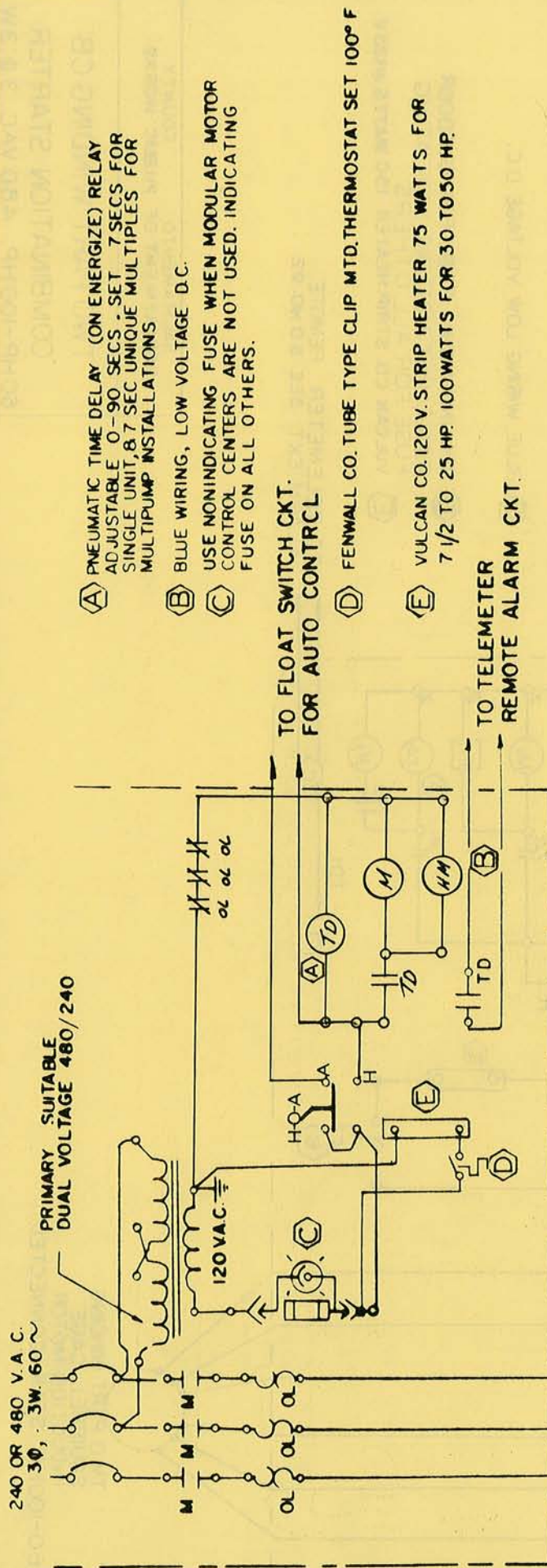
480 V.A.C.
3 ϕ , 3W, 60~



SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TWO PART WINDING CB
COMBINATION STARTER
60HP-100HP, 480 VAC, 3 ϕ , 3W

SD NO. 88



(A) PNEUMATIC TIME DELAY (ON ENERGIZE) RELAY
ADJUSTABLE 0-90 SECS. - SET 7 SECS FOR
SINGLE UNIT, 8.7 SEC UNIQUE MULTIPLES FOR
MULTIPUMP INSTALLATIONS

(B) BLUE WIRING, LOW VOLTAGE D.C.

(C) USE NONINDICATING FUSE WHEN MODULAR MOTOR
CONTROL CENTERS ARE NOT USED. INDICATING
FUSE ON ALL OTHERS.

(D) FENWALL CO. TUBE TYPE CLIP MTD. THERMOSTAT SET 100° F

(E) VULCAN CO. 120V. STRIP HEATER 75 WATTS FOR
7 1/2 TO 25 HP 100WATTS FOR 30 TO 50 HP.

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

TYPICAL C.B. COMBINATION
LINE STARTER
7 1/2 HP - 25 HP - 240 VOLTS
30 HP - 50 HP - 480 VOLTS

S D NO. 89

OPENS ON INCREASING W.S.ELEVATION (HI WATER ALARM)
CLOSE ON INCREASING W.S.ELEVATION

— FLOAT OPERATED SWITCHES

MANUAL PUMP SEQUENCING
PLUG/JACK ASSEMBLY MOUNTED
ON FLOAT SWITCH ASSEMBLY

TO STARTER PUMP NO.1 S D NO. 88 OR 89

TO STARTER PUMP NO.2 S D NO. 88 OR 89

TO STARTER PUMP NO 3 S D NO. 88 OR 89

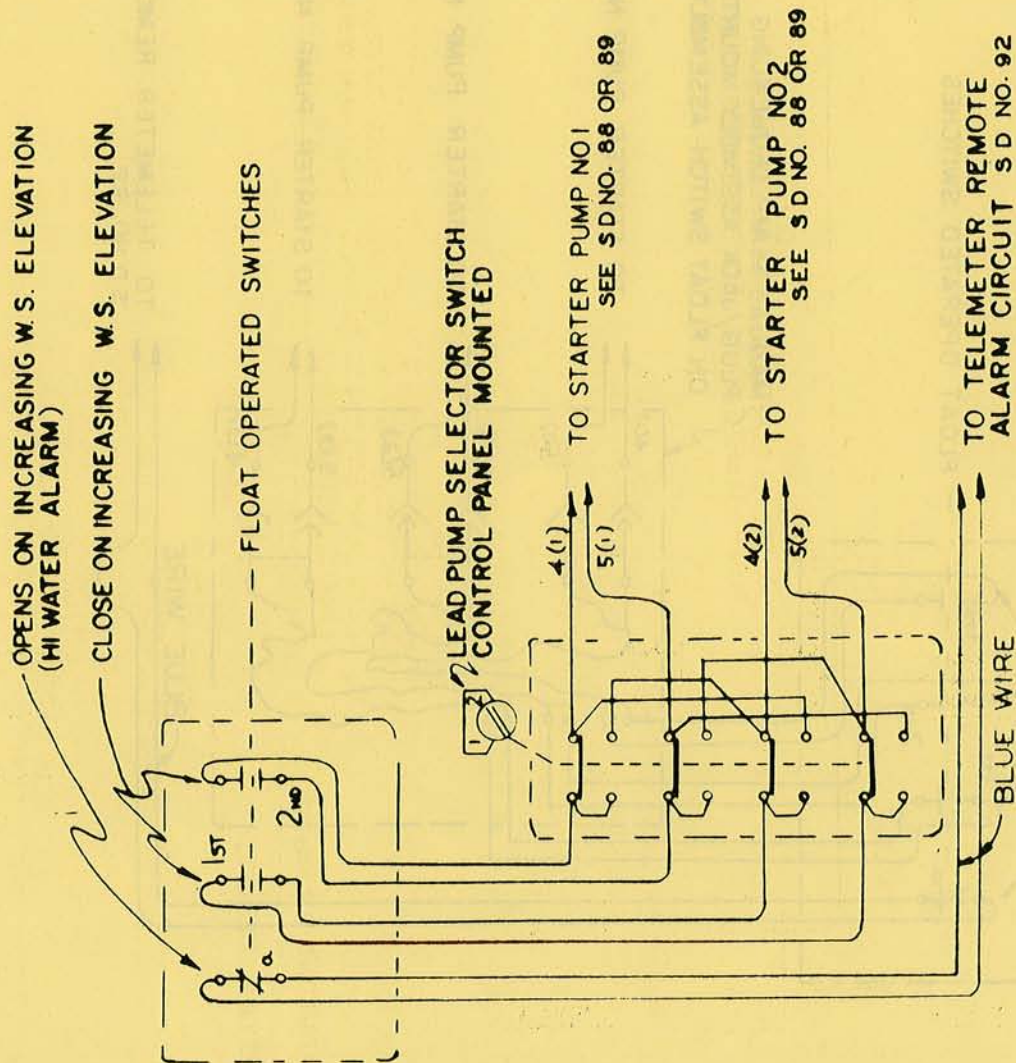
TO TELEMETER REMOTE ALARM CKT.
S D NO. 92

BLUE WIRE

SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

FLOAT SWITCH CIRCUIT FOR
AUTOMATIC CONTROL OF
THREE UNIT INSTALLATION
(MANUAL ALTERNATION)

S D NO. 90



SACRAMENTO COUNTY
DEPARTMENT OF PUBLIC WORKS

FLOAT SWITCH CIRCUIT FOR
AUTOMATIC CONTROL OF
TWO UNIT INSTALLATION
(MANUAL SEL. SW. ALTERNATION)

S D NO. 91

IDENTIFICATION LIST FOR
STANDARD DRAWINGS NO. 78 THROUGH NO. 82

1. Watt hour meter and meter transformer sections.
2. Main disconnect, circuit breaker, 600 V. A.C., 3 pole Westinghouse A-B "De-Ion," or equal, frame & trip size as required.
3. Lighting and miscellaneous power, circuit breaker, 480 V. A.C. EH Frame, 15A./2P. Westinghouse Type A-B.
4. 4 circuit (minimum) 3-15A/1P, and 1-20A/1P, 120/240 V. A.C. 3 wire, grounded neutral, lighting circuit breaker panel. (Additional circuits may be required.)
5. Lighting and miscellaneous power transformer, 1.5KVA (minimum) single phase 480/120-240 V. A.C., 60 cycle temperature rise not to exceed 60° C., Class B or better insulation.
6. Circuit breaker, combination part winding starter with control transformer, heavy duty oil tight hand-off-auto. Selector switch, extra time delay relay and control circuit indicating fuse holder, hour meter, with thermostat and heater, wired in accordance with Drawing No. 88.
7. (Two unit installation only) selector switch. See Drawing No. 91. Heavy duty oil tight two position "Lead Pump Selector."
8. Power service conduit rise space.
9. Terminal board space and conduit space.
10. Telephone terminal box, with two pole terminal board see Drawing No. 92. Locate to conform with telephone company requirements.
11. Telephone service conduit 3/4".
12. Two-inch high raised concrete pad. Two-inches beyond control center in each direction.

IDENTIFICATION LIST FOR STANDARD DRAWING NO. 83

1. Main disconnect, circuit breaker NEMA 1 enclosure 480 V. A.C.
E. Frame, Westinghouse A-B "De-Ion" or equal (trip size as required)
3 pole and Sn.
2. 4 circuit (minimum) 3-15/1P and 1-20A/1P, 120/240V. A.C. 3 wire
grounded neutral, surface mounted general purpose enclosure, lighting
circuit breaker panel (additional circuits may be required).
3. Circuit breaker combination starter, with control transformer, control
circuit fuse, time delay relay, and heavy duty oil tight hand-off-auto.
selector switch, wired in accordance with Drawing No. 89 in N.E.M.A.
1 gasketed enclosure with space heaters and thermostat.
4. Duplex convenience outlet, grounding, 120 V A.C. 15A, Hubble 5252,
or equal.
5. Running time meters, conduit mtg. general purpose enclosure, 120V. A.C.
60 cycle, 0-10,000 hrs. non-reset, G.E. Co. type 8KT or equal.
6. Lead pump selector switch, two position, 4 pole double throw with
escutcheon labeled "1" - "2" oil tight operator and enclosure complete
with laminated phenolic nameplate, see Drawing No. 91.
7. Telephone terminal box with two pole terminal. Board see Drawing No. 92.
8. Oil tight wiring gutter, J.T.C. Std.
9. Mounting board, 3/4" Douglas Fir, exterior grade Plywood, primed one
coat, and finished two coats grey enamel, fastened securely to building
structural members of stiffeners with minimum of 6-3/8" galvanized bolts.
10. Conduit to power meter on service pole.
11. Conduit to telephone service entrance 3/4" minimum.
12. Conduit to pump motors and heavy duty oil tight lockout stop push buttons.
13. Conduit to indoor light and switch.
14. Conduit to external lights, switches and receipts. As required.
15. Conduit to float operated switches (Drawings No. 89 through No. 92).
16. Conduit to trash rack high water alarm switch.

IDENTIFICATION LIST FOR STANDARD DRAWING NO. 84

1. Service pole.
2. Power service conduit riser.
3. Floodlighting conduit riser.
4. Power meter "A" base meter in NEMA 3R enclosure with viewing port.
5. Main disconnect, circuit breaker, 600 V. A.C. 3 pole Westinghouse A-B "De-Ion" or equal, NEMA 3R enclosure frame and trip size as required.
6. Lighting and miscellaneous power transformer, circuit breaker, 480 V. A.C. 2 pole 15A, Eh Frame, Westinghouse A-B "De-Ion" or equal, in NEMA 3R enclosure.
7. Circuit breaker combination starter in NEMA 3R enclosure, with control transformer, hand-off-Auto selector switch, control circuit fuse, time delay relay, internal mounted 0-10,000 hr. running time meter line starter wired per Drawing No. 89 for 30 through 50 H.P. units, and part winding starter wired per drawing No. 88 for 60 through 100 H.P. units with space heater and thermostat.
8. Grounding type, duplex convenience outlet, 120 V. A.C. 15A. in cast weatherproof enclosure.
- 8a. Floodlighting switch, cast weatherproof enclosure.
9. NEMA-3R enclosure, housing for 480/120-240, 1.5 KVA Transformer and 4 circuit 120-240 V. A.C. lighting circuit breaker panel (3 wire grounded neutral with 3-15A-1P and 1-20A-1[°] breakers, 2 are spare).
10. NEMA 4 cast junction box with union hubs as required.
11. NEMA 4 cast telephone junction box with two pole term. Block. See Drawing No. 92.
12. Equipment mounting backboard assembly, 2" x 6" T & G. construction grade Douglas Fir planks secured to items 1 and 12a with two 24d common galv. nails @ each end. Backboard planks to be primed prior to assembly and finished with two coats grey enamel prior to mounting of equipment.
- 12a. 6" x 6" construction grade, heart redwood, paint compatible preservative treated, minimum 5 ft. in ground.
13. Grounding system rigid conduit, clamp and 5/8" copperclad rod ground rod driven minimum 6 ft. in ground.
14. Concrete pad minimum 6" thick, slope to drain extend minimum of 4 ft. in front of control assembly and full width, reinforced with No. 4 bars 8" O.C. each way.

15. Conduit underground to pump.
16. Conduit underground to float operated switches.
17. Conduit as required to telephone service.
18. Union connections for conduit as required to make up assembly.
19. Conduit to trash rack high water alarm switch.

IDENTIFICATION LIST FOR STANDARD DRAWING NO. 85

1. through 3. Similar to Drawing No. 84.
4. Power Meter, NEMA 3R enclosure.
5. Main disconnect circuit breaker, 480 V. A.C., 3 pole and sn. Westinghouse A-B "De-Ion" or equal, NEMA 3R enclosure, frame and trip size as required.
7. Circuit breaker combination line starter in NEMA-3R enclosure, with control transformer, hand-off-auto selector switch control circuit fuse, time delay relay, internally mounted 0-10,000 hr. running time meter, wired per Drawing No. 89 with space heater and thermostat.
8. and 8a. Similar Drawing No. 84.
9. Lighting circuit breaker panel in NEMA 3R enclosure 120-240 V. A.C., wired, grounded neutral, 3-15A-1P breakers and 1-20A-1P breaker (two spares.)
10. and 11. Similar to Drawing No. 84.
12. Douglas Fir exterior grade 3/4" Plywood.
- 12a. through 19. Similar to Drawing No. 84.

IDENTIFICATION LIST FOR STANDARD DRAWING NO. 86

1. Service pole.
2. Power Service Conduit Riser.
3. Floodlighting Conduit Riser.
4. Power meter, NEMA 3R enclosure.
5. Main disconnect, circuit breaker 480 V. A.C. 3 pole & SN, Westinghouse Company A-B "De-Ion" or equal, NEMA 3R enclosure, frame and trip size as required.
6. Weatherproof gutter with raintight hubs.
7. Lighting circuit breaker panel in NEMA 3R enclosure 120/240 V. A.C. 3 wired grounded neutral, 4 circuits, 3-15A-1P and 1-20A-1P breaker.
8. Floodlight switch, weatherproof cast enclosure.
- 8a. Duplex, grounding, convenience outlet, 120 V. A.C. 15A., in weatherproof cast enclosure.
9. Heavy duty oil tight selector switch, "lead pump selector switch" with escutcheon labeled "1" - "2", see Drawing No. 91.
10. Circuit breaker combination linestarters in NEMA 3/4 enclosures with control transformer, control circuit fuse, time delay relay, internally mounted 0-10,000 hr. running time meters wired per Drawing No. 89 with space heaters and thermostat.
11. NEMA 4, cast telephone junction box with 2 pole terminal block. See Drawing No. 92.
12. Backboard for equipment mounting, 3/4" exterior grade Douglas Fir Plywood with 2" x 4" rear horizontal (top and bottom) stiffeners (construction grade). Prime and finish with two coats exterior grey enamel prior to mounting. Board to be secured to stiffeners and Item 1 and 12a using 16d galv. common nails 6" O.C.
- 12a. 6" x 6" const. grade heart redwood, paint compatible preservative treated, minimum 5 ft. in ground.
13. Grounding system rigid conduit, clamp and 5/8" copper clad rod driven minimum 6 ft. in ground.

14. Concrete pad, 6" min. thickness, slope to drain, extend a min. of 4 ft. in front of control assembly and full width, reinforced with No. 4 bars 8" O.C. each way.
15. Conduit underground to float operated switches.
16. Conduit underground to pump motors.
17. Conduit to telephone service.
18. Conduit underground to trash rack high water alarm switch.

IDENTIFICATION LIST FOR STANDARD DRAWING NO. 87

1. Main disconnect, circuit breaker 3 pole, 600 V. A.C. Westinghouse Co. type A-B "De-Ion" or equal, frame and trip size as required.
2. Lighting and miscellaneous power circuit breaker, 2 pole, 480 V. A.C. Westinghouse Co. type A-B "De-Ion" or equal, "E" frame 15A trip (not required for 240 V. A.C. 3 phase, 4 wire installation.)
3. Lighting and miscellaneous power transformer, 1.5KVA, 480/120-240 V. A.C. single phase, temperature rise not to exceed 60°C. (Not required for 240 V. A.C. 3 phase, 4 wire installations).
4. Lighting circuit breaker panel, 4 circuits 120/240 V. A.C. 3 wire grounded neutral, 3-15A-1P and 1-20A-1P breakers.
5. Lead pump selector switch, heavy duty oil tight, two position, with escutcheon labeled "1" - "2". See Drawing No. 91 (not required on 3 unit installations).
6. Weatherproof switch in cast enclosure for area lighting mounted on service pole.
7. Weatherproof duplex grounding type 120 V. A.C., 15A, convenience outlet in cast enclosure.
8. Circuit breaker combination starters (as required) with control transformers, control circuit fuse, time delay relays, running time meters 0-10,000 hrs., 7-1/2 through 50 H.P. units wired as line starters per Drawing No. 89 and 60 through 100 H.P. units wired as two part winding starters per Drawing No. 88 with space heaters and thermostats.
9. Cast weatherproof telephone junction box with two pole terminal block.
10. Conduit underground to telephone service drop 3/4".
11. Conduit underground to power metering equipment on service pole (provide panel service race way).
12. Conduit underground to area lighting, pump motors, float operated switches and trash rack alarm switch as required.
13. Concrete pad 6" minimum thickness, extend 1 ft. beyond panel rear and sides, 3 ft. in front. Reinforcing to be No. 4 bars 8" O.C. each way. Slope to drain.
14. 2" high panel concrete subbase, extend 2" beyond panel on all four sides.

