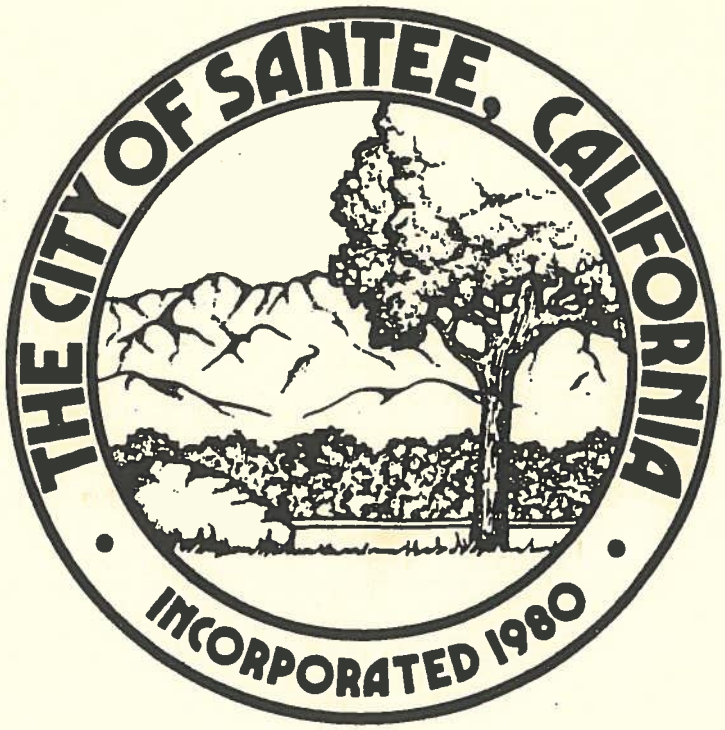
PUBLIC WORKS STANDARDS

SEPTEMBER 1982



CITY OF SANTEE, CALIFORNIA

PUBLIC WORKS STANDARDS

CITY OF SANTEE

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CITY OF SANTEE POLICY "IMPLEMENTATION OF PUBLIC WORKS STANDARDS"

PURPOSE

To establish a policy for the implementation of the recently approved Public Works Standards.

BACKGROUND

The Public Works Standards as adopted by the Council provide for an upgraded design level from the County Standards to reflect the suburban nature of Santee. These standards are intended to provide additional protections for future residents and to reduce maintenance costs for the City.

Many of the changes resulting from these new standards can be easily incorporated on current plans without significant redesign. Other standards however, could require the engineer to significantly revise the improvement plans or subdivision maps. To reasonably address this situation. It is necessary to allow projects now in progress to proceed under the previous requirements, so long as, the public health and safety is not jeopordized.

POLICY

It is the policy of the City Council that:

1. All projects (tentative maps, use permits) approved after November 1, 1982 shall comply totally with the Public Works Standards.

2. Projects which have previously been approved and are currently being designed shall, where feasible, comply with the adopted Standards. The City will rely on the professional integrity of the design engineer to determine where it is feasible to incorporate the standards. The City Engineer, however, will not approve any deviations from the standards which in his opinion adversly affect the public safety.

3. Any improvement plans or final maps approved by the City after May 31, 1984 shall comply totally with the Public Works Standards except where compliance with the standards would invalidate the tentative map.

INTRODUCTION

These Public Work Standards have been adopted by the Santee City Council on October 25, 1982, by Resolution No. 113-82. The standards are intended to guide in the planning of development and in the submittal of improvement plans.

It is recognized a set of standards cannot serve every situation, but are intended to be applicable to the majority of cases. When, from time to time the application of these standards results in an unreasonable or unusual circumstance the design engineer should suggest alternative standards to the City Engineer. The City Engineer will then review the suggested alternative and determine whether the exception is in the public interest before approving or denying the recommended alternative.

The standards are intended to be the minimum requirements necessary to provide adequate and coordinated development, which will provide for current and future users, while balancing initial costs with recurring maintenance costs.

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GENERAL - DESIGN CRITERIA

1. This criteria shall apply to all public works design within the City of Santee which is subject to the review of the City Engineer. These design criteria are not applicable to water works or sanitary sewer design, which shall be designed to meet the standards set forth by Padre Dam Municipal Water District.

2. All improvements are to be designed and constructed in accordance with this design criteria, the San Diego Area Regional Standard Drawings 1982 edition, the Standard Specifications for Public Works Construction 1982 edition, and accompanying Standard Special Provisions. In case of conflict between these documents, the Santee Design Criteria shall take precedence over the Regional Standard Drawings, which shall take precedence over the Standard Specificiations and Standard Special Provisions thereto.

3. All drawings shall be standard size sheets (24" x 36" or 8-1/2" x 11") with standard City title block. All lettering shall be 0.1" or larger to permit photographic reduction.

4. All title sheets shall have an index or key map clearly indicating the sheet numbers issued. All index maps shall be drawn at a scale of 1" = 200' showing overall layout of the water, sewer, storm drain, fire hydrants, and street lighting systems.

5. Each sheet is to be signed by a Registered Civil Engineer. Complex structural, electrical or mechanical installations shall also be signed by the Registered Engineer doing the design. When a soils report is required by the grading ordinance, the grading plans shall be signed by the Soils Engineer.

6. Revisions made after original approval by the City Engineer shall be initiated by a Registered Civil Engineer and submitted to the City Engineer for approval.

7. Profiles shall be shown on the top of sheets. Vertical curves shall show curve length and P.I. elevation, in addition to normal stationing and elevations.

8. Normally the scales for improvement plans shall be 1" = 40' for the horizontal and 1" = 4' or 1" = 2' for the vertical. The vertical scale should be changed to 1" =8' or other appropriate scale where grades are steep. For complex plans the horizontal scale shall be 1" = 20' or larger as necessary for clarity.

9. Improvement plans shall be prepared in ink on drafting film. Stick-on letters, labels or decals shall not be used, unless otherwise approved by the City Engineer. Photo reproductions on mylar are acceptable, provided they are legible and have no significant distortions.

10. Easements shall be a minimum of 10 feet in width unless a lesser width is specifically authorized by the City Engineer. Approved means of obtaining access to the easement must be provided. Utility and drainage easements parallel to side lot lines shall be laid out so the easement is all on one lot.

11. Drainage calculations and the final map showing easements shall accompany all plans submitted for checking.

12. All plans are to be checked by the Engineer of work for consistency, accuracy, clarity and conformity with City Design Criteria, Standard Drawings and Standard Specifications, before submission for approval. If this obviously has not been done, the plans will be returned unchecked by the City.

13. Plans submitted for checking shall be accompanied by a letter of transmittal with the name, address and telephone number of the person responsible for preparing the plans.

14. The original check prints shall accompany revised plans submitted for checking.

15. The Design Engineer shall submit a detailed cost estimate to the City Engineer with the second check prints if the project requires an improvement security.

16. Original drawings shall become the property of the City upon being signed by the City Engineer.

17. The number of sheets submitted should normally be limited to that required for clarity or presentation. Separate drawings for water, and sewers will normally not be required, but shall be shown on the street plans.

18. Improvement plans shall show any trees to remain within the street parkway and within five feet of the right-of way line.

19. The reference plan number of any existing or proposed facilities to be joined shall be shown on the improvement plans.

20. The Design Engineer shall be responsible for obtaining approval of the design of any water, sewer or flood control facilities to be accepted by agencies other than the City of Santee prior to final approval of the improvement plans by the City Engineer.

STREET - DESIGN CRITERIA

1. WIDTHS

A. All street classifications shall conform to the latest adopted Circulation Element of the General Plan and any specific plan thereto.

B. Street widths shall be in accordance with Table A.

C. Intersection of arterial and collector streets may require special design, depending on estimated traffic volumes. The use of single and double left-turn pockets, free right-turn lanes, right-turn islands, raised medians, etc., may be required.

D. Cul-de-sacs shall have a minimum of 38 foot curb line radius in residential areas and a minimum 50 foot curb line radius in commercial and industrial areas.

E. Where half-street improvements are required for local streets the developer of the first half is required to install the half-street section plus 12 feet of additional paving. For arterial and collector streets , half street improvement are adequate unless full street improvements are required as a condition of approval.

F. Where feasible, when streets are improved for only one-half widths, the unimproved half shall drain away from the paved section and shall be provided with a ditch. An asphalt berm or 2" x 6" redwood header shall be required at the edge of paving.

2. GRADES

A. The minimum street grade shall 1.0 percent.

B. Vertical curves are required when grade breaks exceed 0.5 percent.

C. Normal crown slope on A.C. pavement shall be 2.0%.

D. Where grades exceed 7%, or on lesser grades where tributary drainage areas are large, special erosion control may be required to be placed across the park-way to reduce erosion.

E. Grades of 12% or greater shall be constructed of Portland cement concrete (PCC) or thickened asphalt section and shall have a rough texture surface. Grades in excess of 15% shall be allowed only with the City Engineer's permission and shall be PCC. No grades in excess of 20% will be allowed.

TABLE A

CITY OF SANTEE

STREET DESIGN CRITERIA

DESIGN CRITERIA	PRIME ARTERIAL	MAJOR ROAD	COLLECTOR STREETS	INDUSTRIAL STREET	LOCAL STREET	CUL-DE-SAC STREET	HILLSIDE * STREET
Estimated Ultimate ADT	40,000 or more	20,000 to 40,000	5,000 to 20,000	------	500 to 5,000	300 max.	500 max.
Design Speed	60 mph	50 mph	40 mph	30 mph	25 mph	20 mph	20 mph
Right-of-Way	126'	102'	84'	72'	56'	56'	40-60'
Curb-to-Curb Distance	106' 18' median	82' 18' median	64'	52'	36'	36'	30'**
Minimum Traffic Index	9	8.5	8.0	7.0	5.0	4.5	5.0
Minimum Structural Section (inches)	5 AC 6 AB	4 AC 6 AB	3 AC 6 AB	3 AC 6 AB	2 AC 6 AB	2 AC 6 AB	2 AC 6 AB
Stopping Sight Distance	525'	350'	275'	200'	160'	160'	160'
Minimum Horizontal Radius	1150'	850'	550'	300'	200'	200'	200'
Max. Grade	6%	7%	10%	6%	12%	12%	20%
Min. Grade	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

* These standards shall also apply to local streets in residential areas, where homes will front on only one side of the street

** Parking 1 side only.
36' with parking both sides.

F. All street plans shall demonstrate the feasibility of future street extension a minimum of 200 feet beyond the property line or limit of work. Longer extensions may be required by the City Engineer.

3. ALIGNMENT

A. Streets shall normally intersect at right angles. Local streets shall have a least 50 feet of tangent adjacent to an intersection, measured from the beginning of the curb return (BCR) along the centerline while collectors and above should have at least 100 feet. Tangent lengths less than specified or an angle of intersection more than 10° from a right angle requires special approval and design.

B. Cul-de-sac streets shall not exceed 500 feet in length without special approval and shall have a 38-foot minimum curb line radius at the turn-around.

C. Minimum length of tangent between reversing curves shall be 100 feet.

D. All corners for local and cul-de-sac streets shall have a minimum a 30-foot curb line radius; collector streets and above shall have a minimum curb line radius of 40 feet. Major streets may require special design.

E. All street plans shall demonstrate the feasibility of future street extension a minimum of 200 feet beyond the property line or limit of work. Longer extensions may be required by the City Engineer.

4. STRUCTURAL SECTION

A. Design shall be in accordance with the California Department of Transportation stabilometer method.

B. Design shall be based on results of preliminary tests made before plans are prepared. The final structural section shall be based on Resistance Value tests, taken at locations designated by the City Engineer, after rough grading has been completed.

C. A minimum of 6" of Class II Aggregate Base as defined in the California Department of Transportation Standard Specifications shall be used when the Traffic Index (TI) exceeds 7 or the street grade is in excess of 8%.

D. The structural section shall be designed to include at least the minimum amount of asphalt concrete (AC) as shown in Table A.

E. If PCC pavement is used, the design shall be in accordance with the California Department of Transportation Highway Design manual. The design shall provide a minimum PCC thickness of 5 inches.

5. CURBS

A. Use 6" curb face with 18" gutter unless 8" is required to handle drainage. Rolled curb shall not be allowed.

6. CROSS-GUTTER

A. All cross-gutters shall be 10' minimum width and conform with Standard Drawings.

B. Cross-gutters shall be allowed on local, cul-de-sac, industrial and hillside streets only.

C. Cross gutter shall be located at intersections only and will not be allowed at mid-block locations.

7. SIDEWALKS

A. Sidewalks shall be installed along both sides of all streets and shall be located contiguous to the curb unless an alternate locations is approved by the City Engineer.

B. The minimum width for sidewalks shall be 5 feet including the top of curb.

C. Sidewalk ramps shall be required at all intersections where sidewalks are required.

8. SIGHT DISTANCE

A. All sight distances shall be in accordance with California Department of Transportation Design Manual.

B. Corner sight distance, measured 10 feet behind the edge of the cross street shall exceed 10 times the design speed of the cross street.

9. HILLSIDE STREET

A. To encourage the orderly development of steep areas, certain deviations from the normal standards for local and cul-de-sac streets will be permitted as specified herein.

These deviations shall apply only to local and cul-de-sac streets in residential areas where the natural slope exceeds 20% as defined in this section.

B. Natural slope of an area is defined as the steepest slope of not less than 50% of the area computed as follows: Taking continuous profiles normal to the slope, i.e., at right angles to the contour lines, at uniform intervals not to exceed 50 feet. The natural slope is then the greatest slope equaled by 50% of the aggregate horizontal length of these profiles.

The limits of the area considered in the determination of this natural slope shall be chosen at the option of the subdivider; however, only one set of standards shall be used between intersections.

C. Where a hillside residential street is authorized, such street shall be designed and improved by the developer to provide:

i. A minimum 30 foot paved width with parking allowed on one side only.

ii. A 5 foot PCC sidewalk on one side only.

iii. A minimum of 7 feet between the face of curb and the slope hinge point on the side with sidewalk and 5 feet on the side without sidewalk.

iv. A maximum estimated Average Daily Traffic volume of 500.

v. A minimum design speed of 20 mph.

vi. A normal 2 percent crown slope is encouraged, but cross fall not exceeding 3 percent shall be allowed to reduce the total amount of grading.

10. PRIVATE STREETS

Private streets shall include all paved roadways and parking areas serving commercial, industrial or residential projects (residential projects with 4 or less units shall comply with the currently adopted Uniform Fire Code except all streets/driveways shall have a PCC or AC surface.)

Private streets shall be designed and constructed to public street standards except the following items may be modified:

A. Street Width - The minimum paved width shall be 30 feet, which will allow parallel parking on one side of the street. If in the opinion of the City Engineer, due to the design of the street there is little likelihood of parallel parking, the street width may be reduced to 26 feet. Parking aisles may be less than 26 feet provided a 26 or 30 foot aisle adjacent to the buildings is provided.

B. Cul-de-sacs - The standard 38 foot curbline radius cul-de-sac is desired but a hammerhead turn around may be provided with details subject to the approval of the Fire Department.

C. Alignment - The minimum horizontal radius measured at the centerline for nearly right angle bends shall be 75 feet.

D. Plans - A profile view of each street does not need to be submitted provided adequate spot elevations and grades are shown. This, however, shall not limit the City Engineer from requiring a profile view in order to adequately review the design.

E. Curbs - AC berms may be substituted for PCC curb and gutter. Street drainage, however, must be conducted in PCC gutters. Rolled curbs will be allowed.

F. Sidewalk - Sidewalks shall be a minimum of 4 feet in width and be constructed of PCC. They do not need to be adjacent to the streets, but must provide access to all units and parking areas.

G. Street lights (type and style to be determined by the developer) shall be located to adequately illuminate all intersections and right angle curves.

H. Monuments - Street monumentation shall not be required for private streets except as needed to conform with the requirements of the Subdivision Ordinance.

11. STREET LIGHTS

A. Luminaires, lamps and standards shall be of a type approved by the City Engineer.

B. All street lights shall be high-pressure sodium vapor lamps with cutoff type luminaires.

C. All street lighting standards shall be of the pre-stressed reinforced concrete ("Marbelite" or similar) type.

D. The lighting circuits shall be underground.

E. All wiring shall be new, approved for such installation, and spliced only at concrete pull boxes.

F. At intersections the light shall be placed on the far right corners of the major street.

G. Street lights shall normally be located on the outside curves. Lights shall be located behind sidewalk when curb and sidewalk are contiguous.

12. TRAFFIC SIGNALS

A. The design shall conform to the latest CALTRANS Standards and shall consider the ultimate needs of the intersection.

13. MONUMENTATION

A. Centerline monuments (per Regional Standard Drawing No. M-10) shall be installed at the Point of Iintersection (P.I.) of all curves if found within the paved roadway (otherwise at the Beginning of Curve (B.C.) and End of Curve (E.C.), at the centerline intersection of all streets and at the radius point of all cul-de-sacs. A 5.0 foot offset may be used to avoid conflicts with utility access covers.

14. DRIVEWAYS

	Maximum*	Minimum*	Thickness
Commercial	52 feet	30 feet	5 1/2" or 9" PCC
Residential	30 feet	12 feet	5 1/2" PCC

Maximum Frontage: Residential - 40%
Commercial & Industrial - 30%

*Clear width measured at bottom of transition
**The 5-1/2 inch thick commerical driveway must be steel reinforced.

A. Minimum clear distance between driveways on same property - two feet.

B. Minimum clear distance from property line - three feet, unless joint driveway over property line is used.

C. Minimum distance from curb return-0 feet-no encroachment.

D. Minimum distance from fire hydrant, utility or street light pole - three feet.

All dimensions are to top of transition unless otherwise noted.

E. Alley Apron (Modified G-17) shall be used when the following conditions apply:
1. When the development is commercial, indurstrial, or multiple residential and fronts on a Circulation Element street.
2. When the development is commercial, industrial, or multiple residential and fronts on any street having a current or projected Average Daily Traffic volume of 5,000 or greater.

15. PAVEMENT MARKINGS

A. Pavement markings shall be in conformance with the criteria as presented in Chapter 6 of the latest edition of the State of California Department of Transportation Traffic Manual.

B. Raised ceramic and/or reflective pavement markers conforming to the latest CALTRANS Standards shall be installed on collector streets and above, as directed by the City Engineer.

C. Blue reflective markers shall be installed to identify all fire hydrants.

16. STREET NAME AND TRAFFIC SIGNS

A. The improvement plans shall show all necessary warning and regulator signs and street name signs. These shall be furnised and installed by City forces, the cost of which will be the developers resonsibility.

17. GUARDRAILS

A. Guardrails or reinforced block walls shall be provided along the tops of slopes adjacent to roadways in accordance with Figure 7-1 of the California Department of Transportation Traffic Manual.

18. STREET WIDTH AND IMPROVEMENT STANDARDS VARIANCE

A. Where the literal interpretation and enforcement of these standards would result in practical difficulties, environmental degradation or results inconsistent with the general purpose of these standards, the City Engineer may grant an exception to these standards. The applicant shall submit the suggested revision to the standards along with a statement addressing the following points.

(1) That there are extraordinary or unusual circumstances or conditions applicable to the situation or surrounding property necessitating a variance of the standards.

(2) That the granting of such variance will not cause substantial drainage, safety, maintenance or other problems.

(3) That the granting of such variance will not conflict with existing or future traffic and parking demands or pedestrian or bicycle use.

(4) That the granting of such variance will not be detrimental to the public welfare or injurious to the property or improvements in the vicinity in which the variance is granted.

The City Engineer will then review the request and submit a determination in writing to the applicant. If the applicant so desires an appeal of the City Engineer's decision may be filed with the City Council.

DRAINAGE - DESIGN CRITERIA

1. GENERAL

A. All drainage design and requirements shall be in accordance with the latest adopted Master Drainage Plan, the requirements of the City Engineer and be based on full development of upstream areas.

B. The design of all master plan facilities shall be in accordance with the latest standards of the San Diego County Flood Control District.

C. Public drainage facilities shall be designed to carry a ten-year storm underground, and the 100-year storm to the right-of-way lines.

D. The use of underground storm drain systems, in addition to standard curb and gutter, shall be required:

(1) When flooding or street overflow during 100-year storm will cause serious damage.

(2) When 100-year storm flow from future upstream development (as proposed in General Plan) will cause drainage problems.

(3) When existing adequate drainage facilities are available for use (adjacent to proposed development).

(4) When more than one travel lane of major or collector streets would be obstructed by storm water based on 10-year storm.

E. The use of underground storm drain systems may be required:

(1) When the water level in streets during a 50 year storm is within two inches of top of curb.

(2) When velocity of water in streets exceeds 11 FPS.

(3) When the water travels more than 1,000 feet overland.

F. Permanent open drainage ditches will not be permitted in public right-of-way, without the specific permission of the City Engineer.

G. The type of drainage facility shall be selected on the basis of physical and aesthetic adaptability to the proposed land use. Open channels may be considered in lieu of underground systems when the peak flow exceeds the capacity of a 48-inch diameter RCP. Open channels shall be fenced.

H. Permanent drainage facilities and right-of-way shall be provided from the development to point of satisfactory discharge.

I. On site drainage shall be collected on-site and discharged to a storm drain system, or if no system is available within reasonable proximity to the site as determined by City Engineer, the drainage may be discharged thru the curbface to the street. Minor drainage areas less than one acre in size may drain from the site across the driveway.

2. HYDROLOGY

A. Drainage area maps for offsite areas shall be on blue line prints of the latest 200 scale topographic base maps available from the County or on approved alternative map. These maps shall show existing culverts, cross-gutters and drainage courses based on field review and indicate the direction of flow. It shall clearly delineate each drainage basin showing the area (A) and discharge (Q) and the point of concentration.

B. Drainage area maps for onsite areas shall be on blue line prints of the grading plan. If grading is not to be done, then a 100 scale plan or greater enlargement shall be used. The map shall show all proposed and existing drainage faciltiies and drainage courses and indicate the direction of flow. It shall clearly delineate each drainage basin showing the area and discharge and the point of concentration.

C. Use the charts in the latest edition of the San Diego County Flood Control Manual for finding the Time of Concentration (Tc) and Intensity (I).

D. Use the existing or ultimate development, whichever gives the highest runoff coefficient (C).

E. Use the rational formula, Q=CIA, for watersheds less than 0.5 square mile unless an alternate method is approved in advance by the City Engineer. For watersheds in excess of 0.5 square miles, the method of analysis shall be approved by the City Engineer prior to submitting calculations.

3. HYDRAULICS

A. Street - Provide:

(1) Depth of gutter flow calculations.

(2) Inlet calculatons.

(3) Gutter flow inlet Q, and bypass Q on a street plan.

B. Storm Drain Pipes and Open Channels - Provide:

(1) Hydraulic loss calculations for: Entrance, friction, junction, access holes, bends, angles, reduction and enlargement.

(2) Analyze existing conditions upstream and downstream from the proposed system, when required by the City Engineer on a case-by-case basis.

(3) Calculate critical depth and normal depth for open channel flow conditions.

(4) Show the Hydraulic grade line (HGL) plotted on a scale drawing of the pipe or channel profile.

(5) Provide superelevation calculations for curvilinear channels.

(6) The change in hydraulic gradient in the clean-out or junction shall not exceed 3 feet.

(7) In no case shall the hydraulic gradient exceed the elevation of 6 inches below the gutter grade on inlets, during a 10 year storm.

4. STORM DRAINS

A. Minimum pipe grade shall be .10 percent (.001 foot/foot) unless otherwise approved by the City Engineer.

B. Minimum storm drain size shall be 18 inches diameter.

C. The material for storm drains shall be reinforced concrete pipe (RCP), corrugated steel or aluminum pipe (CSP or CAP),asbestos cement pipe (ACP),or cast-in-place concrete pipe (CIPCP) designed in conformance with the San Diego County Flood Control District's design criteria.

CSP or CAP shall not be used in areas to be paved without the approval of the City Engineer. Any request to use CSP or CAP shall be accompanied by a report from a qualified testing laboratory showing the pH and minimum resistivity of the soils in which the pipe will be placed.

The use of CIPCP shall be subject to the specific approval of the City Engineer.

D. The pipe invert elevations, slope, pipe profile and strength classifications or thickness for metal pipe shall be shown on the improvement plans.

Minimum D-load are as follows:

Reinforced Concrete Pipe	1350-D*
Asbestos Cement Pipe	2000-D
Cast-in-Place Concrete Pipe	2700-D**
Other Classifications	H-20 Loading

*Lateral loading on the pipe will require circular reinforcing.

**Cast-in-place concrete pipe shall have a minimum strength of two times the D-load strength indicated for reinforced concrete pipe in all other conditions.

E. Design for a non-silting velocity of 4 feet per second (FPS) with the pipe flowing one quarter full unless otherwise approved by the City Engineer.

F. Conduits shall be designed to flow free of pressure heads except for short runs where the grade changes and a small pressure head cannot be avoided. Where it is necessary to design for a pressure head in a system and it is approved, pressure pipe and appurtenances shall be used.

G. Change in conduit sizes shall be accomplished in a storm drain structure only. The soffit elevations shall match thru the storm drain structure.

H. All conduits on a grade of 20% or greater shall have watertight joints.

I. Only metal pipe shall be used for above ground installations of downdrains.

J. An adequate pipe collar, collar wall or other anchorage is required at 15 foot intervals for all pipes placed on or within slopes of 2 to 1 or steeper.

K. For special designs not covered in these Standards, the current San Diego County Hydrology and Design and Procedure Manual or other method approved in advance by the City Engineer shall be used.

L. For storm drain discharging into unprotected or natural channel, proper energy dissipation measures shall be installed to prevent damage to the channel or excessive erosion.

M. The use of detention basins to even out storm peaks and reduce pipe size may be permitted with the approval of the City Engineer. Substantiating engineering calculation and proper maintenance agreements shall be submitted prior to the approval of the City Engineer.

N. Desiltation measures for silt caused by development shall be provided and substantiating engineering calculations submitted.

O. Protection of downstream or adjacent properties from incremental flows (caused by change from an undeveloped to a developed site) shall be provided. Increased flows shall not be concentrated and directed across unprotected adjacent properties unless an easement and storm drains or channels to contain flows are provided.

P. Unprotected downstream channels shall have erosion and grade control structures or other protective measures installed to prevent degradation, erosion, alteration or downcutting of the channel banks. As a result of increased flows or velocities resulting from development.

Q. Velocity should not exceed 20 FPS in standard wall R.C.P.

(1) Where velocity exceeds 30 FPS, a special wall R.C.P. with a minimum of 1-1/2 inch steel clearance on both the inside and outside surfaces shall be used.

(2) Maximum velocity in special cover R.C.P. shall be 45 FPS.

5. OPEN CHANNELS

A. Design of open channel drainage facilities shall follow the guidelines of the current San Diego County Flood Control District Design and Procedure Manual.

6. INLETS

A. Inlets shall conform to the Regional Standard Drawings and the type of inlet to be used shall be determined as follows:

(1) Type A Curb Inlet - May only be used where there is no room behind curb to accommodate other curb inlets.

(2) Type B Curb Inlet - To be used when inlet capacity is sufficient to intercept the street drainage.

(3) Type C Curb Inlet - May be used to gain additional inlet capacity when a Type B curb inlet is insufficient and when street grade is 5% or greater.

(4) Type D Curb Inlet - Requires a special design. Must have prior City approval.

(5) Type E Curb Inlet - Not Permitted.

(6) Type F Catch Basin - To be used to intercept surface drainage from ditches or swales outside of travelled ways.

(7) Type G Catch Basin - Not to be used. Use Type I instead.

(8) Type H Curb Inlet - Only to be used under special conditions and upon approval.

(9) Type I Catch Basin - To be used in alleys, parking areas or similar paved areas.

B. The curb inlets under Item A may be used at any approved location in the curb on grades up to 5%. Grades in excess of 5% may necessitate use of concrete apron or grates or other special inlet design as approved by the City Engineer.

C. Curb inlets shall be designed based on Bureau of Public Roads charts (Tables C and D).

D. Except in alleys, parking areas and the like, grated inlets should be avoided when possible. The design of grated inlets should be based on the Bureau of Public Roads nomograph (Table E).

E. Catch basins shall be located so as to eliminate concrete cross-gutters whenever possible.

F. Minimum connector pipe between an inlet and storm drain shall be 18".

7. CLEANOUT DETAILS

For purposes of design, the definition of a cleanout under this section shall mean those structures designated as cleanout, curb inlet or catch basin in San Diego Area Regional Standard Drawings.

A. Cleanout Spacing

The maximum length in feet between cleanouts for straight runs of conduit shall be as follows:

(1) Conduit under an equivalent diameter of 33" approximate maximum spacing of 300 feet.

(2) 33" to 48", 400 feet

(3) 51" to 66", 600 feet

(4) 69" and over, 1000 feet

B. Cleanouts, Horizontal Curves or Angle Points

(1) Cleanouts should be installed near one end of all horizontal curves in the conduit where possible, and maintain the maximum spacing.

(2) A cleanout shall be installed near one end of a horizontal curve when radius is 100 feet or less.

(3) A cleanout shall be installed at the point of compound curve (P.C.C.) and/or point of reverse curve (P.R.C.) of curves when required by the City Engineer.

(4) A cleanout shall be installed at all horizontal angle points, except a single angle of 10° or less will be permitted between cleanouts provided:

(a) The conduit line below and above the bend lies in the same vertical plane.

(b) The angle point is located within 40 feet of a cleanout or outfall.

(c) Abrasive bed load material with relatively high velocities will not be carried.

C. Cleanouts: Vertical Curves or Angle Points

(1) Normally on sag vertical curves the cleanout should be located at the end connecting the flattest grade.

(2) A cleanout shall be installed at vertical angle points, except a single angle of 10° or less will be permitted between cleanouts provided:

(a) The conduit line below and above the bend lies in the same horizontal plane.

(b) The angle point is located within 10 feet of a cleanout or outfall.

(c) Abrasive bed load materials with relatively high velocities will not be carried.

(3) An angle of deflection of 30° maximum within 10 feet of an outfall may be approved, provided a shop fabricated angle point is used. Should the conduit ever be extended from this outfall, a cleanout shall be provided.

8. CONDUIT CURVATURES

A. Reinforced Concrete Pipe (RCP)

Normally the minimum radius shall be 45 feet for all locations except at roadway inlet connections where the radius may be reduced to a minimum of 20 feet. Special consideration willbe given where obstructions or unusual problems exist.

Curves are to be constructed with standard manufactured end-beveled sections or by joint openings. Maximum joint openings are as follows:

PIPE DIAMETER	MAX. JOINT OPENING
36 inches or less	3/4 inch
Over 36 inches	1 inch

B. Asbestos - Cement Pipe (ACP)

ACP may be used for relatively straight runs of pipe. Curves in the alignment shall be of reinforced concrete pipe and shall be connected with a concrete pipe collar.

If angle points in alignment of ACP are permitted, the maximum angle point will be 10°, the pipe must be fabricated to join, and the joint shall be connected with a concrete pipe collar. Any angle point greater than 10° will require a cleanout structure.

The above conditions apply to any vertical curves or angle points.

C. Cast-in-Place Concrete Pipe (CIPCP)

The minimum radius or curvature for CIPCP shall be 30 times the nominal internal pipe diameter.

D. Corrugated Aluminum Pipe (CAP) and Corrugated Steel Pipe (CSP)

Curves in pipes measuring 42 inches, or more, in diameter (or vertical height) are permitted under the following conditions:

(1) The pipe is unlined.

(2) Manufactured elbows are used each with a maximum deflection angle of 10° except for locations where the curve connects with a roadway inlet.

(3) Construction plans should indicate by note the deflection angles to be fabricated as specified above.

(4) Curves are not permitted for smaller diameters.

E. Corrugated Plate Conduit and Arches

This is considered a special design and must have prior approval of the City Engineer. Generally, previously criteria will apply where applicable.

F. Rectangular Conduits

Normally a minimum radius 50 feet shall be used.

9. ANGLE OF CONFLUENCE

A. The angle of confluence shall be 90° or less except if the lateral measures an equivalent of 36 inches in diameter or more, the angle of confluence shall be 60° or less.

B. A concrete lug will be allowed at the junction if:

(1) The criteria for cleanout locations in both lines is satisfied.

(2) If the connecting pipe is in conformance with the following:

Main Line	Connector
24"	18" max. *
27"	18" max. *
30"	21" max. *
36"	24" max.
42"	30" max.
48"	30" max.
54"	36" max.
60" or larger	42" max. **

*A cleanout at the connection will be required if there is no cleanout within 50 feet of the connection.

**A cleanout will be required when connector pipe exceeds 42".

10. HEADWALLS AND CURTAIN WALLS

A. Headwalls are to be installed at all inlets and outlets. A curtain wall may be used in place of a headwall where an extension of the conduit is likely to occur and no fill is to be retained at the wall.

B. Flared end sections may be approved with proper details if it is unlikely the conduit will be extended in the near future.

C. Perimeter fences may be required at the inlet and outlet ends of the conduit to reduce hazardous conditions at such points. To provide for maintenance, access gates may be required in the perimeter fences.

11. CONDUIT ENTRANCES

A. Entrances shall be rounded, beveled or expanded, wherever appropriate, to increase the capacity of the conduit, whether the outlet is free or submerged and whether the slope is above or below critical.

B. Flared inlets should be considered for efficient design when the conduit flows under inlet control, except when extension of the conduit upstream is imminent.

C. Inlet aprons shall be used as transitions between the conduit and an improved approach channel, and may be used between the conduit and a natural approach channel. These should be designed to prevent grade cutting of natural channels and/or to provide a more efficient entrance condition.

12. DEBRIS AND SILT CONTROL FACILITIES

A. Where flows are likely to carry floating debris or rock in sufficient size to block the conduit inlet, a trash rack or deflector shall be required.

B. Should the flows be transporting significant quantities of silt, a temporary or permanent desilting basin may be required to prevent silting in the conduit or downstream from the conduit.

13. OUTLET DISSIPATOR

A. Where conduits discharge into an unimproved or natural channel and the velocities exceed those permissable for the material involved, a suitable energy dissipator is to be installed to reduced velocities to non-eriodable conditions.

B. Drop manholes or cleanouts shall not be used for energy dissipators.

14. EASEMENTS

A. Minimum Widths

The following table is a general guide for establishing minimum easement widths, although special conditions, such as deep locations, may require additional width.

Pipe Dia. or Equivalent (inches)	Minimum Width (feet)
18-36	10
42-60	15
over 60	20

B. Storm drains and easements are to be placed on one side of lot ownership lines in new developments and in existing developments where conditions will permit.

C. Generally storm drain easements are to be established exclusively for drainage facilities with storm drain located at the center line of the easement. Joint use easements will be permitted, such as sewer, water, etc. where necessary, except each line shall be separated by a minimum of 5 feet horizontally.

D. Access Easements. Physical access shall be provided to all storm drain easements. Should special access to storm drain easement be required because of grade differential, a minimum access easement of 15 feet shall be established. A minimum access road shall be provided in the access easement, 12 feet wide, with a maximum grade of 15 percent.

E. In areas to be improved over a storm drain easement certain structures or fences may be constructed. This construction must be approved by the City and the owner must obtain an Encroachment Permit.

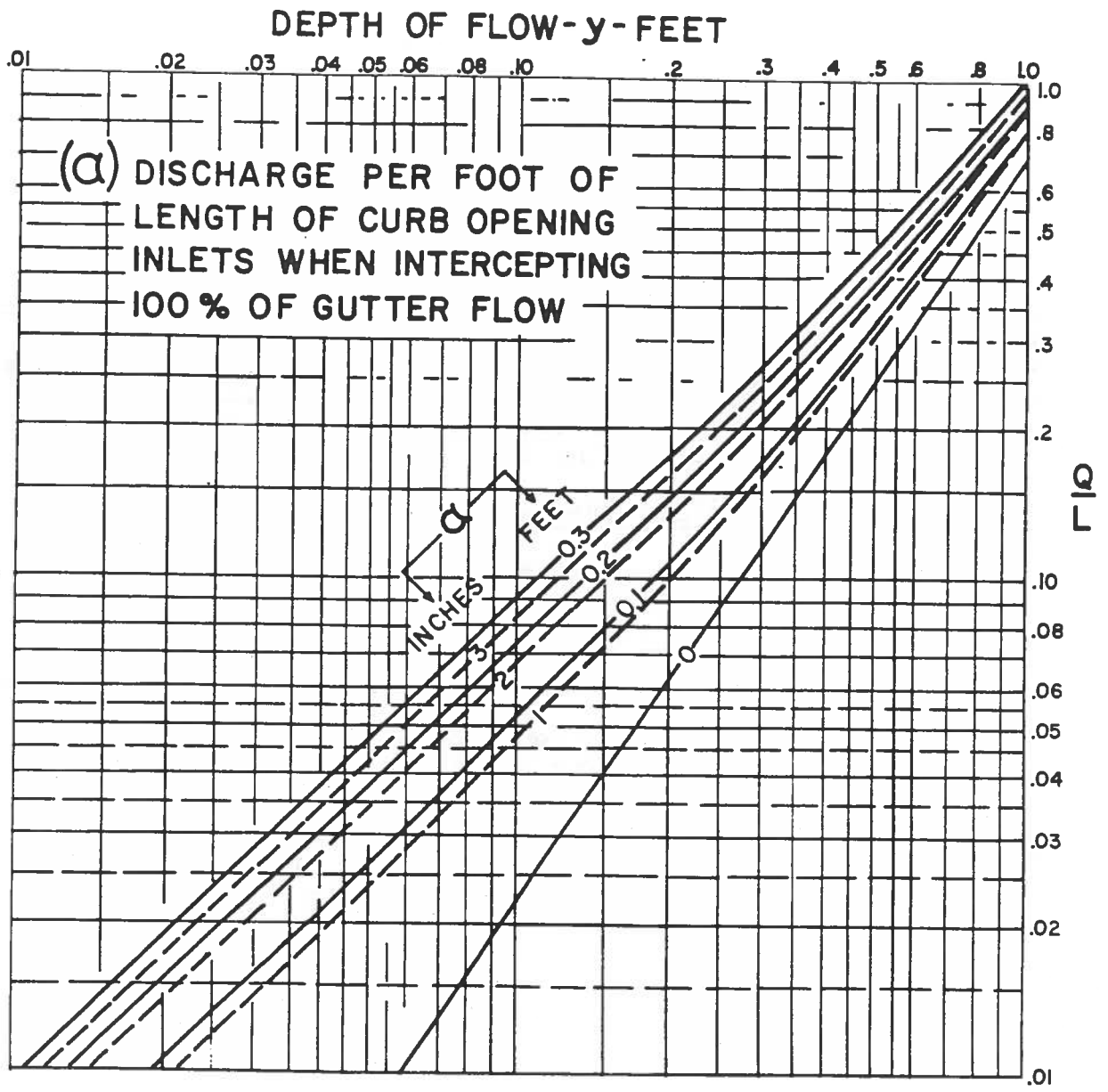
CITY OF SANTEE

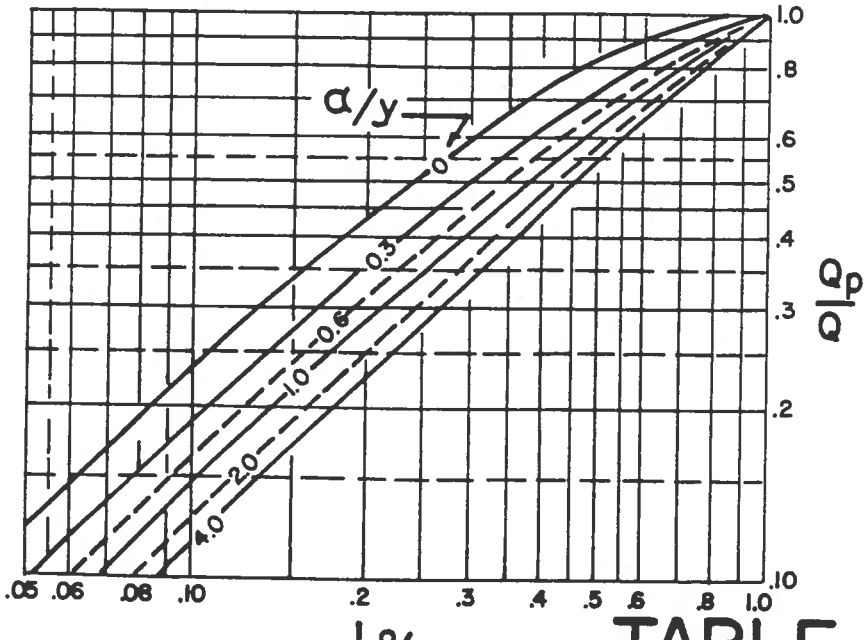
STANDARD DRAWINGS

The standard drawings for the City of Santee shall be comprised of the 1979 edition of the San Diego Area Regional Standard Drawings (SDRS) as published by the San Diego County Department of Transportation and as modified by the additions and substitutions listed below and the City of Santee Supplemental Standard Drawings attached hereto.

Modifications to the San Diego Area Regional Standards

E-1	Shall be modified by the addition of the following note: The light standard shall be prestressed concrete round pole of the type approved by City Engineer.
E-8 thru E-17	Shall be deleted and Caltrans Standard Plans, latest edition, shall be used.
G-16	Shall be modified by the deletion of the required 20' minimum distance between curb openings serving same residential property.



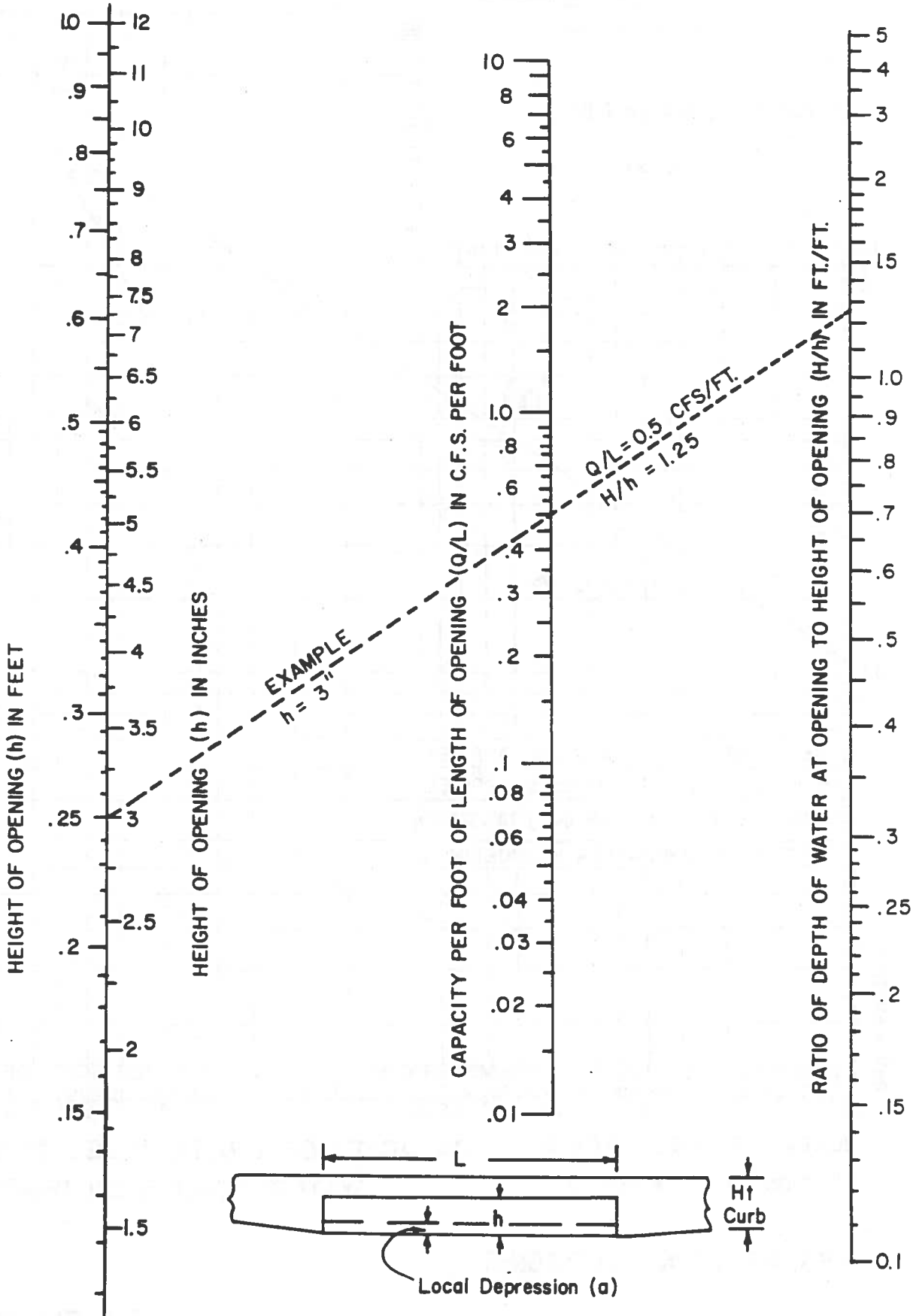


(b)

PARTIAL INTERCEPTION RATIO FOR INLETS OF LENGTH LESS THAN L

TABLE C

BUREAU OF PUBLIC ROADS CAPACITY OF CURB OPENING INLETS ON CONTINUOUS GRADE



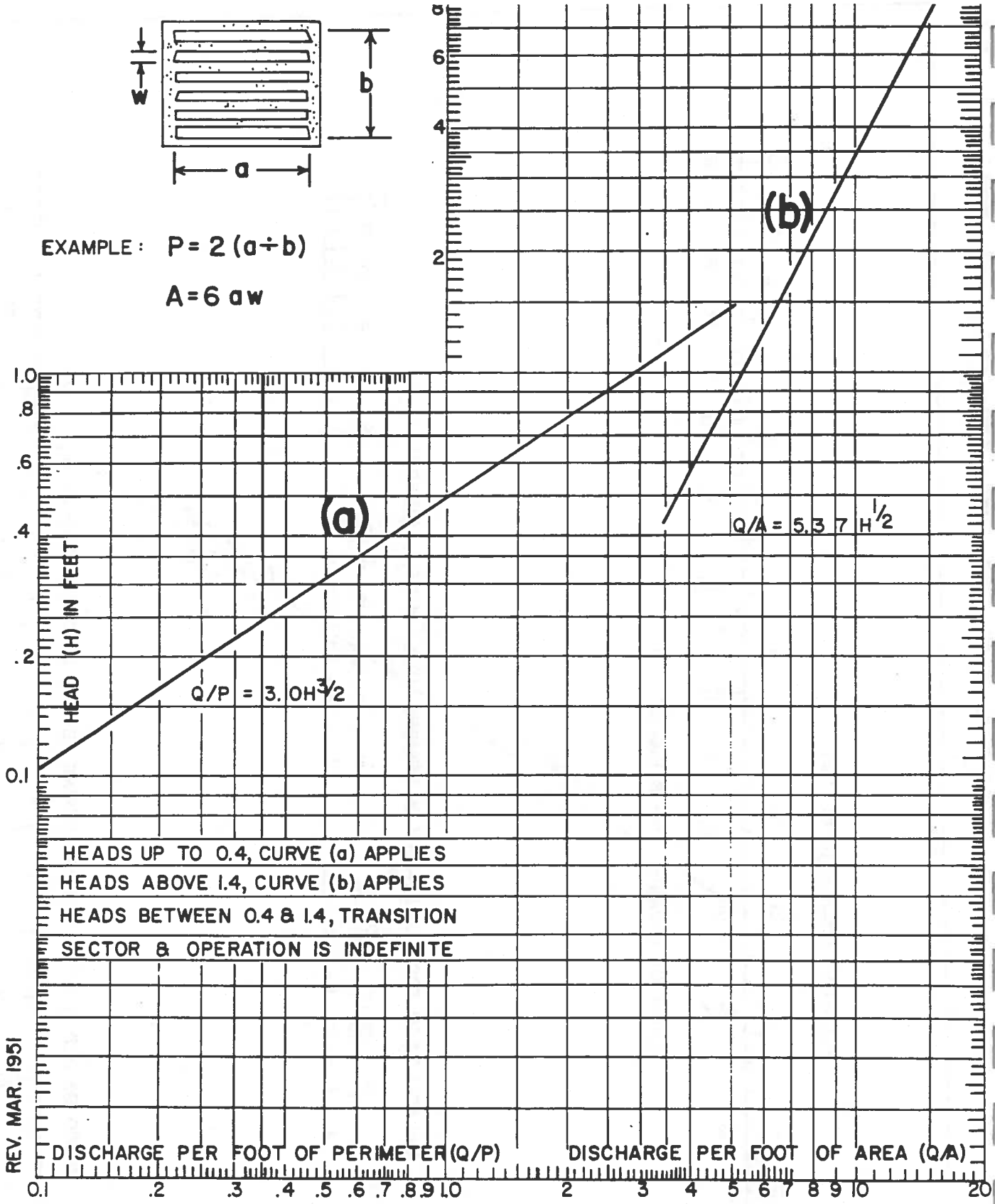
NOMOGRAPH FOR CAPACITY OF CURB OPENING INLET

BUREAU OF PUBLIC ROADS

TABLE D

EXAMPLE: $P = 2(a+b)$

$A = 6\,aw$



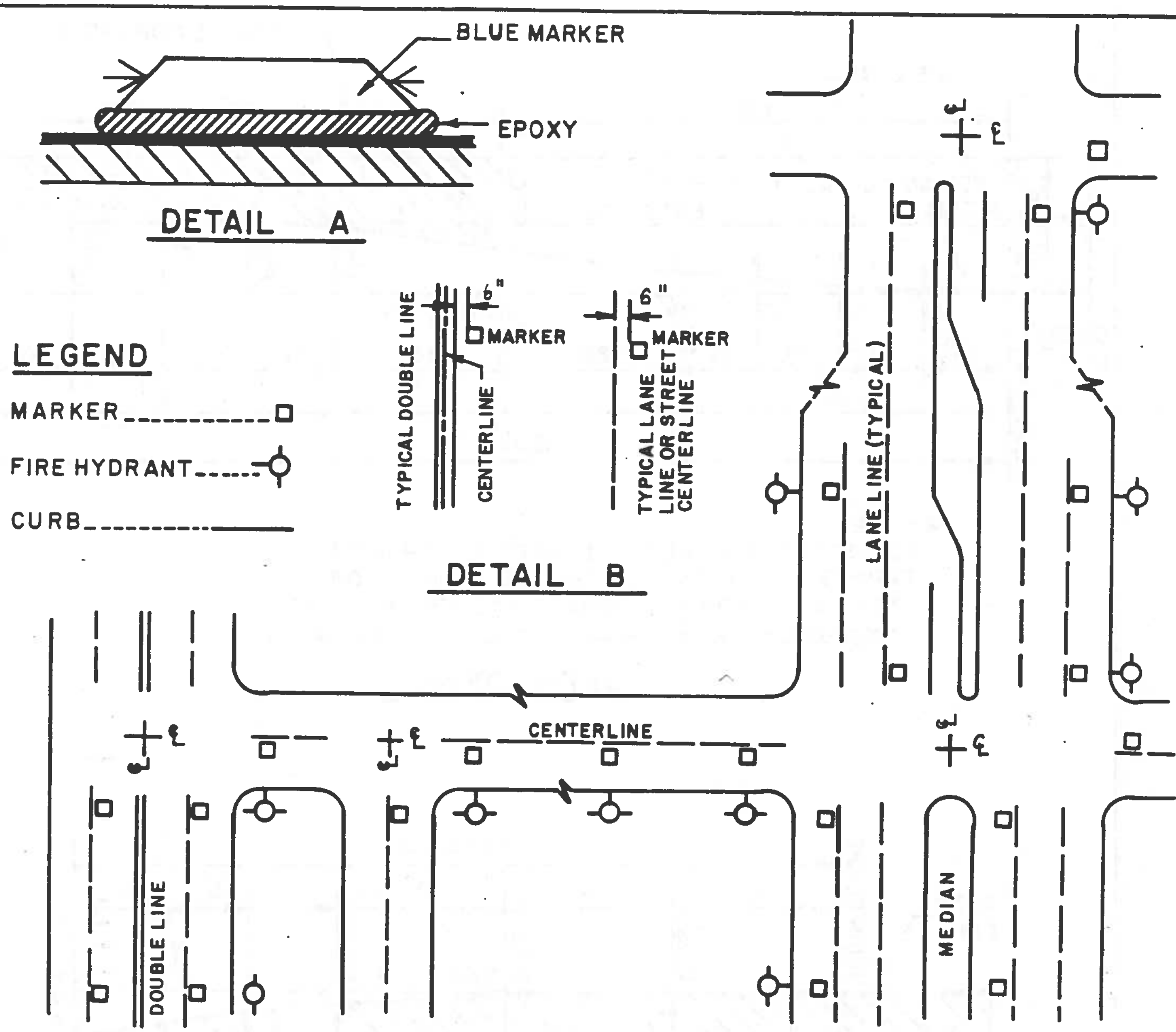
REV. MAR. 1951

BUREAU OF PUBLIC ROADS
DIVISION TWO WASH., D.C.

CAPACITY OF GRATE INLET IN SUMP
WATER PONDED ON GRATE

ASSUME 25% CLOGGING

TABLE E



REQUIRED LOCATIONS FOR FIRE HYDRANT MARKERS

NOTES

1). MARKERS MUST BE INSTALLED AT ALL NEW AND RELOCATED HYDRANTS AND WITHIN ALL RESURFACING PROJECTS.

2). FIRE DEPARTMENT WILL PROVIDE LOCATION(S) FOR ALL MARKERS IN PRD'S, COMMERCIAL LOTS AND ALL OTHER AREAS OUTSIDE OF PUBLIC RIGHT OF WAY.

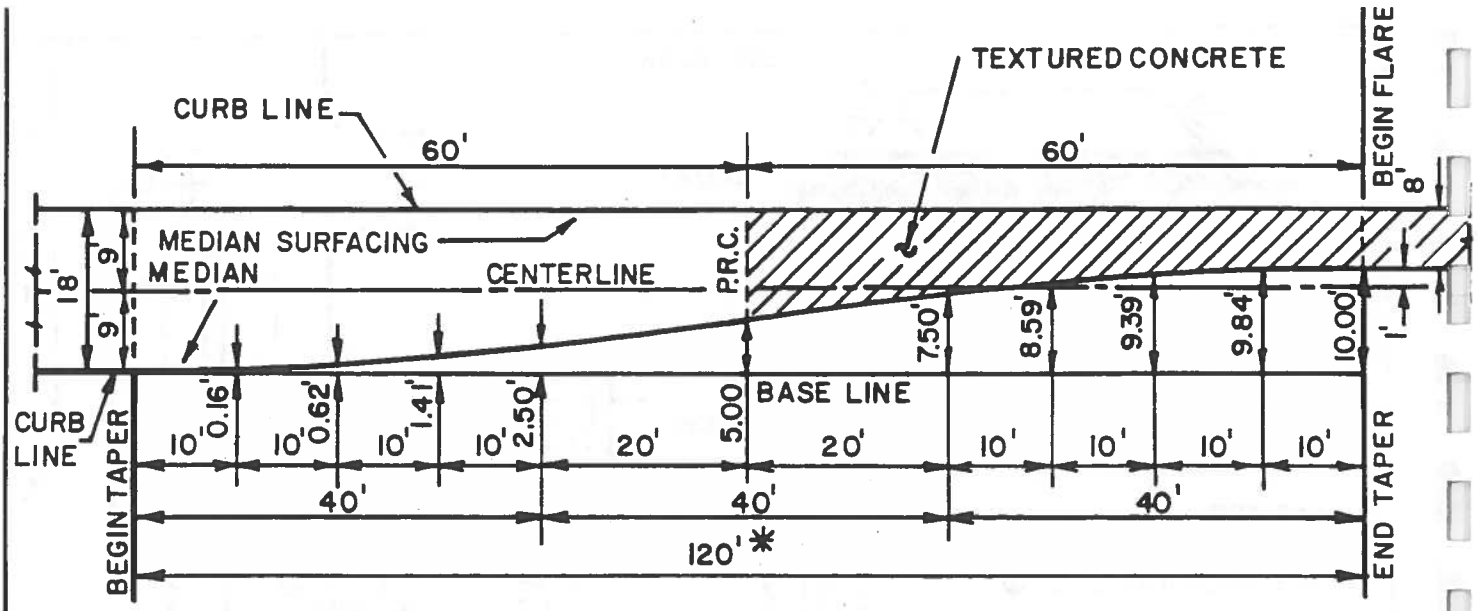
3). MARKERS: SHALL BE BLUE 2-WAY STIMSONITE LIFELITE 88AB OR EQUAL.

4). ADHESIVE: AN AMPLE AMOUNT OF TWO PART (A & B) EPOXY OR EQUAL.

5). SURFACES: CLEAN AND DRY PRIOR TO INSTALLATION PER MANUFACTURER'S RECOMMENDATIONS.

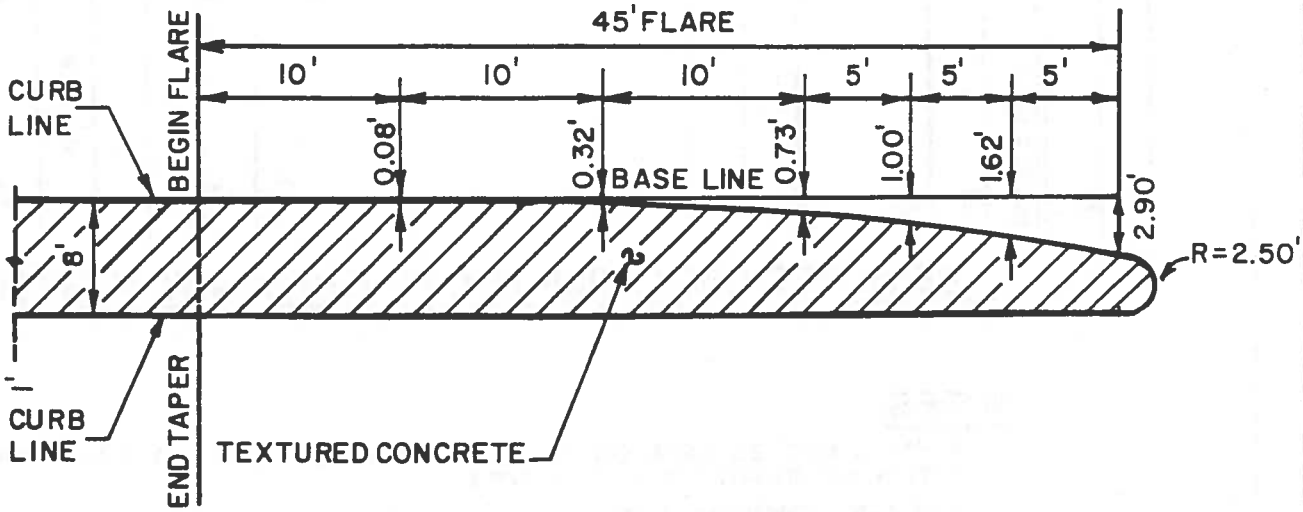
6). INSTALL MARKERS WITH REFLECTIVE SURFACES FACING ONCOMING VEHICLES AND OFFSET 6" FROM LANE LINES. FOR STREETS WITHOUT LANE LINES OR STREETS WITH RAISED PAVEMENT MARKERS AND NO PAINTED LANE LINES, INSTALL MARKERS ON CENTERLINE OR IN LINE WITH EXISTING MARKERS.

REV.	APPROVED	DATE	CITY OF SANTEE	John P. Sullivan CITY ENGINEER	11/12/82 DATE
			FIRE HYDRANT MARKERS	SUPPLEMENTAL STANDARD NO.	1



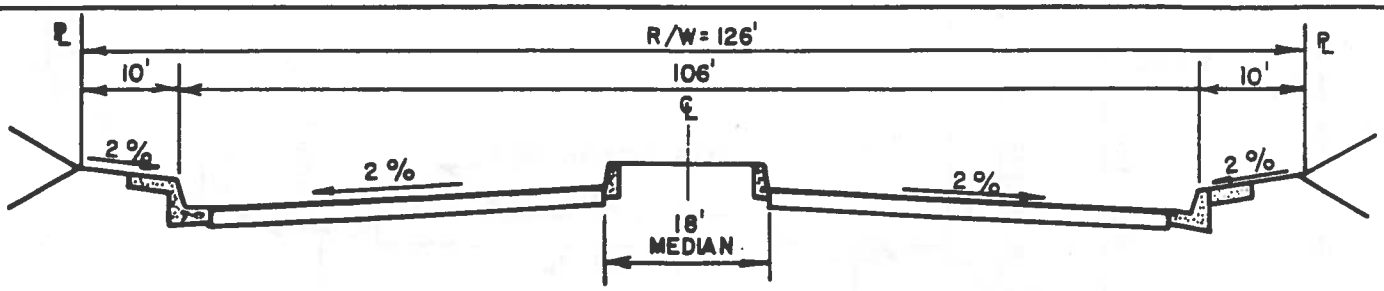
*NOTE:
FOR STREETS REQUIRING LONGER OR SHORTER TAPERS THE DIMENSIONS MAY BE REDUCED OR EXTENDED IN A PROPORTIONATE MANNER, BUT THE TAPER SHALL BE A MINIMUM OF 60 FEET IN LENGTH.

TAPER DETAIL

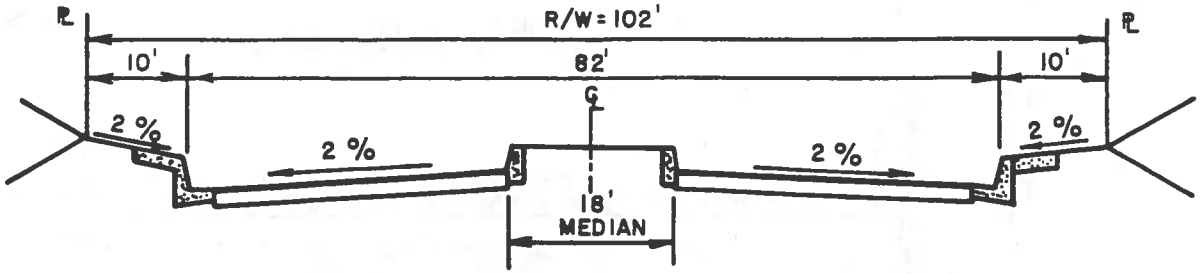


DETAIL NOSE FLARE

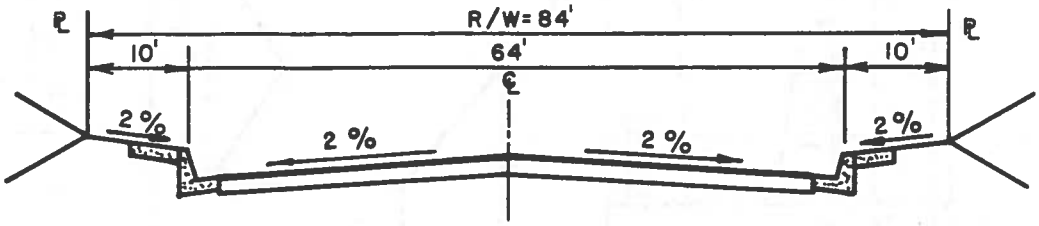
REV.	APPROVED	DATE	CITY OF SANTEE	John P. Sullivan 11/12/82 CITY ENGINEER DATE
			MEDIAN TAPER AND NOSE FLARE	SUPPLEMENTAL STANDARD NO. 2



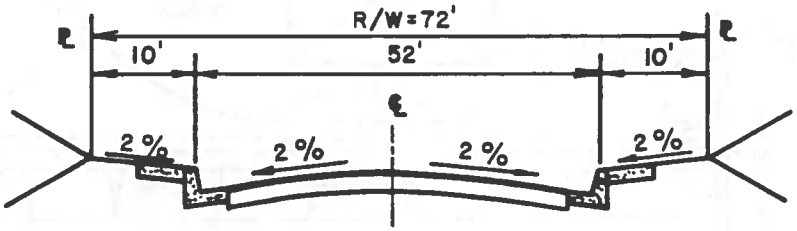
PRIME ARTERIAL STREET



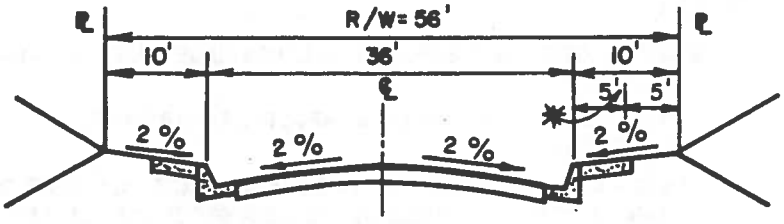
MAJOR STREET



COLLECTOR STREET



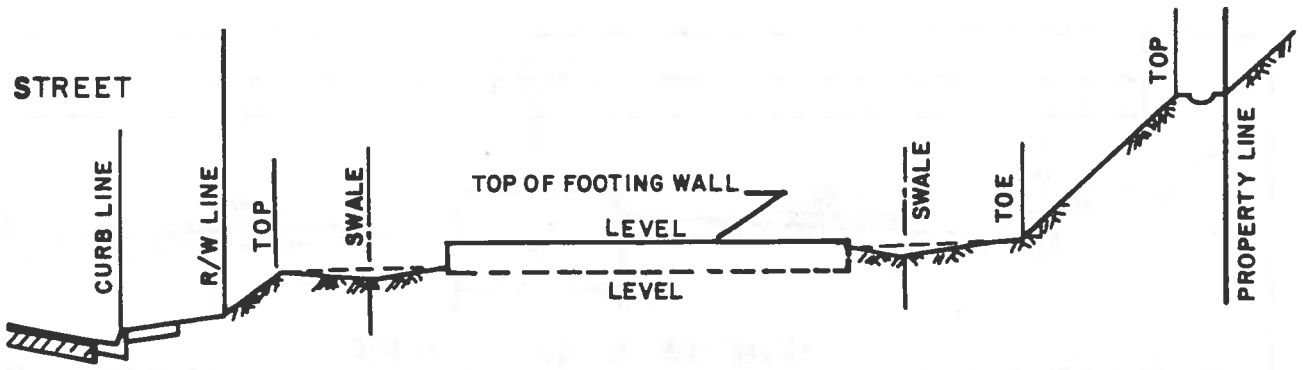
INDUSTRIAL STREET



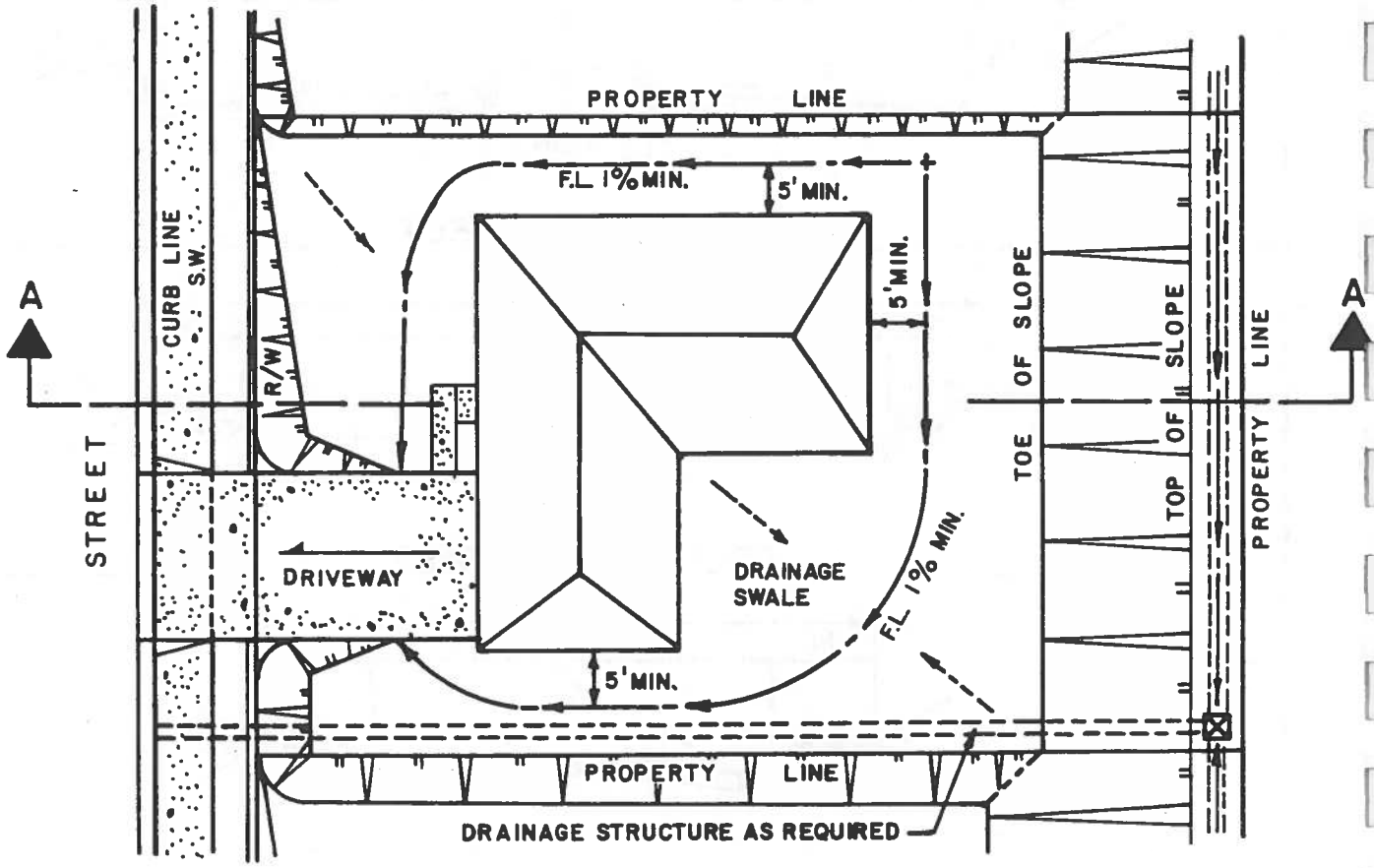
* TYPICAL SIDEWALK WIDTH

LOCAL & CUL DE SAC STREETS

REV.	APPROVED	DATE	CITY OF SANTEE	
				John P. Sullivan 11/12/87 CITY ENGINEER DATE
			STANDARD STREET WIDTHS	
				SUPPLEMENTAL STANDARD NO. 3



SECTION A-A



PLAN

NOTES

1). UNLESS OTHERWISE NOTED ALL DRAINAGE MUST BE CONVEYED TO STREET.

2). NON-EROSIVE DRAINAGE SURFACE REQUIRED WHERE FLOW IS COLLECTED.

3). FINISH GRADING SHALL PROVIDE A MINIMUM POSITIVE DRAINAGE 5' AWAY FROM THE BUILDING UNLESS SPECIFICALLY APPROVED OTHERWISE BY THE SOILS REPORT.

REV.	APPROVED	DATE	CITY OF SANTEE	John P. Lechner 11/12/18 CITY ENGINEER DATE
			TYPICAL LOT GRADING	SUPPLEMENTAL STANDARD NO. 4

SUPPLEMENTARY SPECIFICATIONS FOR STREET LIGHTS

(FOR INFORMATION ONLY)

CITY OF SANTEE
DEPARTMENT OF PUBLIC WORKS

STREET LIGHT SPACING FOR VARIOUS STREETS

Road Type	R/W	C-C	Maximum* Spacing	Size of Light
Local Street	56'/60'	36'/40'	240'	100 W HPS
Industrial/Commercial St.	72'	52'	200'	250 W HPS
Collector Street	84'	64'	180'	250 W HPS
Major Road	102'	82'	90'	250 W HPS
Prime Arterial Highway	126'	106'	90'	400 W HPS

*Measured along centerline of street when lights are staggered.

NEW DEPOSIT RATES

(Energy/Operating Cost)

1 Wood Pole (Pole Only)	$ 75 ($ 3.37/mo.)
1 Wood Pole-Mounted 100 Watt HPS Light	$255 ($11.57/mo.)
1 Wood Pole-Mounted 250 Watt HPS Light	$465 ($20.97/mo.)
1 Ornamental (Concrete) 100 Watt HPS Light	$145 ($ 6.42/mo.)
1 Ornamental (Concrete) 250 Watt HPS Light	$290 ($13.10/mo.)
1 Ornamental (Concrete) 400 Watt HPS Light	$435 ($19.74/mo.)

STATE BOARD OF EQUALIZATION PROCESSING FEES

(For Annexation into Lighting District)

Acreage	Fee
Under 10	$ 130
11-20	$ 150
21-60	$ 220
60-100	$ 320
101-660	$ 430
661-1500	$ 600
1501-3000	$ 790
3001-6000	$1,000
Over 6000	$1,500

5/83

CITY OF SANTEE

STREET LIGHT LUMINAIRE AND WIRING STANDARDS

MAY, 1981

1. Materials (General)

Street lighting luminaire description shall be as follows:

Lamp size = 400 Watt high pressure sodium, 250 Watt high pressure sodium and 100 Watt pressure sodium.
Output = 50,000 lumens (400 Watts), 30,000 lumens (250 Watts) and 9,500 lumens (100 Watts)
Luminaire Type = M-400A cutoff or equivalent for 400 Watt and 250 Watt lamps
M-250R cutoff or equivalent for 100 Watt lamps (See Note 18)
Ballast = Regulator
Socket position = 1 for 400 Watts and 250 Watts in M-400A cutoff,
standard for 100 watt lamps in M-250R cutoff
Shield = Not allowed
Luminaire mounting height = 35 feet for 400 Watts, 30 feet for 250 Watts
27 feet for 100 Watts
Mast Arm = 8 feet with a 1' minimum overhang past fence and curb
Pole = Round Concrete

1. Luminaires:

Street lighting luminaires shall be completely assembled and furnished with a lamp and a photoelectric control unit. Luminaires shall be designed for horizontal mounting with a horizontal burning lamp. It shall be cutoff type of standard make and manufactured by a manufacturer of recognized experience and ability, who is regularly engaged in the manufacturer of street lighting luminaries. The luminaire shall be die cast aluminum and furnished with an optical assembly removable without the use of special tools.

The luminaire shall have a slipfiller capable of attaching to a two inch (2") pipe and end mounting bracket without the need for special mounting parts. Leveling and clamping of the luminaire to the mast arm pipe shall be accomplished by tightening mounting bolts which are externally or internally accessible. Provision shall be made to check leveling of the unit. Luminaires shall include an integral twistlock type receptacle for photoelectirc cell control in accordance with the latest EEI-NEMA standards, and photoelectic control unit. The receptacle shall be prewired to the terminal board. The luminaire power unit assembly shall consist of an integral ballast, starter board, capacitors, and a heavy duty terminal block, and for the 400 watt unit and the 250 watt unit the power unit assembly shall be mounted on a separate component of the luminaire to facilitate replacement.

The luminaire optical assembly shall provide true ninety degree (90 degree) cutoff that does not allow any light to escape above the horizontal and shall consist of a die cast aluminum lens holder, an Alzak processed aluminum relector, a heat and impact resistant clear flat glass lens, and a procelain enclosed mogul multiple screw socket with lamp grips. The socket support assembly for the 400 Watt and 250 Watt installations shall be adjustable to provide variations in the light distribution and shall be factory preset to produce a medium or long cut off Type III distribution.

The socket support assembly for the 100 Watt installations shall be factory preset to produce a medium or long cut off Type II distribution. The optical assembly shall be sealed with a heat resisting gasket, and also filtered to prevent light loss from gaseous and particulate material infiltration for the 400 Watt and 250 Watt installations. The optical assembly door hinge shall be designed so that when the door is opened the hinge pins shall prevent the door from swinging free of the pins. The luminaire shall be constructed and installed in such a manner to provide the required lighting distribution with the lower edge of the luminaire's housing below the entire light source and all glassware. External shielding added to the luminaire to accomplish the function shall not be acceptable

The net weight of the luminaire, including ballast, and its projected area shall be no greater than the following:

Lamp Size (Watts)	Weight (lbs.)	Projected Area (sq.ft.)
100 & 250	50	2.0
400	55	2.5
700	75	2.8
1000	76	3.0

3. High Pressure Sodium Vapor Lamps

High pressure sodium vapor lamps shall have clear glass bulb and be suitable for use in street lighting applications. The lamp shall be designed to operate in any position.

High pressure sodium vapor lamps shall comply with the following minimum performance requirements.

Lamp Size (Watts)	ANSI Code	Rated Ave. Life (@ 10 Hrs. per start)	Initial Lume (A) (Burning any positions)	Light Output Mean (B) Per:	Factor (C)
100	S54	20,000	9,500	.90	.70
250	S50	24,000	30,000	.90	.70
400	S51	24,000	50,000	.90	.70

(A) Initial lumen ratings based on 100 hour photometry readings.

(B) Mean light output factor is taken at 1/2 rated lamp life.

(C) Lumen Output at end of rated life.

High pressure sodium vapor lamps shall be able to reach eighty percent (80%) of light output within four (4) minutes and to restrike within one (1) minute after an outage due to power interruption or voltage drop as the lamp socket.

The base of the lamp shall have a device that will allow the installer to indicate the month and year of installation.

4. High Pressure Sodium Vapor Ballasts

High pressure sodium ballasts shall be of the regulating type, with all windings electrically isolated and provide reliable lamp starting to-20 degrees F. The starting current shall be less than the running current. The power factor shall exceed ninety-five percent (95%).

They shall be suitable for use on multiple distribution circuits with 60 H_z, 120, and 240 voltage rating.

Ballasts shall be of the component type consisting of precision wound coils and welded magnetic steel laminations assembled together and impregnated with a baked on insulating and weather-proof varnish and metal cased hermetically sealed capacitor. Each ballast system shall have an auxiliary starting circuit capable of supplying the pulse characteristics listed below. The starting aid shall be readily accessible and easily replaced in the field. Starting aids must be compatible with core sand coil of the same rating without need for adjustment. Starting aids must be suitable for continuous operation for a minimum of three (3) months in the event of lamp failure without loss of life or ballast damage.

HIGH PRESSURE SODIUM VAPOR BALLASTS

Lamp Size (Watts)	ANSI Code	Line Volts	+ % Allow. Line Volt	Line Var. Oper. Amps	Line Start Amp	Power Factor	% Allow. Line Volt Dip
100	S54	120	10	1.2	.8	98	40-50
		240	10	.6	.4	98	40-50
250	S50	120	10	2.8	1.2	98	40-50
		240	10	1.4	.7	98	40-50
400	S51	120	10	4.1	1.1	98	40-50
		240	10	2.1	.7	98	40-50

The operating sound pressure noise level shall not exceed the ambient noise level by more than five (5) decibels at a distance of 30 feet when measured by a sound level meter conforming to the American Standard for Sound Level Meters. Where the ambient noise level is below 40 decibles, a minimum of 40 decibels shall be assumed as ambient.

5. Photoelectric Control Unit

The photoelectric unit shall consist of photoelectic unit in a wheatherproof housing which plugs into an EEI-NEMA twist lock receptacle integral with the luminaire.

The photoelectric unit shall provide an output in response to changing light levels. The respose level shall remain stable throughout the life of the control unit.

The control unit shall contain a cadmium-sulfide photoelectric cell suitable for operation with 120 V or 240 V line supply as noted on the plans. The unit shall have a rated load capacity of 1,000 volt - amperes minimum, with a normal power consumption of not more than 10 watts. The control unit shall also have surge protection to prevent damage from sudden voltage surges.

The control unit shall have a "Turn-On" level between one (1) and five (5) foot candles. The "Turn-Off" level shall be between one and one-half (1.5) and five (5) times "Turn-On".

6. Fuses

Fuses shall be slow blow 13/32 X 1 1/2 in line 10 amps. The fuse shall be installed in the hot leg of the lighting conductor. The circuit shall be fused in the base of the pole and not in a pull box.

7. Fuseholders

Fuseholders shall be completely waterproof, shall grip the fuse in load side section when fuseholder is opened, be able to take a 13/32 X 1 1/2 fuse, rated at 30 amperes at 600 volts or less, with crimp type tubular terminals of a size able to take the size cable in the particular street light.

8. Wiring

Service to lights shall be solid or stranded copper wire No. 10 AWG minimum. Copper wire shall conform to the applicable portion of ASTM B3 and B8. Size wire used shall be indicated on "As Built" plans. Wire connectors shall be of type approved by the Engineer and bear the UL seal of approval. The installation procedure, including connector size and crimping tools shall conform to the manufacturer's recommendations. Aluminum conductors shall not be substituted for copper.

All As-Built plans will be checked for voltage drop that exceeds acceptable limits. If voltage drip is excessive, As-Builts will be rejected with suggested modifications. If you wish to check your layouts for voltage drop prior to installation, call the Street light Coordinator at 258-0206.

9. Splicing

Splices shall be permitted in pull boxes and lighting standard bases only.

10. Conduit

All conduits shall be min. 1-inch UL approved heavy wall polyvinyl chloride (PVC sch-40). Conduit shall be sand encased (3 inches min. over conduit and all sides). The contractor may, at his expense, use conduit of a larger size, provided the larger size is used for the entire length of the run. Reducing couplings shall not be used. Conduit shall be laid to a depth of not less than 30 inches below the curb grade in sidewalk areas and curbed paved inches below the curb grade in sidewalk areas and curbed paved median areas; 30 inches below highway pavement grade in road areas and finished grade in all other areas. Conduit laid in open trench shall not be covered nor shall any trench or inspection hole be backfilled until installation has been accepted by the Engineer.

11. Pull Box

State No. 3 1/2 Pull Box or equivalent shall be installed within five feet of each street lighting standard and within five feet of each service point unless standard is within five feet of service point. Pull boxes shall be spaced at not over 200 feet. The bottom of the pull box shall rest firmly on a 12 inch thick bed of one-inch crushed rock extending six inches beyond the outside edges of the pull box. Pull boxes shown in the vicinity of curbs shall be placed adjacent to the back of the curb, and where practical, shall not be installed with the long side parallel to the curb. Pull boxes shall not be installed in any part of a driveway or other traveled way unless approved by Engineer. Concrete pull boxes covers shall be inscribed "STREET LIGHTING." Covers shall be secured with 3/8 inch bolts, capscrews, or studs, and nuts which shall be of brass, stainless steel or other non-corroding material.

12. Concrete Pole Construction

Concrete poles shall be tapered, centrifugally cast and prestressed. They may be round, black and white marble aggregate or natural exposed aggregate. The ultimate strength of a pole shall be calculated in accordance with the latest revision of American Concrete Institute (A.C.I.) standard 318. Under working loads (including wind loading) the pole must not be stressed beyond the cracking strength. Wind loads shall be specified in the last edition of the AASHTO Standards.

Pole shape and color shall be uniform for any one project. Replacement poles shall match existing.

Aggregates shall conform to current requirements of ASTM C33, except that abrasion requirements therein shall not apply and that no more than seven percent shall pass a #100 mesh sieve. No dye or sealer shall be used, without approval of the City Engineer.

Mast arm shall have one-foot minimum curb overhang.

A 1/4 inch hot dip galvanized or stainless steel bolt, accessible through the access hole, or a copper strap brazed or mechanically connected to the reinforcing steel shall be provided to ground direct burial poles. The centrifugal casting process shall produce a center duct throughout the length of the pole. The duct shall be free from sharp projections or edges which might injure the wire or cable. It shall have a minimum of 1 1/2 inches diameter. All reinforcing steel shall have a minimum cover of 5/8 inch diameter.

After curing, the surface of the standard shall be treated to remove cement laitance and develop the surface texture.

When finished, poles shall be without cracks or crazing and shall have a uniform surface (without objectionable mold marks) and texture throughout the entire length. Maximum deviation from stringline at any point shall not exceed .03 inch per foot of length.

Poles shall be furnished with a mast arm that provide a minimum of six inches of a horizontal straight section at the end of the bracket arm to mount a two-inch I.P.S. slipfitter type luminaire.

Handhole cover plate securing bolts shall be stainless steel, not brass, plain steel, Cadium coated or galvanized steel. Corrosion and subsequent freezing of these bolts is a serious problem.

The base of light pole shall be heavily coated with roofing asphalt or coal tar enamel.

13. Anchor Bolts for Anchor Base Poles

Anchor bolts shall be of the type and size as shown of Regional Standard Drawing E-1 (Revised). Anchor shall conform to the specifications of ASTM A 307, and shall be provided with two nuts and and two washers each.

Anchor bolts, nuts, and washers shall be galvanized by the hot-dip process conforming to ASTM A 153, or cadmium plated with Type NS coating conforming to AST, 165.

All nuts shall be symetrically formed with the hole centered and at right angles to the face, tapped to fit a corresponding thread so that nuts can be run the entire length of the thread by the fingers without undue forcing, and without noticeable play or rocking.

Plumbing of standards shall be accomplished by adjusting the nuts on the anchor bolts before the foundation cap is placed. Shims or other similar devices for plumbing or raking will not be permitted. After plumbing the standard, anchor bolts shall be cut off 1/4 inch above the nuts and the exposed surfaces shall be repaired.

The contractor shall submit to the Engineer in conformance with the above requirements and the Standard Specifications a certified list of all materials to be used for approval prior to installation.

For Anchor Base Foundation see Regional Standard Drawings E1 and E2.

14. Mast Arm

Mast arms shall be 2-inch I.P.S. galvanized steel or aluminum, self-supporting, without braces, scrolls or rods. Mounting shall be perpendicular to street centerline unless otherwise shown on plans.

Steel arms shall conform to ASTM A 120. Aluminum arms shall be made of corrosion resistant alloys such as Aluminum Association wrought alloys 6061 or 6062, and cast alloys 319 or 356.

Changes in configuration of mast arms will be permitted, providing the mounting height and stability are maintained. Mast arms shall be galvanized.

All exposed hardware shall be cadmium coated, hot diped galvanized or stainless steel.

All protected hardware not visible after installation shall be cast aluminum and/or stainless steel, hot dipped galvanized or cadmium plated steel.

15. Hook-Up to SDG&E's Service Point

To get a service point, contact SDG&E. They are the only ones that know what is available and where it is. Sometimes, a new light can be connected to an existing li system, but that very seldom happens. The service point should be in the City's right-of-way, or you will need to give the City an easement to the service point. A SDG&E easement isn't sufficient. Easements are expensive and time-consuming to you. Avoid service runs across private property if at all possible!

16. Wire and Conduit to Service Point

If the lights are 120 Volt or 240 Volt both wires can be Black. If it is a 120/240 Vol system, there must be a White neutral wire in addition to the 2 Black wires. Any ground wires will be green.

For service points that are up a wood power pole, the first 10 feet from the ground wi be installed one (1) inch schedule 120 PVC or Galvanized Steel. If the wire used is or bigger or if it's a 3-wire installation, two (2) inch conduit will be used. Enough PVC conduit to reach the rest of the way to the service point will be strapped to the pole. SDG&E's crew will install it. Enough wire to reach the service point will be coiled up above the rigid conduit.

If any of this is not done exactly this way, SDG&E may turn down the job, which can cause costly delays to your project.

17. As-Builts

Before SDG&E will hook-up a light, 2 as-built drawings must be given to your inspector. They must clearly show:

1. Wattage and type of each light. (For example: 250 Watt High Pressure Sodium)
2. Location of each light.
3. Conduit runs and pull boxes.
4. Service point. If the service point is a wooden pole, show the Pole Number.
5. Size of wire.
6. Lengths and distances of wire runs.

As-built drawing should be as well-drawn and with as much detail as possible. Sloppy and incomplete drawings will be rejected. These drawings become part of the permanent file on this development, and will be referred to in the future.

18. Other Notes

This is not a complete specification. It is a supplement to the Standard those specifications for Public Works Construction, the Standard Special Provision to Standard Specifications and the San Diego County Regional Standard drawings.

At the present time (May, 1981) ITT does not manufacture a luminaire that meets the City's standards or specifications and therefore their luminaires are not acceptable for installation.

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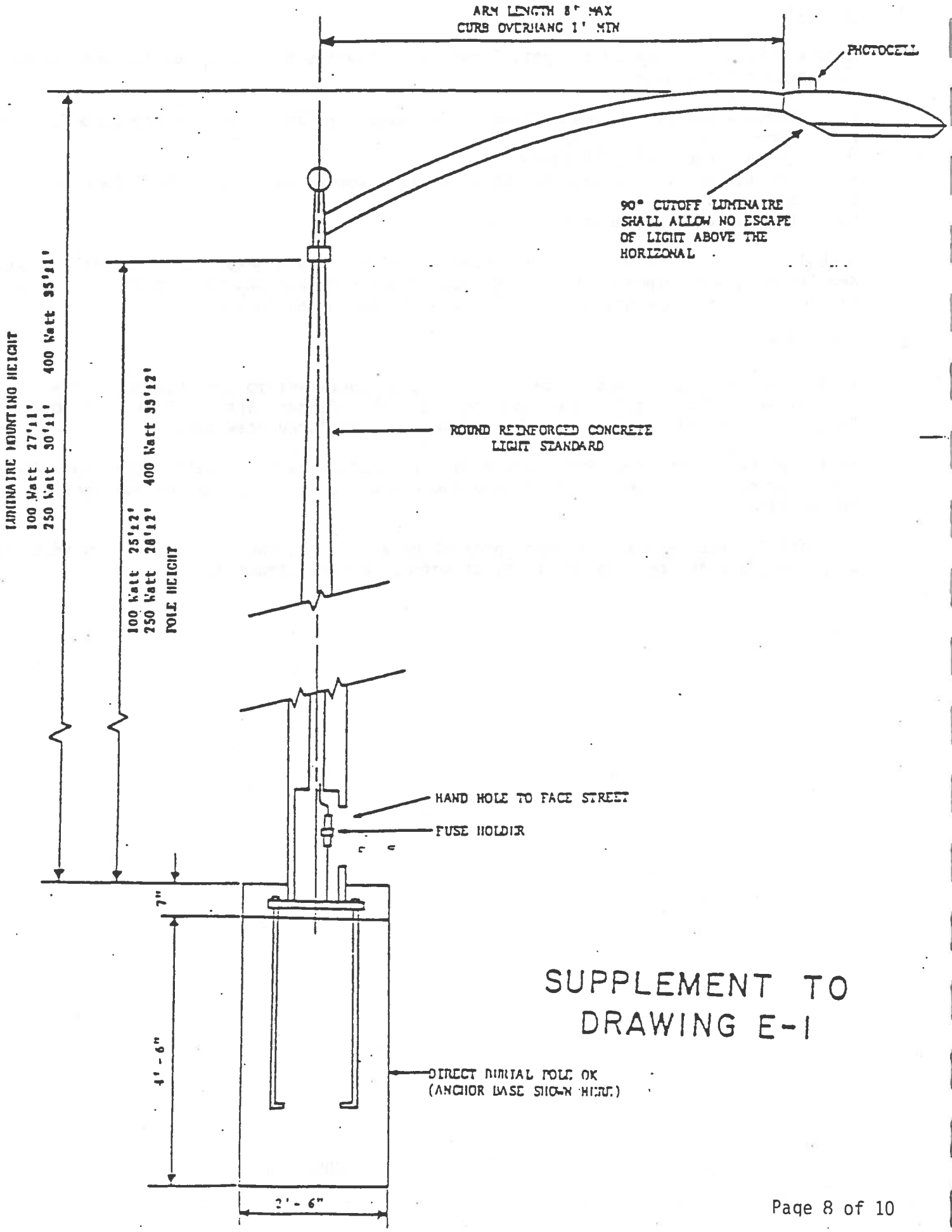
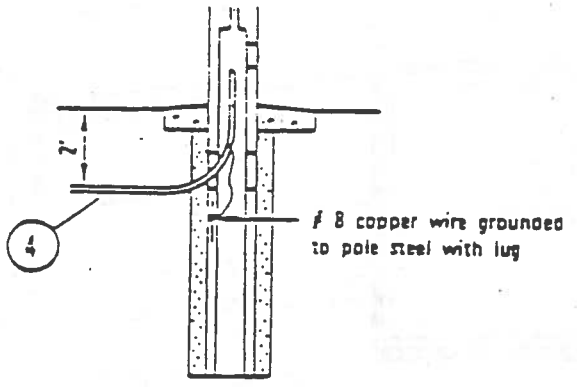
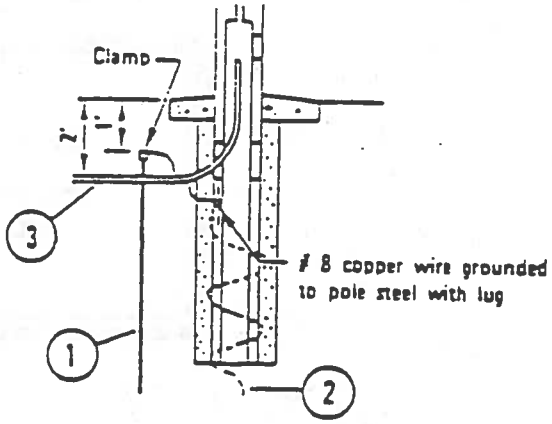
ORNAMENTAL STREET LIGHT



SUPPLEMENT TO DRAWING E-1

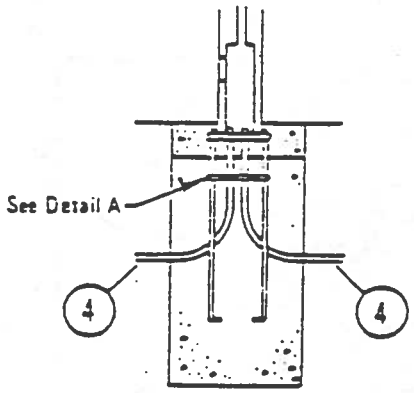


STEEL CONDUIT



NON–METALLIC CONDUIT

DIRECT BURIAL FOUNDATION



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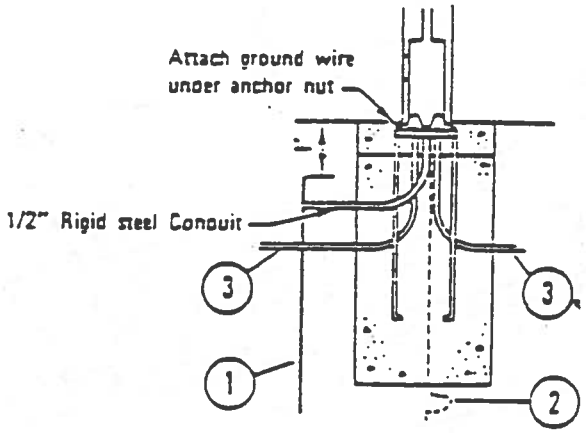

NON–METALLIC CONDUIT

ANCHOR BASE FOUNDATION

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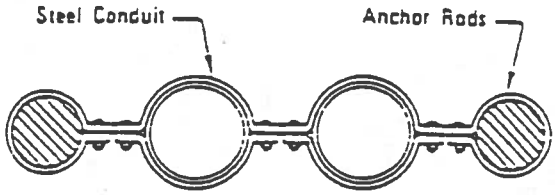
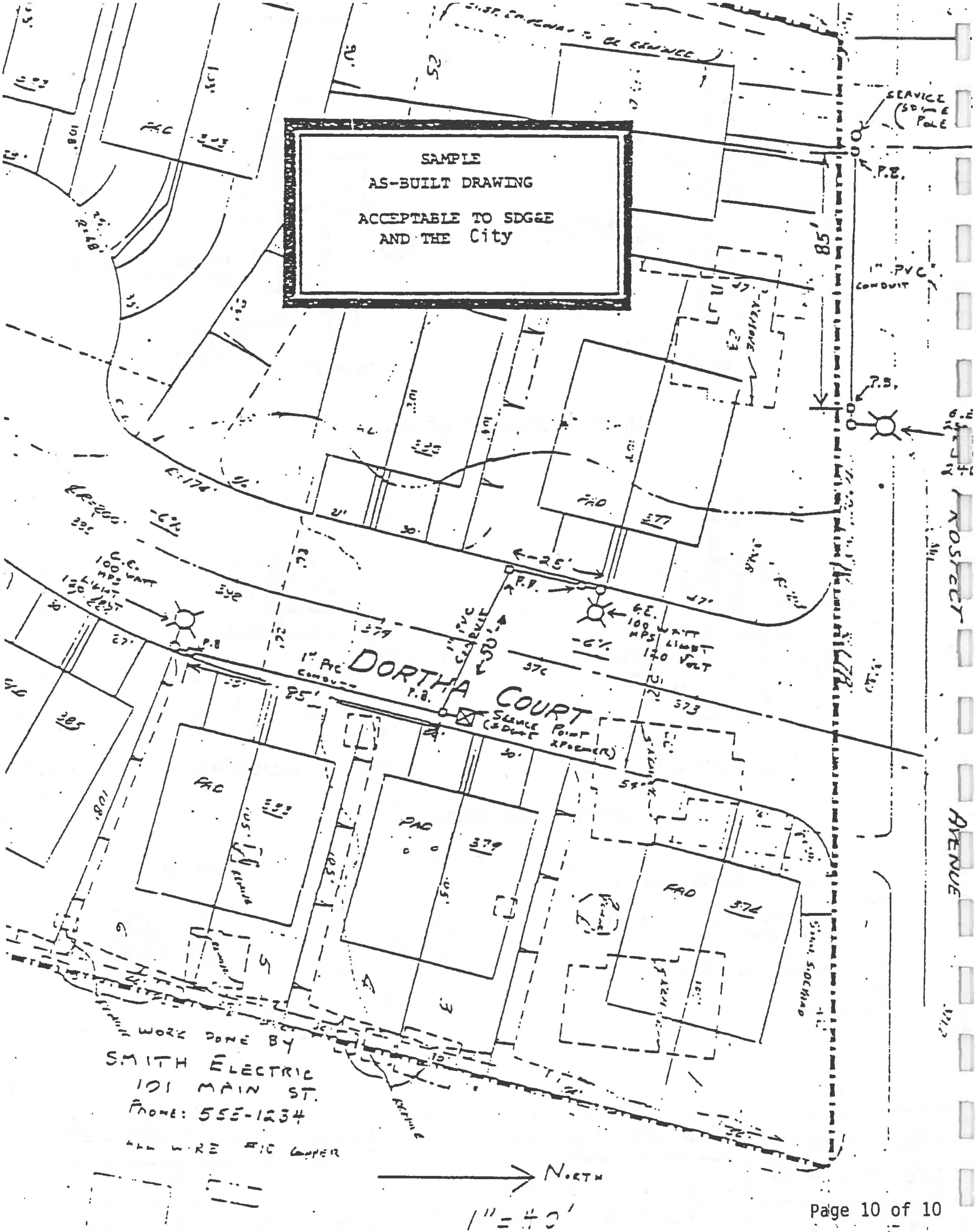
3. Approved non-metallic conduit.
4. Steel conduit



DETAIL A

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	SAN DIEGO REGIONAL STANDARD DRAWING	Revision | By | Approved | Date
DRAWING NUMBER E-2	GROUNDING OF CONCRETE LIGHTING STANDARDS	


SAMPLE
AS-BUILT DRAWING
ACCEPTABLE TO SDG&E
AND THE City
DORTHA COURT
AVENUE
SERVICE POINT (SDG&E XFORMER)
1" PVC CONDUIT
100 WATT MPS LIGHT 120 VOLT
WORK DONE BY
SMITH ELECTRIC
101 MAIN ST.
PHONE: 555-1234
NORTH
1"=40'

STREET LIGHT LUMINAIRE AND WIRING STANDARDS
MAY 1981

1. Materials (General)

Street lighting luminaire description shall be as follows:

Lamp size = 400 Watt high pressure sodium, 250 Watt high pressure sodium and 100 watt high pressure sodium.
Output = 50,000 lumens (400 Watts), 30,000 lumens (250 Watts) and 9,500 lumens (100 Watts).
Luminaire Type = M-400A cutoff or equivalent for 400 Watt and 250 Watt lamps. M-250R cutoff or equivalent for 100 Watt lamps (See note 18)
Ballast = Regulator
Socket Position = 1 for 400 Watts and 250 Watts in M-400A cutoff, standard for 100 watt lamps in M-250R cutoff.
Shield = Not allowed
Luminaire mounting height = 35 feet for 400 Watts, 30 feet for 250 watts, 27 feet for 100 Watts.
Mast arm = 8 feet with a 1' minimum overhang past face of curb
Pole = Round Concrete

2. Luminaires

Street lighting luminaires shall be completely assembled and furnished with a lamp and a photoelectric control unit. Luminaires shall be designed for horizontal mounting with a horizontal burning lamp. It shall be cutoff type of standard make and manufactured by a manufacturer of recognized experience and ability, who is now regularly engaged in the manufacture of street lighting luminaires. The luminaire shall be die cast aluminum and furnished with an optical assembly removable without the use of special tools.

3. The luminaire shall have a slipfitter capable of attaching to a two inch (2") pipe and end mounting bracket without the need for special mounting parts. Leveling and clamping of the luminaire to the mast arm pipe shall be accomplished by tightening mounting bolts which are externally or internally accessible. Provision shall be made to check leveling of the unit. Luminaires shall include an integral twist lock type receptacle for photoelectric cell control in accordance with the latest EEI-NEMA standards, and photoelectric control unit. The receptacle shall be prewired to the terminal board. The luminaire power unit assembly shall consist of an integral ballast, starter board, capacitors, and a heavy duty terminal block, and for the 400 Watt unit and the 250 Watt unit the power unit assembly shall be mounted on a separate component of the luminaire to facilitate replacement.

The luminaire optical assembly shall provide true ninety degree (90°) cutoff that does not allow any light to escape above the horizontal and shall consist of a die cast aluminum lens holder, an Alzak processed aluminum reflector, a heat and impact resistant clear flat glass lens, and a porcelain enclosed mogul multiple screw socket with lamp grips. The socket support assembly for the 400 Watt and 250 Watt installations shall be adjustable to provide variations in the light distribution and shall be factory preset to produce a medium or long cut off Type III distribution.

The socket support assembly for the 100 Watt installations shall be factory preset to produce a medium or long cut off Type II distribution. The optical assembly shall be sealed with a heat resisting gasket, and also filtered to prevent light loss from gaseous and particulate material infiltration for the 400 Watt and 250 Watt installations. The optical assembly door hinge shall be designed so that when the door is opened the hinge pins shall prevent the door from swinging free of the pins. The luminaire shall be constructed and installed in such a manner to provide the required lighting distribution with the lower edge of the luminaire's housing below the entire light source and all glassware. External shielding added to the luminaire to accomplish the function shall not be acceptable.

The net weight of the luminaire, including ballast, and its projected area shall be no greater than the following:

Lamp Size (Watts	Weight (lbs)	Projected Area (Sq. Ft.)
100 & 250	50	2.0
400	55	2.5
700	75	2.8
1000	76	3.0

3. High Pressure Sodium Vapor Lamps

High pressure sodium vapor lamps shall have clear glass bulb and be suitable for use in street lighting applications. The lamp shall be designed to operate in any position.

High pressure sodium vapor lamps shall comply with the following minimum performance requirements.

Lamp Size (Watts	ANSI Code	Rated Ave. Life (@ 10 hrs/start)	Initial Lumes (A) (Burning any position)	Light Output Factor Mean (B)	Per: (C)
100	S54	20,000	9,500	.90	.70
250	S50	24,000	30,000	.90	.70
400	S51	24,000	50,000	.90	.70

(A) Initial lumen ratings based on 100 hour photometry reading.

(B) Mean light output factor is taken at 1/2 rated lamp life.

(C) Lumen Output at end of rated life.

High pressure sodium vapor lamps shall be able to reach eighty percent (80%) of light output within four (4) minutes and to restrike within one (1) minute after an outage due to power interruption or voltage drop at the lamp socket.

The base of the lamp shall have a device that will allow the installer to indicate the month and year of installation.

High pressure sodium ballasts shall be of the regulating type, with all windings electrically isolated and provide reliable lamp starting to -20° F. The starting current shall be less than the running current. The power factor shall exceed ninety-five percent (95%).

They shall be suitable for use on multiple distribution circuits with 60 H_Z, 120, and 240 voltage rating.

Ballasts shall be of the component type consisting of precision wound coils and welded magnetic steel laminations assembled together and impregnated with a baked on insulating and weatherproof varnish and metal cased hermetically sealed capacitor. Each ballast system shall have an auxiliary starting circuit capable of supplying the pulse characteristics listed below. The starting aid shall be readily accessible and easily replaced in the field. Starting aids must be compatible with core and coil of the same rating without need for adjustment. Starting aids must be suitable for continuous operation for a minimum of three (3) months in the event of lamp failure without loss of life or ballast damage.

HIGH PRESSURE SODIUM VAPOR BALLASTS

Lamp Size (Watts	ANSI Code	Line Volts	+ % Allow. Line Volt	Line Var. Oper. Amps	Line Start Amp	Power Factor	% Allow. Line Volt Dip
100	S54	120	10	1.2	.8	98	40-50
		240	10	.6	.4	98	40-50
250	S50	120	10	2.8	1.2	98	40-50
		240	10	1.4	.7	98	40-50
400	S51	120	10	4.1	1.1	98	40-50
		240	10	2.1	.7	98	40-50

The operating sound pressure noise level shall not exceed the ambient noise level by more than five (5) decibels at a distance of 30 feet when measured by a sound level meter conforming to the American Standard for Sound Level Meters. Where the ambient noise level is below 40 decibels, a minimum of 40 decibels shall be assumed as ambient.

5. PHOTOELECTRIC CONTROL UNIT

The photoelectric unit shall consist of photoelectric unit in a weatherproof housing which plugs into an EEI-NEMA twist lock receptacle integral with the luminaire.

The photoelectric unit shall provide an output in response to changing light levels. The response level shall remain stable throughout the life of the control unit.

The control unit shall contain a cadmium-sulfide photoelectric cell suitable for operation with 120 V or 240 V line supply as noted on the plans. The unit shall have a rated load capacity of 1,000 volt - amphres minimum, with a normal power consumption of not more than 10 watts. The control unit shall also have surge protection to prevent damage from sudden voltage surges.

The control unit shall have a "Turn-On" level between one (1) and five (5) foot candles. The "Turn-Off" level shall be between one and one-half (1-1/2) and (5) times "Turn-On".

6. FUSES

Fuses shall be slow blow 13/32 x 1 1/2 in line 10 amps. The fuse shall be installed in the hot leg of the lighting conductor. The circuit shall be fused in the base of the pole and not in a pull box.

7. FUSEHOLDERS

Fuseholders shall be completely waterproof, shall grip the fuse in load side section when fuseholder is opened, be able to take a 13/32 x 1 1/2" fuse, rated at 30 ampres at 600 volts or less, with crimp type tubular terminals of a size able to take the size cable in the particular street light.

8. WIRING

Service runs to lights shall be solid or stranded copper wire No. 10 AWG minimum. Copper wire shall conform to the applicable portion of ASTM B3 and B8. Size of wire used shall be indicated on "As-Built" plans. Wire connectors shall be of type approved by the Engineer and bear the UL seal of approval. The installation procedure, including connector size and crimping tools shall conform to the manufacturer's recommendations. Aluminum conductors shall not be substituted for copper.

All As-Built plans will be checked for voltage drop that exceeds acceptable limits. If voltage drop is excessive, As-Builts will be rejected with suggested modifications. If you wish to check your layout for voltage drop prior to installation, call SDG&E.

9. SPLICING

Splices shall be permitted in pull boxes and lighting standard bases only.

10. CONDUIT

All conduits shall be minimum 1-inch UL approved heavy wall polyvinyl chloride (PVC Sch-40). Conduit shall be sand encased (3 inches minimum over conduit and all sides). The Contractor may, at his expense, use conduit of a larger size, provided the larger size is used for the entire length of the run. Reducing couplings shall not be used. Conduit shall be laid to a depth of not less than 30 inches below the curb grade in sidewalk areas and curbed paved median areas; 30 inches below highway pavement grade in road areas and finished grade in all other areas. Conduit laid in open trench shall not be covered not shall any trench or inspection hole be backfilled until installation has been accepted by the Engineer.

11. PULL BOX

State No. 3 1/2 Pull box or equivalent shall be installed within five feet of each street lighting standard and within five feet of each service point unless standard is within five feet of service point. Pull boxes shall be spaced at not over 200 feet. The bottom of the pull box shall rest firmly on a 12 inch thick bed of one inch crushed rock extending six inches beyond the outside edges of the pull box. Pull boxes shown in the vicinity of curbs shall be placed adjacent to the back of the curb, and where practical, shall not be installed with the long side parallel to the curb. Pull boxes shall not be installed in any part of a driveway or other traveled way unless approved by Engineer. Concrete pull box covers shall be inscribed "STREET LIGHTING". Covers shall be secured with 3/8 inch bolts, capscrews, or studs, and nuts which shall be of brass, stainless steel or other non-corroding material.

12. CONCRETE POLE CONSTRUCTION

Concrete poles shall be tapered, centrifugally cast and prestressed. They may be round, black and white marble aggregate or natural exposed aggregate. The ultimate strength of a pole shall be calculated in accordance with the latest revision of American Concrete Institute (A.C.I.) standard 318. Under working loads (including wind loading) the pole must not be stressed beyond the cracking strength. Wind loads shall be as specified in the last edition of the AASHTO Standards.

Pole shape and color shall be uniform for any one project. Replacement poles shall match existing.

Aggregates shall conform to current requirements of ASTM C33, except that abrasion requirements therein shall not apply and that no more than seven percent shall pass a #100 mesh sieve. No dye or sealer shall be used without approval of the City Engineer.

Mast arm shall have one-foot minimum curb overhang.

A 1/4 inch hot dip galvanized or stainless steel bolt, accessible through the access hole, or a copper strap brazed or mechanically connected to the reinforcing steel shall be provided to ground direct burial poles. The centrifugal casting process shall produce a center duct throughout the length of the pole. The duct shall be free from sharp projections or edges which might injure the wire or cable. It shall have a minimum of 1 1/2 inches diameter. All reinforcing steel shall have a minimum cover of 5.8 inch diameter.

After curing, the surface of the standard shall be treated to remove cement laitance and develop the surface texture.

When finished, poles shall be without cracks or crazing and shall have a uniform surface (without objectionable mold marks) and texture throughout the entire length. Maximum deviation from stringline at any point shall not exceed .03 inch per foot of length.

Poles shall be furnished with a mast arm that provide a minimum of six inches of a horizontal straight section at the end of the bracket arm to mount a two-inch I.P.S. slipfitter type luminaire.

Handhole cover plate securing bolts shall be stainless steel, not brass, plain steel, Cadmium coated or galvanized steel. Corrosion and subsequent freezing of these bolts is a serious problem.

The base of light pole shall be heavily coated with roofing asphalt or coal tar enamel.

13. ANCHOR BOLTS FOR ANCHOR BASE POLES

Anchor bolts shall be of the type and size as shown on Regional Standard Drawing E-1 (Revised). Anchor shall conform to the specifications of ASTM A 307, and shall be provided with two nuts and two washers each.

Anchor bolts, nuts, and washers shall be galvanized by the hotdip process conforming to ASTM A 153, or Cadmium plated with Type NS coating conforming to ASTM A 165.

All nuts shall be symmetrically formed with the hole centered and at right angles to the face, tapped to fit a corresponding thread so that nuts can be run the entire length of the thread by the fingers without undue forcing, and without noticeable play or rocking.

Plumbing of standards shall be accomplished by adjusting the nuts on the anchor bolts before the foundation cap is placed. Shims or other similar devices for plumbing or raking will not be permitted. After plumbing the standard, anchor bolts shall be cut off 1/4 inch above the nuts and the exposed surfaces shall be repaired.

The Contractor shall submit to the Engineer in conformance with the above requirements and the Standard Specifications a certified list of all materials to be used for approval prior to installation.

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1. Wattage and type of each light. (for example: 250 Watt High Pressure Sodium).
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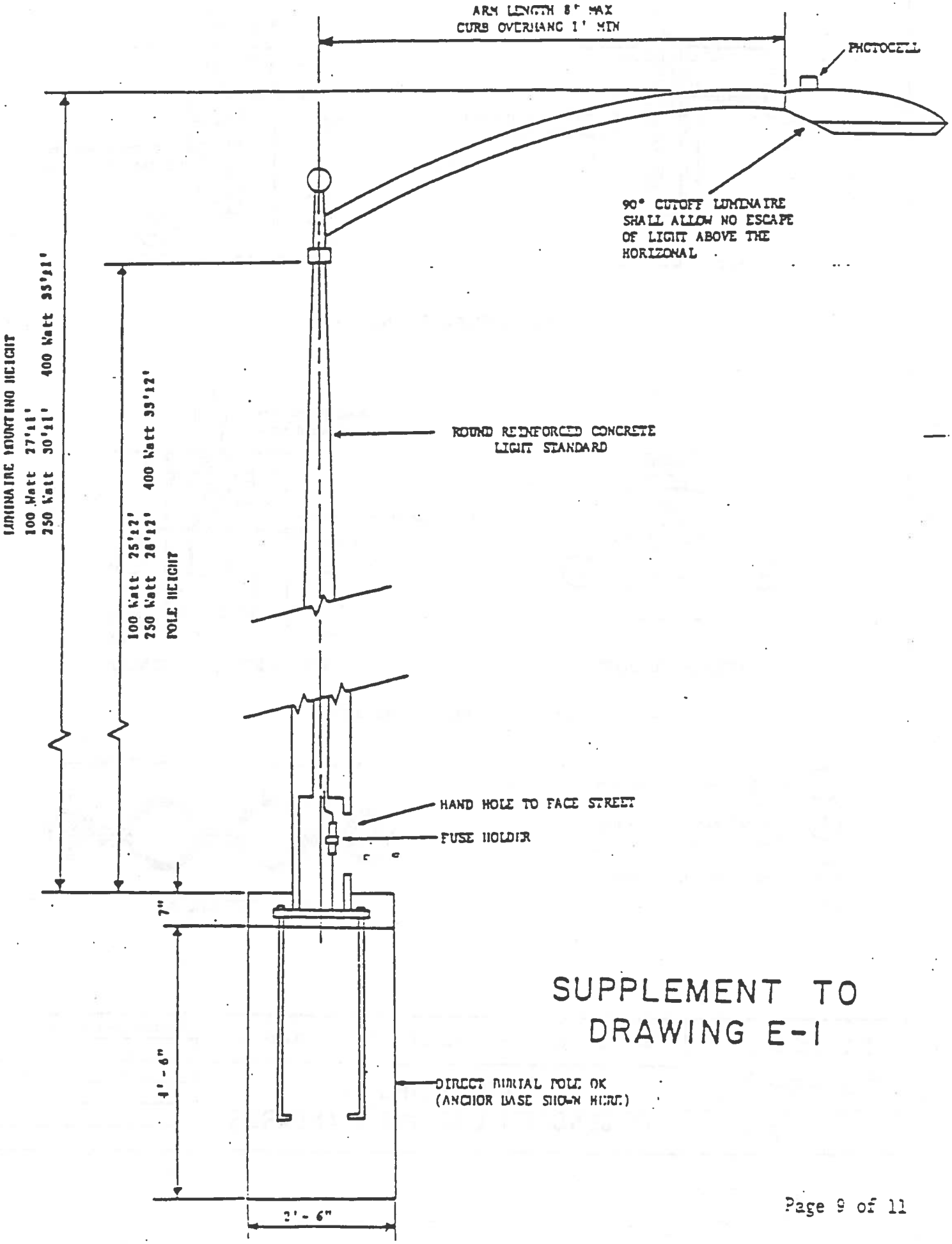
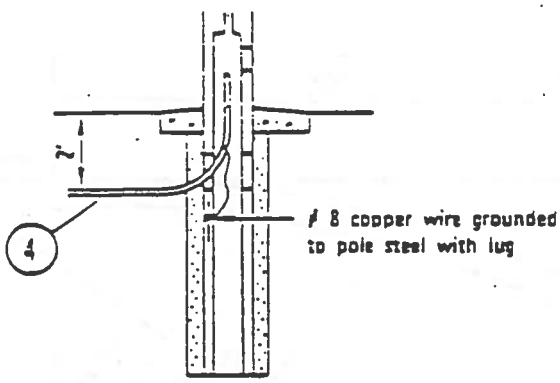
(Rev. 09/91)
1-s*

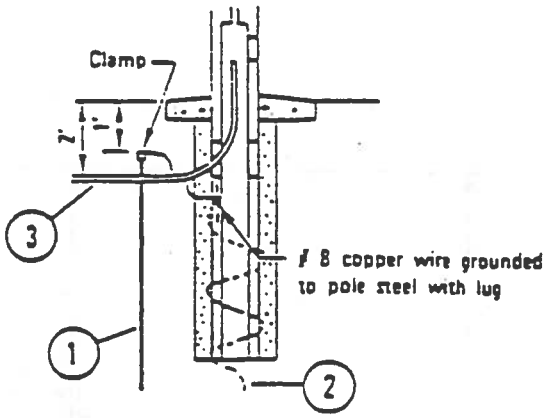
ORNAMENTAL STREET LIGHT



SUPPLEMENT TO DRAWING E-1

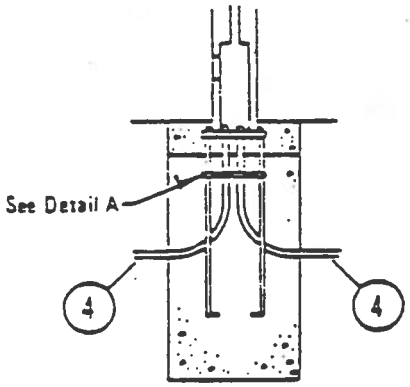


STEEL CONDUIT



NON–METALLIC CONDUIT

DIRECT BURIAL FOUNDATION



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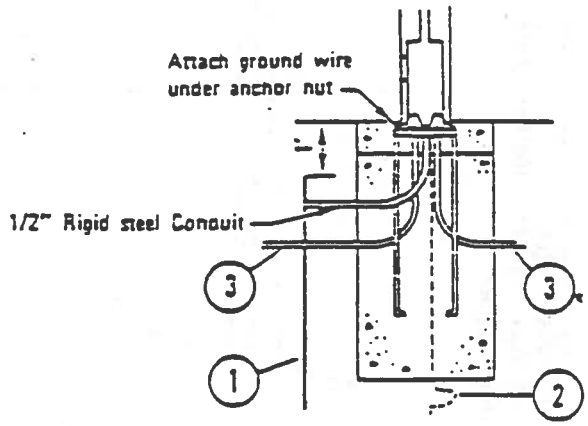

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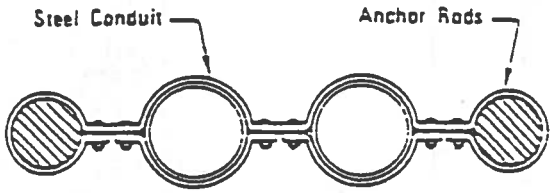
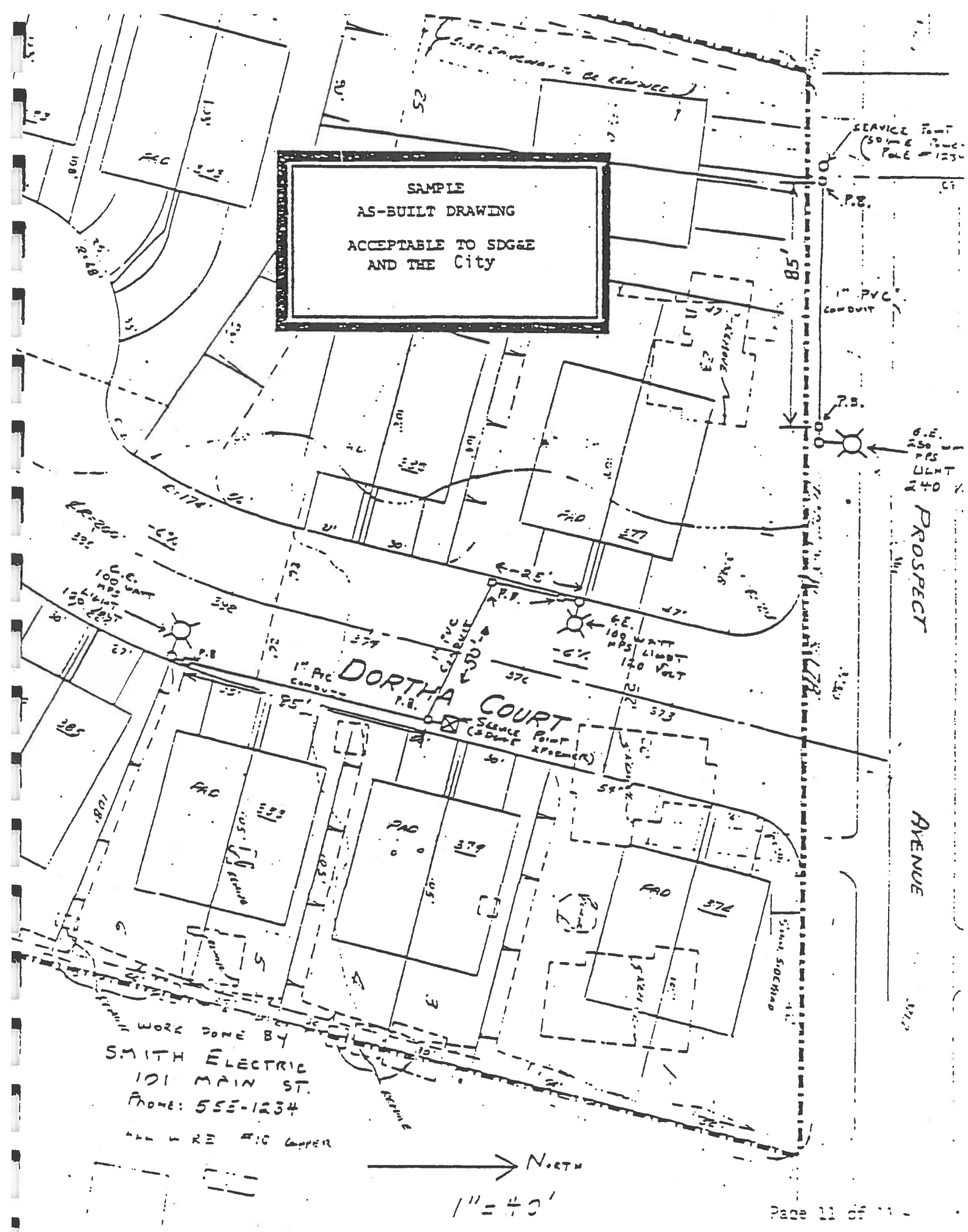


DETAIL A

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	SAN DIEGO REGIONAL STANDARD DRAWING	Revision	By	Approved	Date
	GROUNDING OF CONCRETE LIGHTING STANDARDS				
DRAWING NUMBER E-2					


SAMPLE
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DORTHA COURT
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WORK DONE BY
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101 MAIN ST.
PHONE: 555-1234
NORTH
1" = ±0'

PUBLIC WORKS DEPARTMENT POLICY
ON
CONSTRUCTION CHANGES AND AS BUILT DRAWINGS
FOR
PRIVATE DEVELOPMENTS

Background:

During the course of construction, previously unknown field conditions may require modifications to approved grading or improvement plans. Additionally, cost considerations often prompt requests for changes in materials during the course of construction.

Purpose:

This policy is designed to provide a uniform practice for reviewing and approving proposed modifications to signed plans. By adhering to this policy, review can be completed in an expiditious manner.

Policy:

Prior to commencing any construction not shown on the approved plans, the following actions shall be taken:

1. The Engineer of work shall submit a red lined print showing the proposed change along with a justification for that change. (The approval of PDMWD to be included, if applicable)

2. The proposed change will be reviewed by staff including the field inspector.

3. Once the proposed change is acceptable, the Engineer of Work will be asked to submit a sepia of the original drawing showing the proposed change.

4. Upon approval by the City Engineer, four blue line prints shall be submitted to the City. No work on the proposed change shall commence prior to the submission of these prints.

Prior to the final acceptance of work by the City, the Engineer of Work shall:

1. Certify the improvements and/or grading have been constructed in the locations and to the grades shown on the plans.

2. Submit a red lined set of the original plans showing all "As Built" information including: approved construction changes, locations of water and sewer services, gas and electric facilities, and final pavement sections. The City staff will check the red lined prints and return them to the Engineer of Work within five (5) working days to amend the original plans, which shall be submitted to the City.

3. A statement certifying the survey monuments have been set in accordance with the final map and the Engineer has been paid for setting the monuments.

4. Provide certification that all work to be accepted by other agencies (i.e. Padre Dam Municipal Water District, San Diego County Flood Control, etc.) has been accepted.

Effective: July 1, 1984