

STANDARD PLANS  
AND  
SPECIFICATIONS



SOUTH SAN JOAQUIN IRRIGATION DISTRICT  
ENGINEERING DEPARTMENT

11011 EAST HIGHWAY 120  
MANTECA, CA 95366



SPECIAL PROVISIONS

ADOPTED JULY 28, 1992

SPECIAL PROVISIONS  
TO THE STANDARD SPECIFICATIONS  
OF THE  
SOUTH SAN JOAQUIN IRRIGATION DISTRICT  
CONFIRMED AND ADOPTED JULY 28, 1992

To protect the District's interests in the operation, maintenance, construction and reconstruction of its works and facilities, the District has developed to following Special Provisions, Standard Specifications and Standard Drawings. Further, to provide the District with the necessary protections from the activities of those who engage or contract to accomplish work upon District works and facilities and those who intend to encroach upon District easements, the District has developed a number of Standard Documents. As conditioned within the District's Standard Documents work in, over, or upon District easements shall not be accomplished until either of the following occurs: (1) receipt of written notice of permission granted by the District Board of Directors and acceptance of required documents and instruments, or (2) until a standard written agreement has been consummated on matters of a routine nature of which the authority to consummate has been previously granted to the District General Manager.

Typical Standard Documents which the District utilizes to provide for timely approval and uniform application of its Special Provisions, Standard Specifications and Standard Drawings are as follows:

- (1) Encroachment Agreement
- (2) Temporary Construction Agreement
- (3) Release of Liability and Temporary Permit for use of District Conveyance Channels.
- (4) Structure Abandonment Document
- (5) Structure Application & Agreement
- (6) Structure Permit
- (7) Irrigation Service Abandonment Agreement
- (8) Developers Agreement
- (9) Grant of Easement

To administer to the needs of Special Interests, the District has adopted a policy and fee schedule which is designed to assure that others within the District are not burdened with the costs necessary to administer to such needs. This policy and related fee schedule is on file at the District office. Copies of same may be obtained by making a request to the Engineering Department Head.

Since its beginning, and from time to time thereafter, the District Board of Directors has found it necessary to adopt rules and requirements designed to not only protect its interests but to provide for the equal treatment of all its landowners and voting constituents. A few of the District's specific rules and requirements, which aided in the completion

of the District's Standard Documents, Standard Specifications and Standard Drawings, have been included in the following tabulation to assist all in determining encroachment requirements and in completing structure designs.

Board orders dated:

- (1) 6-9-1914; Adopted rules prohibiting interference with District facilities or the operation thereof without the written permission of the Board of Directors.
- (2) 4-13-1915; Adopted rules and regulations governing the distribution of water in the South San Joaquin Irrigation District, which among other provisions, provides that no openings shall be made or structures placed in any District facility until an application in writing has been made to the Board and permission granted therefore. These rules and regulations also provide that all structures on District facilities must be constructed according to the requirements of the District and must be maintained in a condition satisfactory to the Superintendent, and must not be changed without the permission of the Superintendent.
- (3) 3-11-1919; Applications for permission to construct structures in District ditches shall comply with plans and specifications approved by the District.
- (4) 7-13-1920; Construction of District works involving open channels shall provide for a minimum of 8" freeboard.
- (5) 9-7-1921; Drainage and canal road crossings shall be constructed to the full width of the road right-of-way.
- (6) 4-11-1922; San Joaquin County is to maintain all road bridge and culvert crossings of District ditches at county roads (expanded to cover all city, county, and state roads).
- (7) 12-24-1928; The costs to construct permanent road crossings to be shared 50/50 with San Joaquin County, thereafter responsibility and maintenance by County.
- (8) 11-20-1945; Permits will only be issued for the connection of surface drains, 6" in diameter or smaller, into District Canals and Laterals (limit 1 per 40 acre parcel).
- (9) 4-15-1946; Trees shall not be planted within a distance of 15' of a District pipeline and vines no closer than 10'.
- (10) 6-29-1948; Permits will only be issued for the connection of surface drains, 8" in diameter or smaller, into District Drains (limit 1 per 40 acre parcel).
- (11) 2-21-1950; Removal of soil from lands adjacent to District works shall not proceed without a permit from the District.
- (12) 7-19-1951; Relative to the installation of pipe at city road crossings, the District will furnish equipment and labor crews for the placing of concrete pipe and backfilling same, provided the political body furnish the necessary pipe and complete all sub-base, road pavement, curb, gutter, and sidewalk replacement.



(13) 5-26-1953; Work on District facilities shall occur only at such time as there is no water in the District facility (as determined by the Water Superintendent) and the owner or contractor shall provide suitable notification for inspection by District representatives of all phases of the installation work.

(14) 2-9-54; Private service gates to be connected to District open channels shall be constructed with a minimum 12' long culvert pipe (actual length to be determined by the Engineering Department).

(15) 9-18-1962; The minimum irrigation valve is 18" in diameter unless permitted by the Board of Directors. (see #18)

(16) 6-4-1963; All sprinkler operators are required to install and maintain valves or other spill-over devices for the control of excess flows on their own property.

(17) 3-9-1965; All owners of private pipelines connecting to District facilities shall construct and maintain proper covers and trash racks at the inlet to the private facility.

(18) 2-27-1968; The operators of all irrigation service valves under 18" in diameter are required to have and operate an overpour device that would spill water onto their own property in case the smaller valves becomes plugged or flows are greater than anticipated.

(19) 6-16-1968; Where high water tables exist within the western part of the District, soil shall not be removed where the finished field grade will be closer than 7.5' to the underlying mean annual water table.

(20) 4-15-1969; All new subdivisions are required to replace street crossings with RGRCP.

(21) 1-9-1973; Sprinkler installations shall be designed to serve the sprinkler pump without additional pressure to charged District lines.

(22) 1-16-1973; In order to assure that sprinkler sump installations do not interfere with District operations and activities all sump installations shall be placed no closer to the District lateral than the land-side toe of the laterals embankment (all such installations shall provide for passage of vehicles and equipment within District easement areas).

(23) 5-21-1974; All sprinkler streams require the use of sprinkler sump structures.

(24) 7-13-1976; All developers shall remove valves and plug holes on District pipelines when the valves no longer function for agricultural deliveries.

(25) 1-18-1977; Board reaffirmed that, with exceptions relating to access and flow capacity, the design requirements for road crossings are established by the public works department of the city or county (or state), depending upon location.

(26) 5-4-1982; All District easements shall be a minimum of 30' and shall be recorded on standard District easement forms. Vent pipes and access to pipe interior shall be provided at each angle point and grade change (Maximum spacing at 500').

(27) 9-24-1985; Established guidelines relating to swimming pool encroachments (On file in the Engineering Department).

(28) 9-24-1985; Established a procedure whereby "temporary encroachment (construction) contracts" may be consummated by the General Manager provided, the Director for the area where the work is to be performed is consulted for final approval.

(29) 11-26-1985; Established "no-joint continuous cast in place concrete pipe" as the District's minimum standard for pipelines.

(30) 11-12-1986; Established a minimum standard requiring the use of "rising" gate stems for all canal gates.

(31) 6-30-1987; Adopted a maintenance fee schedule in lieu of replacing certain sections of cast in place pipe (does not apply to sections replaced with RGRCP).

(32) 12-22-1987; Encroachment agreements are required when planting trees on District easements.

(33) 1-26-1988; Encroachment agreements for minor encroachments may be processed without prior Board approval, provided a report is made at the next Board of Directors meeting.

(34) 12-13-1988; Adopted a standard "Developers Agreement".

(35) 5-9-1989; Prohibitions and guidelines were established relating to discharges of storm water into District facilities. Developments are not permitted to connect "direct inlets" to District works. Temporary measures are no longer permitted as a means to resolve local concerns. All storm water containment facilities are to be designed as retention ponds. These prohibitions and guidelines were modified on 12-12-1989 to require commercial developments to secure from the appropriate city or county body a letter from the public works engineer stating that the storm water drainage proposal for the development is in compliance with their storm water drainage master plan. Small Commercial Developments may be permitted direct connections provided, that plans are made for "positive" control of all incoming water flows (by valve, pump, or other acceptable means). Engineering calculations are required indicating flow rate and projected volume. City or County engineers must confirm conveyance capacity within conveyance and receiving channels.

(36) 3-27-1990; All development plans shall contain the following statement, "District has adopted time limits limiting the period of its approval should the landowner/developer fail to substantially complete his development/project in a timely manner and as per approved plans. Unless otherwise noted, these time limits are equal to those utilized by the governmental agency or institution responsible for development approvals. Should the time limits

be exceeded, District reserves the right to then apply any of its current development standards and requirements."

(37) 8-14-1990; Standard Agreements shall not be modified.

(38) 9-25-1990; Established a policy regarding development of lands within the District which requires proposers to install RGRCF in place of open canals (50 cfs or smaller) and in place of CIPCF. Open canals of a capacity in excess of 50 cfs may remain as an open channel, however the developer must reline the canal and provide access roads along the full length of the facility. All new or modified installations require a hydraulic analysis of the receiving or impacted District facility to assure that capacity exists without the imposition of additional head pressure on the facility. This policy also provides for a conditional and limited contribution by the District toward improvement of its facilities when same are solely utilized for irrigation purposes.

(39) 4-23-1991; Board specified that, as relates to the District's Developers Agreement and its Temporary Construction Permits, the "designated representative" shall be the District's General Manager, Assistant General Manager, or District Engineer.

(40) 6-11-1991; Adopted a new Structure Application and Agreement and a new Structure Permit (for standard irrigation installations). Adopted a policy relating to the administration of same. Adopted a policy and fee schedule applicable to services provided for special interests.

(41) 6-25-1991; Adopted a standard operating procedure to resolve situations of noncompliance, wherein staff is directed to notify non-conformers to comply with District requirements and the terms and conditions of its Developers Agreement and in such situations if the nonconformance continues for its attorneys to seek an injunction prior to start of construction.

In this regard, reference is made to the authority of the District in making requirements related to development and use of its easements as provided under the California Irrigation District Law (Water Code Section 20500 et seq.), which states in part that "each district has the power generally to perform all acts necessary to carry out fully the provisions of the Irrigation District Law". Water Code Section 22225 states "a district may do any act in order to put to any beneficial use any water under its control". Water Code Section 22076 states "a district may acquire by any means any "property" or interest in property to carry out its purposes, including property for the construction, improvement, and operation of "works" in this State and "works" by which land has been or may be supplied with water for irrigation. Water Code Section 20530 states "conduits", includes "canals, laterals, ditches, flumes, pipes, and their appurtenances". Water Code Section 20531 states "property" includes all real property. Water Code Section 20529 states "the interest in land which an easement constitutes is real property and itself may be held in fee simple." (Johnson v. Ocean Shore Railroad Co. (1971) 16 Cal App. 3d 429, 434.) states "a district may in its name take conveyances, leases, contracts, or other assurances for

all property acquired by it". (Water Code Section 22436.)

The foregoing statutes establish the District's right to hold title in its own name to easements for canals and pipelines and to perform the necessary acts to assure that these canals and pipelines carry out their purpose of distributing irrigation water for beneficial use within the District. These statutes implicitly authorize the District to establish rules and policies to protect against interference with the District's easement rights. The Board of Directors has established general rules to protect the District's easement rights from interference that generally occurs when the overlying property is developed for (agricultural) residential, commercial, or industrial purposes.

Further, the courts have on many occasions held that property owners along and adjacent to a district pipeline do not have the right to subdivide or develop their property and to install streets for public travel across the pipeline without incurring liability for interference with the exercise of the easement or for damage that may come to the pipeline through the passing of traffic over it. (Board of Dir. Turlock Irr. Dist. v. Fair (1954) 128 Cal. App. 2d 833, 835-836; Bd. Dir. Turlock Irr. Dist. v. City of Ceres (1953) 116 Cal. App. 2d 824, 831-832). In these instances, the courts found that the defendants had the duty to maintain, construct, and reinforce the crossings over the pipeline from traffic over the pipeline, and that the defendants would be liable for any damage to the pipeline caused by their failure to do so.

As previously noted within the introductory paragraphs to these Special Provisions, to respond to ever changing governmental regulations, improvements in technology and special site specific concerns, the District Board of Directors frequently finds it necessary to adopt new special provisions and/or to amend or clarify past actions. Subsequently, each project or development, as it comes before the Board of Directors for approval may, in addition to these Special Provisions, have added special provisions which are "site specific" in nature. These site specific special provisions will be included within the Developers Agreement or other standard District document which is used to protect the District from liability and which assures that the completion of work on IRRIGATION AND DRAINAGE WORKS is to District satisfaction.

The effect of the re-adoption of these Special Provisions and the adoption of Standard (construction) Specifications and Standard Drawings, is that they shall prevail over any previous conflicting special provision, standard drawing or specification of the District. It is further noted that the Standard Drawings are for typical installations only. Subsequently, to address site specific concerns and circumstances, developers and others will find it necessary to slightly alter the typical designs indicated on the Standard Drawings, but under no circumstance shall any alteration impair the ability of the District to properly convey water and operate its facilities, nor shall the alteration result in a final product which is of inferior quality to that specified on the Standard Drawings.



STANDARD SPECIFICATIONS

ADOPTED JULY 28, 1992



# SOUTH SAN JOAQUIN IRRIGATION DISTRICT

## DEFINITIONS

### 1-00 DEFINITION AND TERMS

#### 1-01 A.S.T.M. SPECIFICATIONS

A.S.T.M. Specifications referred to are the latest revision of the Standard Specifications of the American Society for Testing Materials.

#### 1-02 ABBREVIATIONS

AAN	American Association of Nurserymen.
AASHTO	American Association of State Highway and Transportation Officials.
AISC	American Institute of Steel Construction.
AISI	American Iron and Steel Institute.
ANSI	American National Standards Institute.
APHA	American Public Health Association
API	American Petroleum Institute.
AREA	American Railway Engineering Association.
ASME	American society of Mechanical Engineers.
ASTM	American Society for Testing and Materials.
AWG	American Wire Gage
AWPA	American Wood-Preservers' Association
AWS	American Welding Society.
AWWA	American Water Works Association
EIA	Electronic Industries Association.
IEEE	Institute of Electrical and Electronics Engineers.
NEMA	National Electrical Manufacturers Association.
UL	Underwriters; Laboratories Inc.
CF	Cubic Foot
CY	Cubic Yard
EA	Each
GAL	Gallon
LB	Pound
LF	Linear Foot
LS	Lump Sum
MFBM	Thousand Foot Board Measure
MI	Mile
MSYD	Thousand Station Yard
SQFT	Square Foot
SQYD	Square Yard
STA	Station
TAB	Tablet

1-03      ACCEPTANCE

The formal written notice of acceptance by the DISTRICT which acknowledges that all the terms and conditions of the PLANS AND DRAWINGS, these SPECIFICATIONS and those in a Developers Agreement has been completed in all respects.

1-04      BRIDGE

Any structure, which carries a utility facility, or railroad, highway, pedestrian, or other traffic, over a water course or over or under or around any obstruction.

1-05      CAL TRANS STANDARD

California Department of Transportation Standard Specifications Current Edition.

1-06      CITY

Whenever the word CITY is used, it shall be identified by the specific city involved, ie. Escalon, Ripon or Manteca and shall be understood to mean these CITY(s) acting through their duly elected or appointed officers or officials, or their authorized assistants.

1-07      CONDUIT

As used in this document, "CONDUIT" includes canal, ditch, CULVERT, pipeline, flume, water course, or other appliance for conducting water.

1-08      CONTRACT

The written agreement covering the performance of an OWNERS project and the furnishing of labor, materials, tools, and equipment in the construction of the project which has been entered into with the OWNER for construction of DRAINAGE AND IRRIGATION WORK. The CONTRACT shall include the notice to CONTRACTORS, proposal, PLANS AND DRAWINGS, specifications, special provisions and contract bonds; also any and all supplemental agreements amending or extending the project contemplated and which may be required to complete DRAINAGE AND IRRIGATION WORK in a substantial and acceptable manner.

1-09      CONTRACTOR

The individual, partnership, corporation, joint venture, or other combination thereof who has entered into a CONTRACT with the OWNER for the performance of work on the OWNERS project. The term "CONTRACTOR" means the Contractor, Sub-contractor or their authorized representatives.

1-10 COUNTY

Whenever the word "County" is used it shall be understood to mean and refer to the County of San Joaquin or Stanislaus County when work is to be performed in that county , acting by or through its duly elected or appointed officers or officials or their authorized assistants.

1-11 CULVERT

Any structure, other than a BRIDGE which provides an opening under a roadway for irrigation and drainage flows or other DISTRICT purposes.

1-12 DAYS

Unless otherwise designated, DAYS as used in the specifications will be understood to mean calendar days.

1-13 DETOUR

A temporary route for traffic around a closed portion of a road where DRAINAGE AND IRRIGATION WORKS are located.

1-14 DIRECTOR

The elected executive officer(s) of the South San Joaquin Irrigation District.

1-15 DISTRICT

Whenever the word "DISTRICT" is used it shall be understood to mean the South San Joaquin Irrigation District or S.S.J.I.D. acting by or through its duly authorized, elected or appointed officers or officials or their authorized assistants.

1-16 DRAINAGE AND IRRIGATION WORKS

All canals, ditches, culverts, pipelines, flumes or other appliances used for conducting water and any structures used to control, divert or impound the delivery of irrigation, storm, subsurface drainage, or operational spill water. This includes all related and appurtenant structures

1-17 ENGINEER

Whenever the word "Engineer" is used it shall be understood to mean the District Engineer acting directly or through his authorized assistant or representative.

1-18 FEDERAL AGENCIES

Whenever, in the SPECIFICATIONS, reference is made to any Federal agency or officer, such reference shall be deemed made to any agency or officer succeeding in accordance with law to the powers, duties, jurisdiction, and authority of the agency or officer mentioned.

1-19 GENERAL

Unless the context otherwise requires, wherever in these SPECIFICATIONS and other contract documents of the DISTRICT the following abbreviations and terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided in this Section 1-0.

1-20 LABORATORY

A pre-approved and agreed upon laboratory used to test materials, and equipment work detailed on the PLANS AND DRAWINGS.

1-21 LEGAL HOLIDAYS

Those Federal, State and other HOLIDAYS observed by the DISTRICT. A list of the HOLIDAYS observed can be obtained by contacting the DISTRICT's Payroll Department.

1-22 LIQUIDATED DAMAGES

The amount prescribed in the Developers Agreement and these SPECIFICATIONS, to be paid to the DISTRICT or to be deducted from any payments due or to become due the CONTRACTOR for each day's delay in completing the whole or any specified portion of the DRAINAGE AND IRRIGATION WORKS beyond the time allowed in the specifications or on the PLANS AND DRAWINGS.

1-23 OWNER

The term "OWNER" means the OWNER, OWNER'S, Developer or their authorized representative who have entered into a Developers Agreement with the DISTRICT or the construction of DRAINAGE AND IRRIGATION WORKS.

1-24 PIPELINE (See CONDUIT)

1-25 PLANS AND DRAWINGS

The PLANS AND DRAWINGS or reproductions thereof, which show the

location, character, dimensions, and details of the project and DRAINAGE AND IRRIGATION WORKS to be done by the OWNER or CONTRACTOR which are approved in advance by DISTRICT.

1-26      SPECIAL PROVISIONS

The SPECIAL PROVISIONS are specific clauses setting forth conditions or requirements peculiar to the construction of DRAINAGE AND IRRIGATION WORKS and supplementary to these SPECIFICATIONS.

1-27      SPECIFICATIONS

The directions, provisions and requirements contained in these SPECIFICATIONS. Whenever the term "these SPECIFICATIONS" or "these STANDARD SPECIFICATIONS" is used in this book, it means the provisions set forth in this book.

1-28      STATE

The STATE OF CALIFORNIA

1-29      STATE CONTRACT ACT

Chapter 1, Division 2 of the Public Contract Code. The provisions of this act and other applicable laws form and constitute a part of the provisions of the Developers Agreement to the same extent as if set forth therein in full.

1-30      WORK

The furnishing of all equipment, materials, supplies, and services required by the PLANS AND DRAWINGS and any and all obligations, duties, and responsibilities assigned to, or undertaken by the CONTRACTOR pursuant to his CONTRACT with the OWNER.

1-31      WORK UNIT

The WORK UNIT or WORK UNITS means those improvements and only those improvements for which the PLANS AND DRAWINGS are submitted by OWNER to DISTRICT and which is represented by OWNER to DISTRICT as a single unit of improvements to DISTRICT DRAINAGE AND IRRIGATION WORKS which are approved in advance by DISTRICT.



## 2-00 SCOPE OF WORK

### 2-01 WORK TO BE DONE

The work to be done consists of the furnishing of all labor, methods or processes, implements, tools, machinery, equipment, materials of construction and any other construction device, except as otherwise specified, which are necessary and required to construct, install and place in operation in complete order for use in the WORK UNIT more particularly described in the SPECIAL PROVISIONS of the SPECIFICATIONS and as shown on the PLANS AND DRAWINGS, and to leave the grounds in a neat condition.

### 2-02 ALTERATION IN THE WORK

2-2.1 Alterations of the work: In the event the CONTRACTOR is ordered by the OWNER or others to make omissions or alterations of any item or portion of the WORK UNIT, such omissions or alterations shall be approved in writing and in advance by the ENGINEER.

## 3-00 CONTROL OF WORK

### 3-01 SUPERVISION OF WORK

3-01-1 The WORK UNIT shall be completed under the direction of the ENGINEER and to the satisfaction of the DISTRICT. The ENGINEER may direct the order in which the work shall proceed in order to procure the best results and to protect the interests of the DISTRICT.

3-01-2 The CONTRACTOR shall at all times during the construction of the WORK UNIT be represented on the work either in person or by a foreman or other duly designated agent. Notice of any change in the foreman or designated agent shall be given to the Engineer immediately on such change.

3-01-3 Instruction given by the ENGINEER to the CONTRACTOR's foreman or agent on the WORK UNIT shall be considered as having been given to the CONTRACTOR.

### 3-02 WORKMANSHIP

3-02-1 The CONTRACTOR shall do all the work in a thorough and workmanlike manner and shall employ only competent and orderly workmen. If a subcontractor or person employed by the CONTRACTOR shall fail or refuse

to carry out the directions of the ENGINEER or shall appear to the ENGINEER to be incompetent or act in a disorderly or improper manner, he shall be discharged on the request of the ENGINEER, and such person shall not again be employed on the WORK UNIT.

### 3-03 AUTHORITY OF ENGINEER

3-03-1 The approved PLANS AND DRAWINGS shall be supplemented by such working drawings as are necessary to adequately control the work. All authorized alteration affecting the requirements and information given in the approved PLANS AND DRAWINGS shall be in writing. No changes shall be made of any PLANS AND DRAWINGS after the same have been approved by the ENGINEER, except by his direction.

3-03-2 All working drawings shall be reviewed and approved by the ENGINEER before any work involving these PLANS AND DRAWINGS is performed.

3-03-3 It is expressly understood, however, that approval by the ENGINEER of the CONTRACTOR's working drawings does not relieve the CONTRACTOR of the responsibility for accuracy or mutual agreement of dimension of details. It is mutually agreed that the CONTRACTOR shall be responsible for agreement and conformity of his working drawing with the approved PLANS AND DRAWINGS and SPECIFICATIONS.

### 3-04 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS

Finished surfaces, flow lines and other neat areas shall in all cases conform with the lines, grades, cross-sections and dimensions shown on the approved PLANS AND DRAWINGS. Deviation from the approved PLANS AND DRAWINGS as may be required by the exigencies of construction will in all cases be determined by the ENGINEER and authorized in writing or specified in the SPECIFICATIONS governing each type of work.

### 3-05 COORDINATION AND INTERPRETATION OF PLANS

3-05-1 These SPECIFICATIONS, the PLANS AND DRAWINGS, SPECIAL PROVISIONS, Developers Agreement and all supplemental documents are essential parts of the whole and the requirements occurring in one are to be understood to be as binding as though occurring in all.

3-05-2 The PLANS AND DRAWINGS are intended to be cooperative and to describe and to describe and provide for a complete and functional end product. The PLANS AND DRAWINGS shall govern over SPECIFICATIONS. In the event of any discrepancy between any drawings and figures written thereon, the figures shall be taken as correct.

3-05-3 These SPECIFICATIONS are intended to be self-explanatory, but should it appear that the work to be done or any matters relative thereto are not sufficiently detailed or explained in these SPECIFICATIONS, the SPECIAL PROVISIONS the Specifications of other appropriate governing body or the PLANS AND DRAWINGS, the CONTRACTOR shall apply to the ENGINEER for further explanation. Should any doubt or controversy arise as to the meaning or interpretation of any provisions of the specifications the matter shall be referred to the ENGINEER for decision. Whenever any error or omissions are discovered, remedial instruction will always be given.

### 3-06 INSPECTION

The Engineer or his authorized representative shall at all times have access to the work during construction and shall be furnished with every reasonable facility for ascertaining that the materials, supplies and equipment used and employed and the workmanship are in accordance with the requirements and intent of these specifications. All work done and all materials used shall be subject to the Engineer's inspection and approval.

### 3-07 DEFECTIVE OR UNAUTHORIZED WORK OR MATERIALS

3-07-1 The inspection of the work shall not relieve the CONTRACTOR of any of his obligations to fulfill his contract as prescribed, and defective work shall be made good and unsuitable materials may be rejected notwithstanding that such defective work and materials have been previously overlooked by the ENGINEER.

3-07-2 Any work or material that may be found not to comply with the SPECIFICATIONS at any time previous to the final acceptance of the completed work shall be corrected or replaced by the CONTRACTOR upon the order of the ENGINEER in such manner as to comply with the SPECIFICATIONS.

### 3-08 EQUIPMENT AND MATERIALS

3-8-01 Equipment not suitable to produce the quality of work required will not be permitted to operate on the WORK UNIT. The CONTRACTOR shall provide adequate and suitable equipment and plant facilities to meet the requirements of the SPECIFICATIONS and when ordered by the ENGINEER, the CONTRACTOR shall remove unsuitable equipment from the WORK UNIT.

3-8-02 All materials and equipment not conforming to the requirements of the SPECIFICATIONS shall be considered as defective and all such materials and equipment whether in place or not, will be rejected. All materials shall

be removed immediately from the site of the work unless otherwise specifically permitted by the ENGINEER. No rejected material or equipment, the defects of which have subsequently been corrected shall be used until specific approval in writing has been given by the Engineer.

3-8-03 Whenever a Manufacturer's or trade name is used to specify material or equipment it shall be understood that such trade name is used to establish a standard of quality or performance and is not intended to be restrictive. The Contractor shall not, however, furnish or install any substitute materials or equipment except upon written order of the Engineer and any costs involved or structural changes required to allow the use of such substitute material or equipment shall be made and the cost thereof borne by the Contractor and shall not be the basis for any claim or claims for extra work or compensation

### 3-09 FINAL INSPECTION

Whenever the work provided and contemplated by the SPECIFICATIONS and the PLANS AND DRAWINGS shall have been satisfactorily completed and the final cleaning up performed, and the ENGINEER notified in writing, the ENGINEER or his representative will make the final inspection. Notice of acceptance for the project shall not be issued by the DISTRICT until this is completed and "As Built" Drawings are furnished to the ENGINEER.

## 4-00 LEGAL RELATION

### 4-01 APPLICABLE LAWS

4-01-1 The CONTRACTOR shall keep himself fully informed of all existing laws and all future national, state or local laws and municipal ordinances and regulations which in any manner affect those engaged in or employed on the project, or the materials used or which in any way affect the conduct of the work and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the project.

4-01-2 The CONTRACTOR shall at all time comply with and cause all of his subcontractors and employees to comply with the terms and conditions of the Developer Agreement entered into between the OWNER and DISTRICT and with all such existing and future laws, ordinances, regulations, orders and decrees and shall protect and indemnify the DISTRICT, the ENGINEER and all of their employees against any claims or liability arising from or based on the violation of any regulation or decree whether by himself or his employee.

4-01-3 If any discrepancy or inconsistency is discovered in the PLANS AND DRAWINGS OR SPECIFICATIONS for the WORK UNIT in relation to any such laws, regulation, ordinance, order or decree, the CONTRACTOR shall report the same to the ENGINEER in writing and remedial instruction will be issued.

#### 4-02 HOURS OF LABOR

The CONTRACTOR shall forfeit, as penalty to the DISTRICT, Twenty-five dollars (\$25.00) for each workman employed in the completion of the WORK UNIT covered by approved PLANS AND DRAWINGS and these SPECIFICATIONS by him or by any subcontractor under him for each calendar day during which any workman is required or permitted to labor more than eight (8) hours in violation of the provisions of the State Labor Code, and in particular, Section 1815 thereof, inclusive, except that work performed by employees of CONTRACTOR'S in excess of eight (8) hours per day, and forty (40) hours during any one week, shall be permitted upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay, as provided in said Section 1815.

#### 4-03 LABOR DISCRIMINATION

Attention is directed to Section 1735 of the State Labor Code, which reads as follows:

"No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons, except as provided in Section 1420, and every CONTRACTOR for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

#### 4-04 PREVAILING WAGE

The CONTRACTOR shall forfeit as penalty to the DISTRICT, Twenty-five dollars (\$25.00) for each calendar day or portion thereof, for each workman paid less than the stipulated prevailing rates for any work done under the contract by him or by any subcontractor under him, in violation of the provisions of the State Labor Code, in particular, Section 1770 to Section 1780 thereof, inclusive. The difference between such stipulated prevailing wage rates and the amount paid to each workman for each calendar day or portion thereof for which each workman was paid less than the prevailing wage rate shall be paid to each workman by the CONTRACTOR, pursuant to Section 1775 of the State Labor Code.

#### 4-05 REGISTRATION OF CONTRACTORS

CONTRACTOR'S shall be licensed in accordance with the provisions of the State Act entitled, "An act providing for registration of contractors," and defining the term CONTRACTOR; providing a method of obtaining licenses to engage in the business of contracting; and fixing the fees for such licenses; and prescribing the punishment for violation of the provisions of the act., codified as Chapter 9 Division III of the Business and Professions Code, Chapter 37 of the Statutes of 1939, as amended.

#### 4-06 APPRENTICE



In accordance with the provisions of Section 1777.5 and 1777.6 of the State Labor Code and in accordance with the regulations of the California Apprenticeship Council, properly indentured apprentices may be employed in the prosecution of the work. Information relative to number of apprentices, identifications, wages, hours of employment and standards of working conditions shall be obtained from the Director of Industrial Relations or the Division of Apprenticeship Standards and its branch offices.

#### 4-07 PERMITS AND LICENSES

The CONTRACTOR shall procure all permits and licenses required for the work, shall pay for all charges and fees required and shall give all notices necessary or incident to the lawful prosecution of the work.

#### 4-08 PATENT CLAIMS

Patent fees or charges upon any patented article, material, method, process or device used on or incorporated in the work shall be paid by the CONTRACTOR and the CONTRACTOR expressly agrees to hold the DISTRICT and its employees harmless against any suit of law which may be brought for infringement of patents on all such articles or processes he may use in the work.

#### 4-09 SANITARY AND SAFETY CONDITIONS

4-09-1 The CONTRACTOR shall comply with the provisions of all State and Local Sanitary Statutes, laws and regulations and shall see that proper precautions with reference thereto are observed by his workmen.

4-09-2 All of the work shall be conducted in accordance with the latest approved Construction Safety Orders of the State of California Department of Industrial Relations.

#### 4-10 PUBLIC CONVENIENCE

The CONTRACTOR shall furnish, erect and maintain such fences, barriers, lights, signs and other public safety guards as are necessary to give adequate warning to the public at all times that the work is under construction and of any dangerous conditions to be encountered. The CONTRACTOR shall station such guards as may be necessary to prevent accident and avoid damage or injury to the public.

The provisions of Section 7-1.08 of the California Standard Specifications shall apply with regard to convenience of the public and public traffic in connection with his operations. All driveways shall be made usable and accessible as determined by the ENGINEER by suitable earth or rock ramps each night or at the end of the work day.

#### 4-11 USE OF EXPLOSIVES

The use of explosives by the CONTRACTOR in the work will be permitted only with the written consent of the ENGINEER. When the use of explosives is necessary and authorized by the ENGINEER, the CONTRACTOR shall use the utmost care not to damage life or property. All explosives shall be stored and handled in strict accordance with the latest State and Local Statutes, laws and regulation governing the storage and/or use of explosives.

#### 4-12 PRESERVATION OF PROPERTY

4-12.1 The CONTRACTOR shall conduct his operation in connection with the work either on the site, adjacent to the site or off the site, in such a manner as to avoid injury or damage to property, improvements or facilities. The CONTRACTOR shall provide and install suitable safeguards, approved by the ENGINEER, to protect such property and improvements. If such property or improvements are injured as a result of the CONTRACTOR's operations, they shall be restored, at the CONTRACTOR's expense, to a condition as good as when the CONTRACTOR entered upon the work.

4-12.2 The CONTRACTOR shall examine all bridges, culverts, pipelines and other structures over which he intends to move his materials or equipment and before using them he shall properly strengthen and protect such structure, where necessary. The CONTRACTOR will be held responsible for any damage or injury to such structure caused by reason of his operation.

4-12.3 The fact that any pipe, cable, conduit or any other underground facility is not shown upon the plans shall not relieve the CONTRACTOR of his responsibility to ascertain the existence of any underground improvements or facilities which may be subject to damage by his operation and to take necessary measures to protect such facilities. Such omissions from PLANS AND DRAWINGS shall not relieve the CONTRACTOR of his responsibility under this article.

#### 4-13 RESPONSIBILITY OF DAMAGES

4-13.1 The DISTRICT or the ENGINEER shall not be answerable or accountable in any manner, for any loss or damage that may happen to the work or any part thereof, or for any of the materials or other things used or employed in performing the work; or for injury to any person or persons either workmen or the public or for damage to property from any cause.

4-13.2 The CONTRACTOR shall be responsible for any liability imposed by law for any damage to any person or property resulting from defects or obstruction or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance, and shall indemnify and save harmless, the DISTRICT, the ENGINEER, and their employees from all suits or actions of every nature and description brought for, or on

account of any injuries or damages received or sustained by any person or persons, by or from the CONTRACTOR, his servants, or agents in the construction of the work.

#### 4-14 DISPOSAL OF MATERIALS

Unless otherwise provided in the Developers Agreement, the CONTRACTOR shall make his own arrangements for the disposal of refuse material, debris and all other material to be disposed of outside the limits of the work and shall pay all charges involved in the disposal of materials. Where permission or permit for disposal of materials is required the CONTRACTOR shall first obtain such permission or permit in writing and file copies of such permits with the ENGINEER.

#### 4-15 COOPERATION BETWEEN CONTRACTORS

Where two or more CONTRACTORS are employed on related or adjacent work, each shall conduct his operation in such a manner as to not cause any unnecessary delay, damage or hindrance to the other. Each CONTRACTOR shall be responsible to the other for all damages to the work, to persons or property or for loss caused by failure to finish the work within the time specified for completion.

#### 4-16 CONTRACTOR'S RESPONSIBILITY

4-16.1 Until the formal acceptance of the work by the DISTRICT, the CONTRACTOR shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other causes, whether arising from the execution or from non-execution of the WORK UNIT. The CONTRACTOR shall rebuild, repair, restore and make good all injuries or damages to any portions of the WORK UNIT resulting from any of the above causes before its completion and acceptance and shall bear the entire expense thereof except for such injuries or damages as are directed or approximately caused by acts of the Federal Government or the public enemy.

4-16.2 In the event of suspension of the work for any cause whatever, the CONTRACTOR shall be responsible for the work as above specified and shall at his own expense take whatever action necessary to protect the work during any period of suspension of the work.

#### 4-17 PERSONAL LIABILITY

Neither the DISTRICT, the ENGINEER, nor any other officer or authorized assistants or employees of the DISTRICT shall be personally responsible for any liability arising from the prosecution of the work.

#### 4-18 INDEMNITY AND RELEASE

CONTRACTOR and OWNER, their heirs, and the successors and assigns of each shall release and indemnify and hold harmless DISTRICT, its Directors, officers, agents, attorneys, consultants, and employees of and from all claims, demands, damages or injuries of any kind or character whatsoever to any person or persons, lands, trees or improvements from any cause whatsoever occurring upon the work, resulting from the construction, reconstruction, maintenance, inspection and operations of DISTRICT, including but not limited to those caused by water conveyance, leakage, seepage, settlement, or overflow from DISTRICT facilities. Further, each shall (i) indemnify and hold harmless and (ii) release the DISTRICT, its Directors, officers, agents attorneys, consultants and employees, of and from any and all loss, damage, claims demands, actions, causes of action penalties, costs and expenses of whatever nature, including court costs and attorney's fees, which may result from injury to or death of any persons whomsoever including, but not by way of limitation, officers, agents and employees of the DISTRICT, or any other person or against and from damages to or loss or destruction of property whatsoever including, but not by way of limitation, damage to the levees, canals, pipelines and appurtenant facilities of each, and equipment or other property of the DISTRICT in its care or custody, when such injury, death, loss, destruction or damage is due to or arises because of the prosecution of any work within DISTRICT easements or fee-owned property, The required release and indemnity shall be effective notwithstanding any assertion that the DISTRICT or others indemnified and released were themselves negligent and that such negligence was a contributing cause of the damage or loss claimed.

## 5-0 PROSECUTION AND PROGRESS OF THE WORK

### 5-01 SUBCONTRACTING

5-01.1 No subcontractor will be recognized as such and all persons engaged in the work of construction will be considered as employees of the CONTRACTOR and he will be held responsible for their work which shall all be done in strict accordance with the provisions of the PLANS AND DRAWINGS, SPECIFICATIONS AND SPECIAL PROVISIONS.

### 5-02 RIGHT TO ASSURE COMPLETION

5-02.1 If at any time the progress made by the CONTRACTOR or any of the work described herein and the equipment and/or labor furnished by the CONTRACTOR for said work shall in the judgement of the ENGINEER be insufficient to give reasonable assurance of the completion of the WORK UNIT within the allotted time frame, the ENGINEER may notify the CONTRACTOR in writing to provide such additional equipment and/or labor as may be specified in such notice as may be necessary to give reasonable assurance of the completion of the WORK UNIT within the allotted time frame; and if the CONTRACTOR shall not comply with the terms of said notice within one (1) day after the delivery thereof to him or his

foreman or agent on the WORK UNIT, then the DISTRICT may employ and pay for such additional labor and/or equipment as in the judgement of the ENGINEER may be necessary to give reasonable assurance of the completion of the WORK UNIT within the allotted time frame and the cost thereof shall be charged to the CONTRACTOR, who shall be liable to the DISTRICT therefore.

5-02.2 If the ENGINEER shall not give such notice, or if, after such notice has been given, the DISTRICT shall not employ additional labor and/or equipment, the CONTRACTOR and his sureties shall nevertheless be held to full liability for any failure to perform his CONTRACT with the OWNER.

#### 5-03 SUSPENSION OF WORK

5-03.1 The ENGINEER shall have the authority to suspend work on the WORK UNIT wholly or in part, for such periods as he deems necessary due to unsuitable weather or to such other conditions as are considered unfavorable for the suitable prosecution of the work or for such time as he deems necessary due to the failure of the CONTRACTOR to carry out orders given.

5-03.2 The CONTRACTOR shall immediately comply with the written order of the ENGINEER to suspend the work wholly or in part, and the work shall be resumed when conditions are favorable and methods corrected as ordered or approved in writing by the ENGINEER.

#### 5-04 TIME OF COMPLETION - LIQUIDATED DAMAGES

5-04.1 The CONTRACTOR shall complete the work called for under the PLANS AND DRAWINGS within the time limit specified thereon or as otherwise required by the ENGINEER or such authorized and approved extension thereof.

5-04.2 Should the CONTRACTOR fail to complete the WORK UNIT within the time frame designated by the ENGINEER or such extensions thereof as may be granted, a deduction of one thousand dollars (\$1000.00) a day will be assessed the CONTRACTOR for each and every day or fraction thereof, that the WORK UNIT remains uncompleted after the date set for its completion.

5-04.3 The amount stated in Paragraph 5-04.2 has been determined by the DISTRICT as liquidated damages for the loss to the DISTRICT for not being able to utilize and enjoy the benefits of the completed WORK UNIT and also due to the additional expense for the employment of the Engineers, Inspectors, and other personnel by the DISTRICT on the WORK UNIT. The said amounts will be deducted from any monies due the CONTRACTOR under his CONTRACT with the OWNER and the OWNER, CONTRACTOR and their sureties shall be liable to the DISTRICT for any excess.



## 6-0 CERTIFICATES OF COMPLIANCE

A Certificate of Compliance may be required for certain materials and equipment which become final products of the completed WORK UNIT. Certificates of Compliance shall be furnished prior to the use of any materials for which these SPECIFICATIONS or the SPECIAL PROVISIONS require that such a certificate be furnished. In addition, when so authorized in these SPECIFICATIONS or in the SPECIAL PROVISIONS, the ENGINEER may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The Certificate shall be assigned by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the SPECIFICATIONS. A Certificate of Compliance shall be furnished with each lot of material delivered to the WORK UNIT and the lot so certified shall be clearly identified in the certificate.

All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the CONTRACTOR of responsibility for incorporating material in the WORK UNIT which conforms to the requirements of the PLANS AND DRAWINGS and SPECIFICATIONS and any such material not conforming to such requirements will be subject to rejection whether in place or not.

The DISTRICT reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

The form of the Certificate of Compliance and its disposition shall be as directed by the ENGINEER.

## 7-0 BONDS

### 7-1 LABOR AND MATERIAL BOND

A Labor and Material Bond in the amount of one hundred percent (100%) of the estimated cost of the WORK UNIT shall be executed by the OWNER in favor of the DISTRICT, which bond shall be submitted with the executed Developers Agreement.

### 7-2 FAITHFUL PERFORMANCE BOND

A bond for the faithful performance of the WORK UNIT as covered by the Developers Agreement in the amount of one hundred percent (100%) of the total estimated cost of the WORK UNIT shall be executed by the OWNER in favor of the DISTRICT which bond shall be submitted prior to commencement of work on the WORK UNIT.

### 7-3 MAINTENANCE BOND

Upon completion of the WORK UNIT and prior to acceptance of the WORK UNIT by the DISTRICT, the OWNER, shall provide a Maintenance Bond to the DISTRICT guaranteeing the workmanship, materials of construction and operation of equipment and WORK UNIT for a period of one (1) year. The amount of the bond shall be in an amount determined by the ENGINEER.

## 8-0 PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

### 8-1 ADDITIONAL INSURED

The CONTRACTOR shall take out and maintain during the life of the CONTRACT, Comprehensive Public Liability, Property Damage and Builders Risk "All Risk" Insurance, in which the DISTRICT and the ENGINEER shall be named as an additional insured, which will protect the CONTRACTOR, any and all subcontractors, the DISTRICT and the ENGINEER and their agents or representatives, against any claims for personal injury, including accidental death as well as from the operation of the CONTRACTOR, whether such operation shall have been performed by the CONTRACTOR, any Subcontractor, or by anyone employed either directly or indirectly by any of them.

### 8-2 LIMITS OF INSURANCE

The Comprehensive Public Liability and Property Damage Insurance shall be provided with the limits not less than the following:

(1) Limit of liability for injury or accidental death

One person	\$ 500,000.00
One accident	\$1,000,000.00

(2) Limit of liability for property damage

One accident - \$2,000,000.00	Aggregate
liability for loss- \$5,000,000.00	

### 8-3 CERTIFICATES OF INSURANCE

The CONTRACTOR shall furnish the DISTRICT with satisfactory proof of the carrying of the required insurance by submitting certifications or policies of insurance to the ENGINEER, prior to the commencement of any work under the CONTRACT.

## 9-0 COMPENSATION INSURANCE

### 9-1 CAL OSHA REQUIREMENTS

All Provisions of the California Occupational Safety and Health Act of 1973 (CAL OSHA) as amended, shall be adhered to.

## 9-2 LABOR CODE

In all operations connected with the WORK UNIT, the CONTRACTOR shall observe the provisions of the Labor Code, Statutes of 1937, Chapter 90 enacted by the California State Legislature, and all amendments as enacted by the State Legislature to said Code. The CONTRACTOR will be liable for any accidents or injuries to employees engaged in the work herein specified.

## 9-3 LIABILITY

The CONTRACTOR shall, previous to the commencement of any work on the WORK UNIT, take out and maintain in full force and effect, -compensation insurance covering his full liability for compensation to any person or persons employed or the dependents thereof who may be injured in carrying out the work on the WORK UNIT.

## 10-0 DUST CONTROL

### 10-0.1 DESCRIPTION

This work shall consist of applying either water or dust palliative, or both, for the alleviation or prevention of dust nuisance.

Dust resulting from the CONTRACTOR's performance of the work, either inside or outside the right of way of DISTRICT, shall be controlled by the CONTRACTOR. Dust control requirements can be altered by the ENGINEER as deemed necessary or prudent if current measures taken are not effective.

It is understood that the provisions in Section 10, "Dust Control," will not prevent the CONTRACTOR from applying water or dust palliative for his convenience if he so desires.

### 10-0.2 APPLICATION

Water shall be applied and dust palliative shall conform to and be applied as provided in these SPECIFICATIONS.

## 11-0 EXISTING FACILITIES

### 11-1 PRESERVATION OF PROPERTY

All existing facilities and structures, whether some are existing DISTRICT IRRIGATION AND DRAINAGE WORKS or belong to others are to remain in-place, shall remain unharmed, undamaged, and not altered in anyway unless otherwise specified, or as directed in the SPECIAL PROVISIONS or the Developers Agreement.

The CONTRACTOR will be held responsible for the maintenance, protection and damage

to existing facilities, structures, or obstructions shown on the PLANS AND DRAWINGS.

If such objects are damaged by reason of the CONTRACTOR's operations, they shall be replaced or restored at the CONTRACTOR's expense.

The fact that any underground facility is not shown on the PLANS AND DRAWINGS shall not relieve the CONTRACTOR of his responsibility.

The CONTRACTOR shall verify locations of all existing underground utilities and shall contact the respective utility companies forty-eight (48) hours prior to commencement of work (via Underground Service Alert #1-800-642-2444).

The CONTRACTOR is responsible for coordination of the removal or relocation of all existing utilities with the respective utility companies.

## 12-0 CLEARING AND GRUBBING

### 12-1 DESCRIPTION

This work shall consist of removing all objectionable material from within DISTRICT right of way, DISTRICT construction sites, material sites within DISTRICT right of way, areas through which IRRIGATION AND DRAINAGE WORKS are to be excavated, and such other areas as may be specified in the SPECIAL PROVISIONS. Clearing and grubbing shall be performed in advance of grading operations and in accordance with the requirements specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

### 12-2 PRESERVATION OF PROPERTY

Existing DISTRICT IRRIGATION AND DRAINAGE WORKS, adjacent property, utility and non-DISTRICT facilities, and trees and plants that are not to be removed, shall be protected from injury or damage resulting from the CONTRACTOR's operations.

Only trees and plants that are designated or marked for removal by the ENGINEER shall be removed.

### 12-3 CONSTRUCTION

The area above the natural ground surface shall be cleared of all vegetable growth, such as trees, logs, upturned stumps, roots of down trees, brush, grass, weeds, and all other objectionable material including concrete or masonry.

Within the limits of clearing, the areas below the natural ground surface, except in embankment areas where the grading plane is 2 feet or more above the natural ground, shall be grubbed to a depth necessary to remove all stumps, roots, buried logs, and all other objectionable material. Such objectionable material shall not be left in or under embankments or dikes.

All trees, existing stumps and roots within embankment areas where the grading plane is 2 feet or more above the natural ground shall be cut off not more than one foot above the natural ground at any point, or completely removed where a structure is to be constructed as determined in the approved PLANS AND DRAWINGS and/or Developers Agreement.

Where the construction is to be performed through orchard, vineyard and other cultivated areas, such orchard trees, vines and other vegetable growth shall not be removed from the right of way area unless otherwise indicated on the PLANS AND DRAWINGS or directed by the ENGINEER.

Unless otherwise specified within the SPECIAL PROVISIONS or directed by the ENGINEER shade and ornamental trees and plants shall be preserved, and such trees and plants shall be fully protected from injury by the CONTRACTOR at his expense. When required trees shall be felled in such a manner as not to injure standing trees, plants, and improvements which are to be preserved.

Tree branches extending over the right of way and which hang within 20 feet of finished grade shall be cut off close to the boles in a workmanlike manner. In connection with the removal of tree branches that extend over the new or widened roadway, the CONTRACTOR shall remove other tree branches under the direction of the ENGINEER, in such a manner that the tree will present a balanced appearance. Scars resulting from the removal of branches shall be treated with a heavy coat of an approved tree paint.

#### 12-4 REMOVAL AND DISPOSAL OF MATERIALS

All materials removed shall be disposed of in an appropriate manner, in an approved disposal location, and in strict accordance to all COUNTY, STATE, or federal regulations and laws. Any liability associated with the removal and disposal of materials shall rest solely with the OWNERS CONTRACTOR, individual, or company.

The construction site and adjacent areas shall be left with a neat and finished appearance.

### 13-0 EARTHWORK

#### 13-0.1 DESCRIPTION

This work shall consist of performing all necessary grading operations.

#### 13-0.2 GRADE TOLERANCE

Immediately prior to placing subsequent layers of material thereon, the grading plane shall conform to of the following:

When aggregate base is to be placed on the grading plane, the grading plane shall not vary above or more than 0.1 foot below the grade established by the ENGINEER.

### 13-1 UNSUITABLE MATERIAL

Material below the natural ground surface in embankment areas, and material below the grading plane in excavation areas, that is determined by the ENGINEER to be unsuitable for the planned use, shall be excavated and disposed of or stabilized as directed or approved by the ENGINEER.

When unsuitable material is removed and disposed of the resulting hole shall be filled with material suitable for the planned use. Such suitable material shall be placed and compacted in layers as hereinafter specified for constructing embankments.

Excess material from excavation work which is not used for embankment construction shall become the property of the OWNER and shall be disposed of by him at his expense, unless directed otherwise by the ENGINEER.

### 13-2 INSPECTION

In order to determine the character of foundation material, the CONTRACTOR shall, if directed by the ENGINEER, dig test pits and make test borings and foundation bearing tests.

Whenever any structure excavation is completed substantially to grade, the CONTRACTOR shall notify the ENGINEER who will make an inspection of the foundation. No concrete or masonry shall be placed until the foundation has been approved by the ENGINEER.

#### 13-2.1 STRUCTURE BACKFILL

All Backfill operations impacting IRRIGATION AND DRAINAGE WORKS, control structures, head walls, valve structures, CONDUITS, PIPELINES, or other DISTRICT structures shall be done as follows unless otherwise directed or specified by the ENGINEER:

Backfill material shall be of the same or similar kind of material as was removed. This material shall be distributed uniformly around all parts of the structure. The bottom portion of the backfill shall be placed and thoroughly tamped equally on all sides of the structure in equal depths which shall not exceed 1211 of uncompacted material. Flooding with water is not permitted. The backfill shall be of a relative compaction equal to that of the undisturbed soil adjacent to the areas to be backfilled.

### 13-3 RELATIVE COMPACTION

Relative compaction within DISTRICT right of way shall not normally exceed 90 percent. The ENGINEER shall determine any appropriate deviation of the relative compaction requirement and may set depth of compaction requirements as deemed necessary to protect DISTRICT, STATE, CITY and COUNTY interests.

### 14-0 CONCRETE STRUCTURES

#### 14-0.1 DESCRIPTION

This work shall consist of constructing IRRIGATION AND DRAINAGE WORKS and all

other types of Portland cement concrete structures to the lines and grades established by the ENGINEER and in accordance with the designs and details shown on the PLANS AND DRAWINGS and as specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

This work shall include construction of minor structures of cast-in-place concrete or of precast concrete members using either unreinforced, reinforced or prestressed concrete or any combination thereof.

The work involved in precast concrete members shall include the other structural members of precast concrete and shall also include the placing of all precast concrete members, except piling which shall be placed as provided in Section 49, "Piling" of CALTRANS STANDARD.

Concrete shall conform to the provisions in Section titled "Concrete Specifications."

#### 14-0.2 MINOR STRUCTURES

Miscellaneous concrete structures that are identified on the PLANS AND DRAWINGS or in the SPECIAL PROVISIONS as minor structures shall be constructed of minor concrete or of concrete of the class designated there on.

Metal frames and covers or frames and grates and other miscellaneous iron and steel for use with minor structures shall conform to the provisions in Section titled "Miscellaneous Iron and Steel" of these SPECIFICATIONS.

Minor structures, at the option of the CONTRACTOR, may be furnished and installed as precast units, or the units may be combined precast and cast-in-place structures, provided the structures in place substantially conform to cast-in-place construction as specified in these SPECIFICATIONS. Precast units for inlets may be round, oval, or rectangular in horizontal cross section or any combination of these. Means shall be provided for adjustments in the field to meet final grade, paving or surfacing.

#### 14-0.3 DEPTH OF FOOTINGS

The elevations of the bottoms of footings shown on the PLANS AND DRAWINGS shall be considered as approximate only and the ENGINEER may order, in writing, such changes in dimensions or elevations of footings as may be necessary to secure a satisfactory foundation.

#### 14-0.4 PUMPING

#### 14-0.5 FORMS

Pumping from the interior of any foundation enclosure shall be done in such manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete, or for a period of at least 24 hours thereafter, unless it be done from a suitable sump separated from the concrete work.

Concrete forms shall be mortar-tight, true to the dimensions, lines, and grades of the structure, and of sufficient strength to prevent appreciable deflection during the placing of the concrete.

The inside surfaces of forms shall be cleaned of all dirt, mortar and foreign material. Forms which will later be removed shall be thoroughly coated with form oil prior to use. The form oil shall be a commercial quality form oil or other equivalent coating which will permit the ready release of the forms and will not discolor the concrete.

Concrete shall not be deposited in the forms until all work connected with constructing the forms has been completed, all reinforcing and materials required to be embedded in the concrete have been placed for the unit to be poured, and the ENGINEER has inspected the embedded materials. Such work shall include the removal of all dirt, chips, sawdust, water and other foreign material from the forms.

The rate of depositing concrete in forms shall be controlled to prevent deflections of the forms or form panels in excess of the deflections permitted by these SPECIFICATIONS.

Forms for all concrete surfaces shall conform to the requirements herein for forms for exposed surfaces.

Prior to the use of each forming system to be used for exposed surfaces and when requested by the ENGINEER, the CONTRACTOR shall furnish form design and materials data to the ENGINEER for approval.

Forms for exposed concrete surfaces shall be designed and constructed so that the formed surface of the concrete does not undulate excessively in any direction between studs, joists, form stiffeners, form fasteners, or wales. Undulations exceeding either  $3/32$  inch or  $1/270$  of the center to center distance between studs, joists, form stiffeners, form fasteners or wales will be considered to be excessive. Should any form or forming system, even though previously approved for use, produce a concrete surface with excessive undulations, its use shall be discontinued until modifications satisfactory to the ENGINEER have been made. Portions of concrete structures with surface undulations in excess of the limits herein may be rejected by the ENGINEER.

All exposed surfaces of each element of a concrete structure shall be formed with the same forming material or with materials which produce similar concrete surface textures, color and appearance.

Forms for exposed surfaces shall be faced with form panels. A form panel shall be considered to be the continuous section of form facing material, unbroken by joint marks, against which the concrete is placed.

Form panels for exposed surfaces shall be plywood conforming to or exceeding the requirements of U.S. Product Standard PS 1 for Exterior B-B (Concrete Form) Class I Plywood or any material other than plywood which will produce a smooth uniform concrete surface substantially equal to that which would result from the use of such plywood. Only



form panels in good condition free of defects, such as scars, dents or de-laminations, shall be used for exposed surfaces.

Form panels shall be arranged in symmetrical patterns conforming to the general lines of the structure. Except when otherwise provided herein or shown on the PLANS AND DRAWINGS and SPECIFICATIONS, panels for vertical surfaces shall be placed with the long dimension horizontal and with horizontal joints level and continuous. For walls with sloping footings which do not abut other walls, panels may be placed with the long dimension parallel to the footing. Form panels on each side of the panel joint shall be precisely aligned, by means of supports or fasteners common to both panels, to result in a continuous unbroken concrete plane surface.

Forms for exposed surfaces shall be constructed with triangular fillets not less than 3/4" by 3/4" attached so as to prevent mortar runs and to produce smooth straight chamfers at all sharp edges of the concrete.

Form fasteners consisting of form bolts, clamps or other devices shall be used as necessary to prevent spreading of the forms during concrete placement. The use of ties consisting of twisted wire loops to hold forms in position will not be permitted.

Anchor devices may be cast into the concrete for later use in supporting forms or for lifting precast members. The use of driven types of anchorages for fastening forms or form supports to concrete will not be permitted.

Form fasteners and anchors shall be of such types that they can be removed as required for form bolts without chipping, spalling, heating or otherwise damaging the concrete surface.

All forms shall be removed, shall not be buried, and shall not be left on or within DISTRICT right of way.

Forms for IRRIGATION AND DRAINAGE WORKS may be constructed of any suitable material that will produce a structure with the inside dimensions and at least the wall thicknesses shown on the PLANS AND DRAWINGS. Undulations of finished wall surfaces shall not exceed 0.5-inch.

The removal of forms which do not support the dead load of concrete members, other than railings and barriers, shall not begin until at least 24 hours after the concrete for the member has been placed and until the concrete has sufficient strength to prevent damage to the surface.

Forms for railings or barriers may be removed at the convenience of the CONTRACTOR after the concrete has hardened. The concrete surfaces exposed by removing forms shall be protected from damage.

The CONTRACTOR shall be responsible for designing and constructing safe and adequate form-work which provides the necessary rigidity, supports the loads imposed, and produces in the finished structure the lines and grades indicated on the PLANS AND DRAWINGS.

Approval by the ENGINEER of the form work working drawings or form-work inspection performed by the ENGINEER will in no way relieve the CONTRACTOR of full responsibility for the form-work.

#### 14-0.6 FORM-WORK DESIGN AND DRAWINGS

The CONTRACTOR shall submit to the ENGINEER working drawings and design calculations for form-work proposed for use on structures to be constructed within DISTRICT right of way. When form-work exceeds 6 feet in height and when form-work will be used to support placement of equipment or personnel such form-work shall be designed by an Engineer who is registered as a Civil Engineer in the STATE of California.

Temporary bracing shall be provided, as necessary, to withstand all imposed loads during erection, construction and removal of any form-work. The form-work drawings shall show provisions for such temporary bracing or methods to be used to conform to this requirement during each phase of erection and removal. Wind loads shall be included in the design of such bracing or methods.

The CONTRACTOR is responsible for the proper evaluation of his form-work materials and design of the form-work to safely carry the actual loads imposed.

### 15-0 REINFORCEMENT

#### 15-0.1 DESCRIPTION

This work shall consist of furnishing and placing reinforcement of the shape and dimensions shown on the PLANS AND DRAWINGS, and as specified in these SPECIFICATIONS.

#### 15-0.2 MATERIALS

Bar reinforcement, welded wire fabric, and reinforcing wire shall conform to the following requirements:

##### 15-0.2A BAR REINFORCEMENT

Reinforcing bars shall be deformed billet-steel bars for concrete reinforcement conforming to the specifications of ASTM Designation: A 615, Grade 60 or low alloy steel deformed bars conforming to the specifications of ASTM Designation: A 706, except that bars conforming to ASTM Designation: A 615, Grade 40 may be used as reinforcement in the following:

1. Slope and channel paving.
2. Minor structures.
3. Sign foundations.

Reinforcing bars shall be placed in accordance with the size and spacing shown on the PLANS AND DRAWINGS, regardless of the designation and grade of

reinforcing bars selected by the CONTRACTOR.

Welded wire fabric -may be substituted for reinforcing bars in the following:

1. Slope paving and lined ditches.
2. Retaining walls.
3. Culvert headwalls, endwalls, and wingwalls.
4. Air-blown mortar.

Substituted welded wire fabric shall be on an equivalent area basis and shall be placed as directed by the ENGINEER. Welded wire fabric shall be supplemented with reinforcing bars when said fabric does not provide the required area of steel.

The substitution of welded wire fabric for bar reinforcing steel as provided above shall not apply to epoxy-coated reinforcing bars.

#### 15-0.2B WELDED WIRE FABRIC

Welded wire fabric shall conform to the specifications of ASTM Designation: A 185.

#### 15-0.2C REINFORCING WIRE AND PLAIN BARS

Wire used as reinforcement and bars used as spiral reinforcement in minor structures and concrete piles as shown on the PLANS AND DRAWINGS and SPECIFICATIONS, shall be, at the option of the CONTRACTOR, either cold drawn steel wire conforming to the specifications of ASTM Designation: A 82, or hot-rolled plain or deformed bars conforming to the strength requirements of ASTM Designation: A 615, Grade 60.

#### 15-0.3 STEEL LISTS

When requested, 2 copies of a list of all reinforcing steel shall be furnished to the ENGINEER at the site of the work before the placing of reinforcing steel is begun. Furnishing such lists to the ENGINEER shall not be construed to mean that the lists will be reviewed for accuracy. The CONTRACTOR shall be wholly and completely responsible for the accuracy of the lists and for furnishing and placing all reinforcing steel in accordance with the details shown on the PLANS AND DRAWINGS and as specified.

#### 15-0.4 INSPECTION

When requested by the ENGINEER, the CONTRACTOR shall obtain from the fabricator a copy of the certified mill test report for each heat and size of reinforcing steel, showing grade, physical and chemical analysis.

#### 15-0.5 CLEANING

Before concrete is placed, the reinforcement to be embedded shall be free of mortar, oil, dirt,

excessive mill scale and scabby rust, and other coatings of any character that would destroy or reduce the bond.

#### 15-0.6 BENDING

Reinforcement shall conform accurately to the dimensions shown on the PLANS AND DRAWINGS.

Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks or improper bends shall not be used.

Hooks and bends shall conform to the provisions of the Building Code Requirements for Reinforced Concrete of The American Concrete Institute.

#### 15-0.7 PLACING

Reinforcement shall be accurately placed as shown on the PLANS AND DRAWINGS and shall be firmly and securely held in position by wiring at intersections and splices and by using precast mortar blocks or ferrous metal chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under applied loads. Wooden, aluminum and plastic supports shall not be used. Placing bars on layers of fresh concrete as the work progresses will not be permitted.

Metal supports shall have a clear coverage of not less than two inches. Protective coatings on metal supports shall not be considered when determining clear coverage. Where the clear coverage to reinforcing steel as shown on the PLANS AND DRAWINGS or ordered by the ENGINEER exceeds the minimum coverage specified herein, the clear coverage for metal supports shall be increased accordingly.

The minimum spacing center to center of parallel bars shall be  $2 \frac{1}{2}$  times the diameter of the bar. The minimum clear distance between bundles of bars and adjacent bundles or single bars shall be not less than the following:

1. Bundles of 2 bars, 2 times diameter of larger bar
2. Bundles of 3 bars, 2.5 times diameter of larger bar
3. Bundles of 4 bars, 3 times diameter of larger bar

In no case shall the clear distance between bars or bundles of bars be less than  $1 \frac{1}{2}$  times the maximum size of the coarse aggregate.

Bundle bars shall be tied together at not more than 6-foot centers.

All reinforcement shall have a clear coverage of 2 inches, except as otherwise shown on the PLANS AND DRAWINGS or specified in the SPECIAL PROVISIONS. If ordered by the ENGINEER, additional clear coverage shall be provided. Clear coverage shall be measured

from the surface of the concrete to the outside of the reinforcement.

Welded wire fabric shall be rolled flat before placing concrete, unless otherwise shown on the PLANS AND DRAWINGS. Welded wire fabric shall be held firmly in place against vertical or transverse movement by means of devices satisfactory to the ENGINEER.

Tack welding on reinforcing bars will not be permitted.

The minimum horizontal load to be allowed for wind on the bar reinforcing steel assemblage, or on a combined assemblage of reinforcing steel and form-work, shall be not less than 20 pounds per square foot of gross projected area of the assemblage.

## 16-0 AIR-BLOWN MORTAR (GUNITING SHOTCRETE)

### 16-1 DESCRIPTION

This work shall consist of lining ditches and channels, paving slopes, and constructing warped sections and other similar features with air-blown mortar in accordance with the details and dimensions shown on the PLANS AND DRAWINGS and as specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

Air-blown mortar shall consist of either dry mixed fine aggregate and Portland cement pneumatically applied by a suitable mechanism, to which mixture the water is added immediately previous to its expulsion from the nozzle, or mortar premixed by mechanical methods and pneumatically applied through a nozzle onto the prepared foundation.

### 16-2 MATERIALS

Portland cement, fine aggregate and mixing water shall conform to the provisions of these SPECIFICATIONS in Section titled, "Concrete Specifications."

The dry mixture shall consist of one part Portland cement to not more than 4 1/2 parts of fine aggregate thoroughly mixed in a dry state before being charged into the machine. Measurement may be either by volume or weight. The fine aggregate shall contain not more than 6 percent moisture by weight.

The premixed mortar shall contain not less than 610 pounds of Portland cement per cubic yard, fine aggregate and water. A maximum of 30 percent pea gravel may be substituted for fine aggregate. The maximum size of pea gravel shall be such that 100 percent passes the 1/2 inch screen and at least 90 percent passes the 3/8 inch screen.

Admixtures pre-approved by the ENGINEER may be used with the premixed mortar.

When required by the PLANS AND DRAWINGS or the SPECIAL PROVISIONS, the air-blown mortar shall be colored by mixing a fine ground, synthetic mineral oxide, specifically manufactured for coloring concrete, into the air-blown mortar. The coloring agent shall be uniformly and homogeneously mixed with the air-blown mortar. The color of

the completed air-blown mortar, after curing and when air dry, shall conform closely to Color No. 30450 of Federal Standard No. 595a or to such other color specified in the SPECIAL PROVISIONS or shown on the PLANS AND DRAWINGS.

Reinforcement, if required, shall conform to the provisions in Section titled "Reinforcement" of these SPECIFICATIONS.

#### 16-3 PREPARATION OF FOUNDATION

The foundation for areas to receive air-blown mortar shall be evenly graded before the mortar is applied and no point on the graded slope shall be above the slope plane shown on the PLANS AND DRAWINGS and SPECIFICATIONS or directed by the ENGINEER.

The areas shall be thoroughly compacted, with sufficient moisture to provide a firm foundation and to prevent absorption of water from the mortar, but shall not contain free surface water.

When shown on the PLANS AND DRAWINGS and SPECIFICATIONS, joints, forms and shooting strips shall be provided for backing or paneling. Ground or gaging wires shall be used where necessary to establish thicknesses, surface planes and finish lines.

#### 16-4 PLACING

The placing of premixed mortar shall be limited to 8 foot lifts measured along the slopes, and gaging wires shall be placed at approximately 7-10 foot centers.

The nozzle shall be directed in such a manner as to result in minimum rebound of the mortar.

The velocity of the material as it leaves the nozzle shall be maintained uniform and at a rate determined for the given job conditions.

A constant pressure of not less than 45 pounds per square inch shall be maintained in the placing machine where the hose length is 100 feet or less and the pressure shall be increased at least 5 pounds for each additional 50 feet of hose or fraction thereof.

Water used for hydration at the nozzle shall be maintained at a uniform pressure, which shall not be less than 15 pounds per square inch greater than the air pressure at the machine.

Materials that have been mixed for more than 45 minutes and have not been incorporated in the work shall not be used, unless otherwise permitted by the ENGINEER.

#### 16-5 FINISHING

After the mortar has been placed as nearly as practicable to the required depth, the surface shall be checked with a straight-edge, and any low spots or depressions shall be brought up to proper grade by placing additional mortar in such a manner that the finished surface will be reasonable smooth and uniform for the type of work involved.

Loose areas of air-blown mortar shall be removed and replaced by the CONTRACTOR at his expense.

Air-blown mortar shall be cured and protected as specified in Section titled, "Concrete Curing and Protection" of these SPECIFICATIONS.

If a coloring agent is added and the CONTRACTOR elects to use the curing compound method for curing the airblown mortar, the curing compound shall be the white or translucent type conforming to the specifications of AASHTO Designation: M 148, Type 1-D, except that the loss of water in the water retention test shall not exceed 0.040-gram per square centimeter of surface. The curing compound shall be applied to the exposed surface at a uniform rate of one gallon per 150 square feet of area.

## 17-0 PAINING

### 17-1 GENERAL

#### 17-1.1 DESCRIPTION

This work shall consist of painting new installations and repainting existing installations in conformance with the requirements of the various sections of these SPECIFICATIONS.

Painting shall conform to the requirements specified in these SPECIFICATIONS and the SPECIAL PROVISIONS, and as shown on the PLANS AND DRAWINGS or directed by the ENGINEER.

#### 17-1.2 WEATHER CONDITIONS

Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather. Blast cleaning or application of solvent-borne paint will not be permitted when the atmospheric or surface temperature is at or below 35 degrees F. or when the relative humidity exceeds 85 percent at the site of the work. Application of water-borne paint will not be permitted when the atmospheric or surface temperature is at or below 50 degrees F. or when the relative humidity exceeds 75 percent at the site of the work. Application of paint will not be permitted when freshly painted surfaces may become damaged by rain, fog, or condensation, or when it can be anticipated that the atmospheric temperature or relative humidity will not remain within the specified application conditions during the drying period, except as provided in the following paragraph for enclosures. If fresh paint is damaged by the elements it shall be replaced or repaired by the CONTRACTOR at his expense.

Subject to approval by the ENGINEER in writing, the CONTRACTOR may provide suitable enclosures to permit painting during inclement weather. Provisions shall be made to control atmospheric conditions artificially inside the enclosures within limits suitable for painting throughout the painting operation and drying period.

### 17-1.3 APPLICATION

The CONTRACTOR shall notify the ENGINEER, in writing, at least 24 hours in advance of the date cleaning and painting operations are to begin.

Painting shall be done in an neat and workman like manner. Unless otherwise specified, paint shall be applied by brush, or roller, or any combination of these methods.

Spray methods shall not be used.

Each application of paint shall be thoroughly cured and any skips, holidays, thin areas or other deficiencies corrected before the succeeding application. The surface of the paint being covered shall be free from moisture, dust, grease or any other deleterious material which would prevent the bond of the succeeding applications. In spot painting, old paint which lifts after the first application, shall be removed by scraping and the area repainted before the next application.

Unless otherwise specified, should 7 days elapse between paint applications, the painted surface shall be washed prior to the next paint application.

Brushes, when used, shall have sufficient body and length of bristle to spread the paint in a uniform film. Paint shall be evenly spread and thoroughly brushed out.

On all surfaces which are inaccessible for painting by regular means, the paint shall be applied by sheepskin daubers, bottle brushes, or by any other means approved by the ENGINEER.

Rollers, when used, shall be of a type which do not leave a stippled texture in the paint film.

Mechanical mixers may be used to mix paint. Prior to applying, the paint shall be mixed a sufficient length of time to thoroughly mix the pigment and vehicle together, and shall be kept thoroughly agitated during its application.

Precautions in the handling and the application of paints shall be in accordance with all applicable occupational safety and health standards, rules, regulations and orders established by the State of California.

### 17-1.4 THINNING PAINT

Paints specified shall be formulated ready for application and no thinning will be allowed unless otherwise specified in SPECIAL PROVISIONS.

### 17-1.5 PROTECTION AGAINST DAMAGE

The CONTRACTOR shall provide protective devices, such as tarps, screens or



covers, as necessary to prevent damage to the work and to other property or persons from all cleaning and painting operations.

Paint or paint stains which result in an unsightly appearance on surfaces not designated to be painted shall be removed or obliterated by the CONTRACTOR at his expense and to the satisfaction of the ENGINEER.

If traffic causes an objectionable amount of dust, the CONTRACTOR, shall sprinkle the adjacent roadbed and shoulders with water or dust palliative for a sufficient distance on each side of the location where painting is being done.

All painted surfaces that are marred or damaged as a result of operations of the CONTRACTOR shall be repaired by the CONTRACTOR, at his expense, with materials and to a condition equal to that of the coating specified herein.

Upon completion of all painting operations and of any other work that would cause dust, grease, or other foreign materials to be deposited upon the painted surfaces,, the painted surfaces shall be thoroughly cleaned.

## 17-2 PAINING STEEL

### 17-2.1 GENERAL

Cleaning and painting of steel structures shall conform to the provisions of this Section.

All exposed surf aces of steel and other metals, except galvanized or metalized surfaces, shall be cleaned and painted as required herein.

### 17-2.2 SURFACE PREPARATION

All surfaces of new and existing steel structures or other metals which are to be painted shall be blast cleaned unless otherwise specified in the SPECIAL PROVISIONS, or approved in writing by the ENGINEER.

Any damage to sound paint, on areas not designated for treatment, resulting from the CONTRACTOR'S operations shall be repaired by him to the satisfaction of the ENGINEER.

### 17-2.3 BLAST CLEANING

Abrasives used for blast cleaning shall be either clean dry sand, mineral grit, steel shot, or steel grit, at the option of the CONTRACTOR, and shall be of a grading suitable to produce satisfactory results. The use of abrasives other than those specified in this Section will not be permitted unless authorized in writing by the ENGINEER.

Unwashed beach sand containing salt or excessive amounts of silt will not be allowed.

Exposed steel or other metal surfaces to be blast cleaned shall be cleaned in accordance with the requirements for commercial blast cleaning so that, when viewed without magnification, the surfaces are free of all visible oil, grease, dirt, rust, paint and mill scale, including mill scale not removed during previous cleaning and painting. Exposed surfaces include all surfaces exposed to the atmosphere. Very light shadows, streaks and discolorations caused by stains of rust, stains of mill scale, and stains of previously applied paint may remain on no more than 33 percent of the surface provided that such shadows, streaks and discolorations are generally evenly dispersed. Slight residues of rust and paint may also be left in the craters of pits if the original surface is pitted. Blast cleaning shall leave all surfaces with a dense and uniform anchor pattern of not less than one mil as measured with an approved surface profile comparator.

Attention is directed to the regulations for abrasive blasting operations adopted by the STATE Air Resources Board, Subchapter 6 in Chapter 1, of Part III of Title 17, California Administrative Code.

When blast cleaning is being performed near machinery, all journals, bearings, motors and moving parts shall be sealed against entry of abrasive dust before blast cleaning begins.

Blast cleaned surfaces shall be primed or treated the same day blast cleaning is done, unless otherwise authorized by the Engineer. If cleaned surfaces rust or are contaminated with foreign material before painting is accomplished, they shall be re-cleaned by the CONTRACTOR at his expense.

#### 17-2.4 PRE-TREATMENT

Pre-Treatment Primer, shall be applied to freshly blast cleaned steel surfaces prior to the application of the first undercoat of paint. All blast cleaned surfaces shall be coated with pre-treatment wash within 4 hours of cleaning. Treatment shall be applied sooner if, in the opinion of the ENGINEER, atmospheric conditions are such that corrosive products form on freshly blast cleaned surfaces in less than 4 hours.

During the application of the pre-treatment primer no blast cleaning will be permitted adjacent to the areas being treated.

No paint shall be applied until after the treated surfaces have thoroughly dried.

The first undercoat of paint shall be applied to the treated surfaces the same day that cleaning and pre-treatment have been done.

#### 17-2.5 STEAM CLEANING

All dirt, grease, loose chalky paint or other foreign material which has accumulated on the previously painted or galvanized surfaces shall be removed with a steam cleaning apparatus which shall precede all other phases of cleaning. It is not intended that sound paint be removed by this process. Any paint which becomes loose, curled, lifted, or loses its bond with the preceding coat or coats after steam cleaning, shall be removed to sound paint or metal surface by the CONTRACTOR at his expense.

A biodegradable detergent shall be either added to the feed water of the steam generator or applied to the surface to be cleaned. The detergent shall be of such composition and shall be added or applied in such quantity that the cleaning as provided in the above paragraph is accomplished.

Any residue, detergent, or other foreign material which may accumulate on cleaned surfaces shall be removed by flushing with fresh water.

Steam cleaning shall not be performed more than 2 weeks prior to painting or other phases of cleaning.

Subsequent painting shall not be performed until the cleaned surfaces are thoroughly dry and in no case in less than 24 hours after cleaning.

#### 17-2.6 HAND CLEANING

Wire brushes, either hand or powered, hand scraping tools, power grinders, or sandpaper shall be used to remove all dirt, loose rust and mill scale, or paint which is not firmly bonded to the surfaces.

Pneumatic chipping hammers shall not be used unless authorized in writing by the ENGINEER.

#### 17-2.7 PAINT

The paint systems for new or existing structural steel or other metal surfaces shall conform to the requirements in this Section. Unless otherwise provided on the PLANS AND DRAWINGS or in the SPECIAL PROVISIONS, the paints to be applied when painting metal surfaces (except for faying surfaces), the minimum number of applications and the dry film thicknesses shall conform to the following:

1. Pre-treatment primer shall be applied in one application. Red Oxide Primer or equivalent, same color.
2. Undercoat paint shall be of a Hy-Lux Enamel Type and shall be green in color and be applied in 2 applications.
3. Final coat. The thickness of the final coat shall be limited to that which will result in uniform drying throughout the paint film. The final coat shall be that required for exposed metal coating systems and shall consist of two

applications of Benjamin Moore paint product code 13392, color code CB85B (sand/tan) or equivalent product having the same color.

Succeeding applications of paint shall be of such shade as to contrast with the paint being covered.

#### 17-2.8 PAINTING

Painting of new steel members shall be done at the following stages of construction unless otherwise specified in these SPECIFICATIONS or in the SPECIAL PROVISIONS or approved in writing by the ENGINEER:

Steel structures, other than sign structures, shall be blast cleaned and painted with the total thickness of undercoats before erection. After erection and before applying subsequent paint, all areas where paint has been damaged or has deteriorated and all exposed unpainted surfaces shall be thoroughly cleaned and spot painted with undercoats to the specified thickness.

No paint shall be applied to surfaces where the paint film may be damaged by heat.

Surfaces exposed to the atmosphere and which would be inaccessible for painting after erection shall be painted the full number of applications prior to erection.

All blast cleaning, except that performed within closed buildings, and all painting shall be performed during daylight hours.

At contact surfaces of stiffeners and of built up members, open seams which would retain moisture shall be caulked with non-sag polysulfide or polyurethane material conforming to the provisions in Federal Specification TTS-230, Type II, or other approved material before the application of finish coat paint.

Except for anchor bolt assemblies, metal surfaces embedded in concrete need not be painted. Ungalvanized anchor bolt assemblies shall be painted or dipped with one application of organic Zinc-Rich Primer prior to installation

### 17-3 PAINTING GALVANIZED SURFACES

#### 17-3.1 GENERAL

When galvanized surfaces are required to be painted, such surfaces shall be cleaned and painted in conformance with the provisions in Section titled, "General," and this Section.

#### 17-3.2 SURFACE PREPARATION

All galvanized surfaces not previously steam cleaned that are to be painted shall first be cleaned by washing with mineral spirit solvent sufficient to remove any oil,

grease, or other materials foreign to the galvanized coating.

After washing, or steam cleaning, all areas shall be roughened by abrasive blasting using an abrasive that is no larger than 30 mesh. Galvanizing shall not be removed by this operation.

#### 17-4 PAINING TIMBER

##### 17-4.1 GENERAL

Timber surfaces which are required to be painted shall be prepared and painted in conformance with the provisions in Section

Unless otherwise shown on the PLANS AND DRAWINGS or specified in the SPECIAL PROVISIONS, all new timber requiring painting shall be painted with 3 applications of paint. The paint used for various applications will be shown on the PLANS AND DRAWINGS or specified in these SPECIFICATIONS or the SPECIAL PROVISIONS and if not so shown or specified, the paint to be used will be selected by the ENGINEER.

On all timber previously painted, the number of applications and types of paint will be specified by the ENGINEER but shall not exceed 3 properly applied coats.

##### 17-4.2 PREPARATION OF SURFACES

All cracked or peeled paint, loose chalky paint, dirt and other foreign material shall be removed by wire brushing, scraping or other means immediately prior to painting. The moisture content of the timber shall not be more than 20 percent at the time of the first application.

##### 17-4.3 PAINING

When permitted in writing by the ENGINEER, the first application of paint may be applied prior to erection.

After the first application has dried and the timber is in place, all cracks, checks, nail holes, or other depressions shall be puttied flush with the surface and allowed to dry before the second application of paint. Succeeding applications of paint shall be of such shade as to contrast with the paint being covered.

#### 18-0 CULVERT AND DRAINAGE PIPE JOINTS

##### 18-1 DESCRIPTION

Joint systems or couplers for CULVERT or drainage pipes to be installed will be designated by classification on the PLANS AND DRAWINGS or in the SPECIAL PROVISIONS.

At the option of the CONTRACTOR, joint systems or couplers to be installed shall conform to the details shown on the PLANS AND DRAWINGS. The joint systems or couplers to be installed shall conform to the requirements in Section 18-2, "Performance Requirements for Culvert and Drainage Pipe Joints."

#### 18-2 PERFORMANCE REQUIREMENTS FOR CULVERT AND DRAINAGE PIPE JOINTS

If the CONTRACTOR elects to furnish and install joint systems or couplers for CULVERT and drainage pipes in accordance with this Section 18-2, the joint systems or couplers shall be approved by the ENGINEER prior to their intended use. Such joint systems or couplers shall perform the intended function, possess durability equivalent to that of the pipe and comply with the joint property requirements set forth by the pipe manufacturer.

1. Integral Joint - The joint overlap is the amount of projection of one culvert barrel into the adjacent culvert barrel.

When pipe sections are installed on straight alignment, the pipe sections shall be joined to provide maximum joint overlap. When pipe sections are installed on curved alignment, the pipe sections shall be joined to provide maximum joint overlap on one side of the outside perimeter of the pipe with not less than 1/4 inch overlap on the opposite side. Joints not meeting the above requirements will be considered disjointed and the disjointed pipe sections shall be replaced with specially manufactured pipe sections which will meet the above requirements.

2. Sleeve Joint - The joint overlap is the minimum sleeve width required to engage both culvert barrels which are abutted to each other.
3. Watertightness. - Watertightness is the ability of a joint -to hold water under pressure without leaking. It shall be attained by the use of approved durable, high quality, resilient joint materials designed to perform the intended function. These materials shall be neoprene expanded rubber or sheet rubber gaskets, 11011 ring rubber gaskets, butyl rubber base joint sealant, or other approved resilient materials.

When watertight joints are shown on the PLANS AND DRAWINGS or specified in these SPECIFICATIONS or the SPECIAL PROVISIONS, the assembled joint shall pass the following performance test without leakage at that joint:

A hydrostatic pressure test on a joint shall be made in accordance with Section 20-81. No mortar or concrete coatings, fillings, or packings in addition to that normally required for the joint shall be placed prior to watertightness tests. After the pipe sections are fitted together with the gasket or gaskets in place, the assembly shall be subjected to a pressure resulting from a minimum head of 10 feet of water above the crown of the pipe for 48 hours or at a head or for an alternative duration as determined by the ENGINEER. Moisture or beads of water appearing on the surface of the joint will not be considered as leakage. The tests on individual joints may be

performed at the fabricator's facility or at the job site.

The joint watertightness test shall be performed on pipe sections in straight alignment and on pipe sections deflected from straight alignment. When testing pipe sections not on straight alignment, the pipe sections shall be positioned to create a gap on one side of the outside perimeter of the pipe that is 1/2 inch wider than the gap for pipe sections in straight alignment. When coupling bands are used to test pipe sections not on straight alignment and the maximum gap on one side of the outside perimeter of the pipe is less than 1/2 inch wider than that for pipe sections in straight alignment, said coupling band pipe sections shall be positioned to provide maximum gap.

The CONTRACTOR shall furnish to the ENGINEER a Certificate of Compliance showing that the material being furnished conforms to the joint property requirements as described above. Field tests may be required by the ENGINEER whenever there is a question regarding compliance with these requirements.

## 19-0 ALTERNATIVE CULVERTS

### 19-1 DESCRIPTION

This work shall consist of furnishing and installing or constructing alternative CULVERTS as shown on the PLANS AND DRAWINGS or as directed by the ENGINEER in accordance with the provisions specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

The allowable kinds of CULVERT to be used for installation or construction of alternative CULVERTS will be shown on the PLANS AND DRAWINGS. The kind of CULVERT to be installed or constructed shall be selected by the CONTRACTOR from the allowable kinds of CULVERTS shown on the PLANS AND DRAWINGS.

### 19-2 ALTERNATIVES

The kinds of CULVERTS for alternative CULVERTS shall conform to the following provisions:

#### 19-2A REINFORCED CONCRETE PIPE AND PIPE ARCH

Reinforced concrete pipe and pipe arch shall conform to the provisions in Section 21-0, "Reinforced Concrete Pipe."

#### 19-2B CORRUGATED STEEL PIPE AND PIPE ARCH

Corrugated steel pipe and pipe arch shall conform to the provisions in Section 22-0, "Corrugated Metal Pipe."

#### 19-2C CAST-IN-PLACE CONCRETE PIPE

Cast-in-place concrete pipe shall conform to the provisions in Section 20-0, "Cast-In-Place Concrete Pipe."

## 19-2D REINFORCED CONCRETE BOX CULVERTS AND ARCH

CULVERTS Reinforced concrete box CULVERTS and arch CULVERTS shall conform to the provisions in Section 14-0, "Concrete Structures."

### 20-0 CAST-IN-PLACE CONCRETE PIPE

#### 20-1 DESCRIPTION

Cast-in-place monolithic concrete pipe shall consist of Portland cement concrete placed in a prepared trench at the locations shown on the PLANS AND DRAWINGS, as specified in these SPECIFICATIONS and the SPECIAL PROVISIONS, and as directed by the ENGINEER.

#### 20-2 THICKNESS

The minimum wall thickness for the various sizes of pipe shall conform to the following table:

Internal Diameter	Wall Minimum Thickness
24" .....	3"
27" .....	3"
30" .....	3"
33" .....	3 ½"
36" .....	3 ½"
42" .....	4"
48" .....	5"
54" .....	5 ½"
60" .....	6"
66" .....	6 ½"
72" .....	7"
78" .....	7 ½"
84" .....	8"

#### 20-3 PIPE MAKING EQUIPMENT

The pipe shall be constructed with equipment specially designed for constructing cast-in-place monolithic concrete pipe. Pipe making equipment shall be a single-staged construction machine. The equipment shall be acceptable to the ENGINEER. The CONTRACTOR may be required to furnish evidence of successful operation on other work of the equipment he proposes to use. Equipment not suitable to produce the quality of work required for the PIPELINE will not be permitted to operate on the PIPELINE.

#### 20-4 EXCAVATION

The trench shall be excavated to the lines and grades according to the PLANS AND



DRAWINGS and the SPECIFICATIONS. The trench shall be shaped to form the bottom outside of the pipe and shall be graded and prepared to provide full, firm, and uniform support by undisturbed earth, rock, or compacted fill over a minimum of the bottom 210 degrees of the outside of the pipe, hereinafter referred to as the "trench form." When the soil around the trench form must be over-excavated and then backfilled and compacted, trenching shall be performed to produce the above-mentioned stable trench form. Local and/or OSHA trench shoring requirements shall be observed.

## 20-5 CONSTRUCTION

All water, which may have entered the trench, shall be removed before constructing the pipe. All surfaces against which concrete is to be placed shall be free of standing water, mud, and debris and shall be firm enough to prevent contamination of the concrete by earth or other foreign material.

Surfaces against which concrete is to be placed shall be thoroughly moistened with water, if necessary, so that moisture will not be drawn from the freshly placed concrete.

Where strata or lenses of loose sand, silt, or other non-cohesive soils are encountered below the contact line of the pipe and the trench form, these shall be stabilized by the application of asphalt materials, cement mortar membranes, or other approved methods that will provide a stable surface, or by over-excavation and compacted backfill.

When soils tend to slough or are soft and spongy, the trench shall be over-excavated and the space backfilled with selected cohesive soils or foundation stabilization material and compacted by acceptable methods to a density that will provide stability that will prevent re-excavation without sloughing.

Where the pipe is to be constructed through fill material, the compacted fill shall be constructed to at least 1 foot above the trench form. Such fill shall have stability in the zone of the trench form equal to the firm undisturbed earth in the area adjacent to the fill.

When the soil around the trench form must be over-excavated and then backfilled and compacted, trenching shall be performed to produce the abovementioned stable trench form.

The cast-in-place pipe shall be constructed in one placement around the complete periphery.

A positive method or device shall be used when placing invert concrete to ensure that invert thickness is maintained at not less than minimum wall thickness at any point. This method or device shall be defined prior to commencement of work, and it shall enable inspection to be made during placement to guarantee this minimum thickness.

The concrete shall be vibrated, rammed, tamped or worked with suitable appliances until the concrete has been consolidated to the maximum practicable density, free of rock pockets, and closes snugly against all surfaces of forms. The concrete shall completely fill the form.

When placing operations cease for any reason, the end of the pipe shall be left rough with

a slope of approximately 45 degrees. The ends of the pipeline shall be covered with suitable material, to maintain a humid condition within the pipe.

Construction joints shall be clean and damp before continuing pipe making operations. Cleaning construction joints shall consist of removing all loose or defective concrete, coatings, and any other deleterious materials.

After the removal of forms, the inside of the pipe will be inspected and any required repairs shall be made. All porous and fractured concrete shall be removed by chipping openings into the concrete pipe as directed by the ENGINEER.- The chipped openings and any holes cut in the pipe for inspection or to facilitate removing the forms shall be repaired by filling with concrete or dry patching mortar.

The pipeline alignment and flow line grade of the finished pipe shall not vary more than 0.10-foot from the grade and alignment lines established by the ENGINEER.

The finished surface of the concrete pipe shall be substantially free of fractures, cracks and roughness.

#### 20-6 BACKFILL

After the pipeline has been completed, the CONTRACTOR shall backfill the pipe trench with material obtained from excavation. Compaction of the backfill material will not be required; however, sufficient excavated material shall be mounded over the trench to allow for settlement of the backfill material.

#### 20-7 MATERIALS

##### 20-7A CONCRETE

Cast-in-place monolithic concrete pipe shall conform to ACI 346-70 except as otherwise noted on the PLANS AND DRAWINGS. Cast-in-place monolithic concrete pipe shall consist of Portland cement concrete conforming to the Section titled REINFORCED CONCRETE, with modifications as follows:

##### 1. STRENGTH

The minimum allowable 28-day compressive field strength shall be 2,500 psi when cured and tested in conformance with ASTM C 31 and C 39.

##### 2. AGGREGATE SIZE AND GRADING

Size of coarse aggregate shall be a maximum of 3/4 inch for 30-inch diameter pipe and 1 inch for 36-inch diameter and larger pipe. Aggregate gradation shall conform to the Section titled REINFORCED CONCRETE. Penetration shall not exceed 1-1/2 inches when determined by California Test 533.

### 3. CEMENT CONTENT

The pipe shall be constructed of Class A Portland cement concrete. Minimum cement content shall be five and one-half sacks per cubic yard.

### 4. WATER CONTENT

Water content shall not exceed 50 pounds (6 gallons) per sack of cement, including free water in the aggregate.

### 5. TEMPERATURE

The temperature of the concrete when it is placed shall not exceed 90 degrees F, nor shall it be less than 40 degrees F.

#### 20-7B AIR ENTRAINING ADMIXTURE

An air-entraining admixture shall be used in such amount as will affect the entrainment of 3 to 5 percent of air by volume of the concrete as discharged by the mixer. Other admixtures shall be used only with the approval of the ENGINEER.

#### 20-7C SLUMP

The slump shall be the minimum necessary to provide workability resulting in well consolidated concrete, but in no case shall the slump exceed 2-1/2 inches and shall not be less than 1-1/2 inches.

#### 20-7D INSPECTION

The ENGINEER and his representatives shall have access to all phases of the work, and the CONTRACTOR shall provide proper facilities for access and inspection.

#### 20-8 WORKMANSHIP

##### 20-8A CONSTRUCTION JOINTS

If construction of the pipe stops short of a manhole or for a period of time exceeding 20 minutes, the resulting construction joint must be reinforced with a concrete collar. The concrete collar shall be installed in accordance to DISTRICT Standards.

Construction joints shall be clean and damp when covered with fresh concrete or mortar. Cleaning of construction joints shall consist of removing by washing, all laitance, loose or defective concrete, coating, and foreign material.

##### 20-8B ALIGNMENT

Pipelines intended to be straight shall be so laid, and in no case shall deviation from a

straight line exceed 0.10 foot for line or 0.10 foot for grade.

Cast-in-place concrete pipe shall not be installed on curves less than a radius of 120 feet for 24 to 30 inch pipe, 150 feet for 36 inch pipe, and 180 feet for 41 to 48 inch pipe and 200 feet for 54 inch pipe.

#### 20-8C FORMS

Forms shall be aluminum with a minimum of one full circumference spreader per form. Forms shall be strong enough to withstand the vibrating of the concrete and to permit workmen to place the concrete without causing distortion at any point. Form support systems shall be constructed so that previously placed concrete shall not be damaged.

Forms shall be lapped so that lap ridges in the pipe shall face downstream in the direction of flow.

Forms shall not be removed until concrete has cooled sufficiently to prevent surface cracks or checking, and until concrete has attained sufficient strength to prevent displacement, but in no case shall forms be removed before 4 hours after placement.

#### 20-8D FINISHING

Variations in the internal diameter shall not exceed 1 inch for 24- and 30-inch diameter pipe, and 1-1/2 inch for 36- to 48-inch diameter pipe.

Offsets at form laps shall not exceed 1/2 inch.

Form structures bearing plate indentations shall not exceed 1/8 inch, and the interior surface of the pipe shall be equivalent to a steel screeded finish. Any extraneous concrete shall be removed from the interior surface as soon as possible after placing.

#### 20-8E CURING

Immediately after finishing, not to exceed 30 minutes after placement, the exterior surface shall be covered with 6-mil impervious plastic film with 4 to 6 inches of cover of moist selected native material to hold the film in place and to aid in the curing process. Care should be exercised in placement of film and earth so that no damage or contamination of the concrete has been incurred.

Circulation of air through completed sections of pipe shall be prevented at all times by bulk-heading open ends and all openings left open for valves or gates.

Sufficient water shall be placed in each completed section to provide a minimum water depth of 12 inches in the PIPELINE interior not more than 72 hours after the first placement of concrete. Water used for this purpose and for testing shall be 50 degrees F or warmer.

## 20-BF CLOSURE SECTIONS

Closure or concrete collars; see item CONSTRUCTION JOINTS, hereinbefore; shall be installed as shown on the PLANS AND DRAWINGS. Concrete strength shall be as specified in this section. CONCRETE AND REINFORCING STEEL shall conform to Section REINFORCED CONCRETE.

## 20-8G THICKNESS TESTS FOR CAST-IN-PLACE PIPE

The thickness at the top of the pipe will be measured by probing at approximately 50-foot intervals, or at other intervals as determined by the ENGINEER, during placement of the concrete. The probe shall be forced through the concrete to make firm contact with the form and shall be held in a position normal to the surface when the measurement is taken. The probe shall be a 3/8-inch round bar, at least 2 inches longer than the wall thickness to be measured, rounded on one end with a tee handle on the other. Thickness at the invert and springline will be measured through holes drilled by the CONTRACTOR. The holes, which shall not be less than 3/4-inch in diameter, shall be drilled after the removal of the forms and within 72 hours of concrete placement.

One hole shall be drilled every 150 feet on tangent and 75 feet on curves and shall be located in either the invert or springline as determined by the ENGINEER in order to determine wall thickness. Following testing, repair pipe with non-shrink grout.

In lieu of drilling holes in the invert, the CONTRACTOR may remove freshly placed concrete in the invert with a shovel, or other suitable tool, to expose the point of contact between the concrete and the trench form. The thickness will be measured along the vertical centerline of the section between a straightedge placed longitudinally on the concrete surface, and the point of contact. All such concrete removed shall be wasted and the void filled with fresh concrete.

After measurement, the CONTRACTOR shall patch all holes as directed by the ENGINEER. All costs of probing, drilling, removing, and repairing shall be borne by the CONTRACTOR.

## 20-8H VISUAL INSPECTION AND REPAIR

After the internal fixed forms have been removed, the inside of the pipe shall be inspected. All rock pockets, blisters, voids, or similar defects shall be repaired immediately in a manner approved by the ENGINEER.

## 20-8I HYDROSTATIC TESTING

Cast-in-place concrete pipe shall be cleaned and tested prior to acceptance and shall be free of all detectable leaks.

No sooner than twenty-eight days after the PIPELINE has been installed or when the concrete has obtained a compressive strength of 2,500 psi, the PIPELINE shall be tested.

The PIPELINE shall be tested between each control structure or in lengths not to exceed 5,000 feet, whichever is less. Fill the PIPELINE with water (not less than 50 degrees F in temperature) to the maximum design head at the downstream structure. Maintain a full pipe for 48 hours. If leaks are evident, the line shall be drained and the leaks repaired by and at the expense of the CONTRACTOR. After the leaks have been repaired, refill the line to the aforementioned head and test for a minimum of 8 hours. During the test period, the leakage rate shall not exceed 1,500 gallons per inch of diameter per mile per 24 hours. If the line fails the hydrostatic test, the CONTRACTOR shall drain the line, repair all imperfections, and retest the line as described above.

#### 20-8J FINAL CLEANING

Prior to final acceptance, clean all parts of the system. Remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the system. If necessary, use mechanical rodding, pigging, or bucketing equipment.

Upon the ENGINEER's final inspection of the system, if any foreign matter is still present in the system, clean the sections and portions of the lines as required.

After cleaning all openings in the PIPELINE shall remain closed.

#### 21-0 REINFORCED CONCRETE PIPE

##### 21-0.1 DESCRIPTION

These SPECIFICATIONS apply to Rubber Gasket Reinforced Concrete Pipe (R.G.R.C.P.). In lieu of the AASHTO designation, all R.G.R.C.P. shall be of either Class III, Class IV, or Class V, and must be of the TYPE (Spun, Packerhead, etc.) specified by the ENGINEER or mandated by the project needs.

Shallow depths, loads, or other conditions that would require R.G.R.C.P. stronger than Class III would require a pipe design submittal and approval by the ENGINEER.

##### 21-0.2 STRUCTURES

Storm drain manholes may be standard four foot diameter precast manholes when detailed on the PLANS AND DRAWINGS. Storm drain manhole barrels and taper sections shall be precast concrete sections using Type II Portland Cement complying with ASTM C-478.

Minor Concrete Structures including, but not limited to Pressure Manholes and Control Structures shall be constructed to the line, grades, and details shown on the PLANS AND DRAWINGS and shall conform to the requirements of these SPECIFICATIONS and the SPECIAL PROVISIONS.

##### 21-0.3 JOINTS

Each joint shall be sealed to prevent leakage and infiltration.

Only rubber gasketed joints will be accepted and shall conform to the requirements of ASTN designation C-443.

Rubber gaskets shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

#### 21-0.4 LAYING PIPE

No pipe shall be laid which is cracked or damaged and which, in the opinion of the ENGINEER, is unsuitable for use. Used materials, rejects, misfits, or seconds are not acceptable for use on DISTRICT PIPELINES.

Curved alignment shall be accomplished by one of the two methods described below.

1. Maximum permissible joint deflection for gasketed joints shall be as recommended by the pipe manufacturer. The CONTRACTOR shall submit a copy of the pipe manufacturer's recommendations. Pipe sections of less than standard length to reduce angular deflection of joints will be allowed only with the ENGINEER's approval.
2. Beveled Pipe Sections of pipe with one or both ends beveled may be used for curved alignment. Beveled pipe shall have a maximum deflection of five (5) degrees from a plane perpendicular to the pipe axis unless other-wise shown on the PLANS AND DRAWINGS or approved by the ENGINEER.

#### 21-0.5 ALIGNMENT

Pipes are intended to be laid straight and shall be so laid as shown on the PLANS AND DRAWINGS or approved by the ENGINEER. In no case shall deviation from a straight line exceed 0.10 foot for line or 0.10 foot for grade in any PIPELINE.

#### 21-0.6 REPAIRS

Should a CONTRACTOR install RGRCP in such a manner as to damage connections or cause leakage, all such repair or leakage shall be resolved by either removal of the defective pipe joints or as conditioned below by use of repair methods delineated on DISTRICT "Pipe Joint Repair": Standards. The repair of "damaged pipe joints" and "leaks" are conditioned as follows.

1. Should leaks or pipe joint damage occur within consecutive "Pipe Joints", the pipe lengths shall be removed and reinstalled to DISTRICT specifications.
2. There shall be no two consecutive damaged or leaking pipe joints repaired with the "Pipe Joint Repair" standard.
3. The "Pipe Joint Repair" Standard shall not be utilized within street right-of-way or within three pipe lengths of cast-in-place pipe or structures.

4. The DISTRICT's "Pipe Joint Repair" Standard shall not be utilized on more than 3 pipe joints in any one hundred continuous lineal feet of RGRCP..

## 22-0 CORRUGATED METAL PIPE

### 22-1 GENERAL

#### 22-1.1 DESCRIPTION

This work shall consist of furnishing and installing corrugated metal pipe and pipe arches, for CULVERTS, siphons, drains, slotted pipe, and CONDUITS, all with necessary fittings, as shown on the PLANS AND DRAWINGS or directed by the ENGINEER in accordance with the provisions specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

Corrugated metal pipe shall be either corrugated aluminum pipe or corrugated steel pipe as shown on the PLANS AND DRAWINGS or designated by the ENGINEER.

Whenever pipe arches are to be installed, the SPECIFICATIONS contained in section 22, "Corrugated Metal Pipe," for pipe shall also apply to pipe arches.

#### 22-1.2 DIMENSIONS AND THICKNESS

Dimensions and thicknesses shown are nominal and shall conform to AASHTO Designation: M 36 for corrugated steel pipe and AASHTO Designation: M 196 for corrugated aluminum pipe, except as modified herein.

The dimensions given for pipe are nominal inside diameters from which the average inside diameter shall not vary more than the following:

61' through 18" diameter .....	1/4" maximum
21" through 24" diameter .....	3/8" maximum
Over 24" diameter .....	1/2" maximum

The nominal thickness of sheets for corrugated metal pipe shall be equal to or greater than that necessary to resist internal and external loading.

The lapped longitudinal seams of riveted or resistance spot welded pipe arches shall be placed in the top arch and shall be staggered so as to alternate on each side of the center of the top arch not less than 3 inches.

#### 22-1.3 PROTECTIVE COATINGS, LININGS AND PAVINGS

When required by the SPECIAL PROVISIONS or the ENGINEER, pipes shall be protected with bituminous coating, bituminous lining or have the invert paved with bituminous material. All moisture, dirt, oil, unbonded or incompatible paint, grease, alkalis, or other foreign matter shall be removed from the surface to be coated



before the coating material is applied. Bituminous coatings shall be applied to the inside and outside of pipes to a minimum thickness of 0.05-inch as provided in AASHTO Designation: M 190, Type A, except as specified in this Section 22-1.3.

Coupling bands for coated pipes shall have a protective coating. Coupling bands to be protected by coatings in accordance with AASHTO Designation: M 190 may be single-dipped with the coating thickness requirement waived.

Bituminous linings, if required, shall be applied over said bituminous coatings, to the inside of the pipe as provided in this Section 22-1.3.

Bituminous pavings, if required, shall be applied over said bituminous coatings, to the inside bottom portion of pipe as provided in AASHTO Designation: M 190, Type C.

When linings and pavings are not required, an asphalt mastic coating may be substituted for the bituminous coating on corrugated steel or aluminum pipe or a polymeric coating may be substituted for bituminous coating on corrugated steel pipe.

Asphalt mastic coating shall conform to the requirements of AASHTO Designation: M 243 except that asbestos fibers shall not be used. The asphalt mastic material shall be applied uniformly to the outside surface with a minimum thickness of 0.05-inch at any point. Asphalt mastic coating shall be applied at the fabrication plant. Any pinholes, blisters, cracks or lack of bond shall be cause for rejection.

Polymeric coating shall conform to the requirements of AASHTO Designation: M 246. The polymeric coating shall be applied to the galvanized sheet prior to corrugating and, unless otherwise specified in the PLANS AND DRAWINGS or SPECIAL PROVISIONS, the thickness shall be not less than 0.010-inch. Any pinholes, blisters, cracks or lack of bond shall be cause for rejection.

When corrugated metal pipes are to be bituminous lined, the fabrication requirements specified in Section 22, "Corrugated Metal Pipe," shall be altered so that the rivet heads inside the pipe will be in the valley of the corrugation. During the fabricating process, provisions shall be made at the ends of pipes to retain the bituminous material. Both the inside and outside surfaces shall be bituminous coated as specified in AASHTO Designation: M 190, Type A. In addition to this coating the valleys on the inside periphery shall be filled by the centrifugal process with the same type of bituminous material to such extent that the thickness on the crests of the corrugations will not be less than 1/8 inch. The lining shall be smooth and uniform and its surface shall be parallel to a line projected along the crests of the corrugations.

When protective coatings are applied to pipes, each section of pipe and fittings shall have the thickness of the metal clearly identified on the inner surface with paint or other means approved by the ENGINEER.

Damaged protective coatings, linings and invert paving shall be repaired by the CONTRACTOR at his expense. Bituminous material conforming to the provisions of AASHTO Designation: M 190 or other materials approved by the ENGINEER shall be used to repair damaged bituminous coatings; asphalt mastic material conforming to the provisions of AASHTO Designation: M 243 shall be used to repair damaged asphalt mastic coatings; and tar base material conforming to the provisions of AASHTO Designation: M 243 shall be used to repair damaged polymeric coatings.

#### 22-1.4 EARTHWORK

Excavation, backfill and shaped bedding shall conform to the provisions found on the PLANS AND DRAWINGS, and shall meet all STATE and FEDERAL safety order provisions.

The pipe shall be laid in a trench excavated to the lines and grades established by the ENGINEER and in no case shall deviation from a straight line exceed 0.5 foot for alignment or 0.10 foot for grade. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe.

#### 22-1.5 LAYING PIPE

Corrugated metal products shall be shipped, handled, and laid in such a manner as to prevent bruising, scaling or breaking of the galvanized surface or protective coating.

Annular corrugated pipe shall be laid in the trench with the outside laps of circumferential joints upgrade, with the longitudinal laps positioned other than in the invert, with the separate sections spaced not more than 1 1/2 inches apart and then firmly jointed together with the corrugations in alignment. Corrugations or projections on the coupler shall properly engage the corrugations of the pipe section before bolts are tightened.

New corrugated metal pipe shall be connected to existing or new drainage facilities as shown on the plans. When concrete collars or tee connections are required to connect new corrugated metal pipe to existing or new pipe, the concrete collars or tee connections shall be constructed of minor concrete. Reinforcement for the concrete collars or tees shall conform to the SPECIAL PROVISIONS, the Developers Agreement or on the PLANS AND DRAWINGS.

#### 22-1.6 STRUCTURES

Where shown on the PLANS AND DRAWINGS, inlet and outlet structures shall be constructed or installed in connection with corrugated metal pipes. Where such structures are constructed or installed the ends of pipes shall be placed flush or cut off flush with the structure face, unless otherwise directed by the ENGINEER.

### 22-1.7 COUPLING BANDS

At the option of the ENGINEER, coupling bands for corrugated metal pipe may conform to the requirements in this Section 22-1.7, or to the requirements in Section 18-2, "Performance Requirements for Culvert and Drainage Pipe Joints."

The requirements and details for corrugated metal pipe coupling bands conforming to this Section 22-1.7 are shown on the PLANS AND DRAWINGS. The type of coupling band used will be at the CONTRACTOR's option and shall conform to the requirements and details shown on the PLANS AND DRAWINGS. The metal of the bands shall be corrugated, dimpled, or otherwise formed in a manner that will effectively engage the corrugations of the pipe ends.

Coupling bands for corrugated steel pipe shall conform to the specifications of AASHTO Designation: M 36. Coupling bands for corrugated aluminum pipe shall conform to the specifications of A-ASHTO Designation: M 196. Wedges and straps for connecting universal coupling bands shall be made from galvanized steel sheets conforming to the specifications of AASHTO Designation: M 218.

When channel or wing channel coupling bands are used, the interior bend radii of the pipe flange and the channel shall be not less than the thickness of the metal of which they are formed.

When universal coupling bands are used with a wedge and strap connection, the straps shall be positioned so that the coupling band is drawn into tight contact with the pipe when the wedge is fully driven. Upon being driven, the wedge shall bear fully upon the bearing surfaces of the straps. The wedge shall be driven until no further movement can be obtained using a one pound hammer.

Aluminum and steel materials shall not be mixed in any installation except for coupling band fastening hardware.

Joints for CULVERTS and CONDUITS shall consist of connections made with coupling bands as shown on the PLANS AND DRAWINGS for positive joints. The universal coupling band shall not be used.

Joints for CULVERTS and CONDUITS, and joints for pipe designated on the PLANS AND DRAWINGS as watertight, shall be watertight under pressure and all conditions of expansion, contraction, and settlement, and shall conform to the requirements for watertightness in Section 18-2, "Performance Requirements for Culvert and Drainage Pipe Joints."

## 22-2 CORRUGATED STEEL PIPE

### 22-2.1 DESCRIPTION

Corrugated steel pipe shall conform to the provisions for corrugated metal pipe in Section 22-1, "General," and for corrugated steel pipe in this Section 22-2.

## 22-2.2 MATERIALS

Corrugated steel products shall conform to the requirements of AASHTO Designation: M 36 and shall be fabricated from either zinc-coated steel sheet or aluminum-coated steel sheet except when fabrication from zinc-coated steel sheet is required by the special provisions.

Zinc-coated steel sheet shall conform to the requirements of AASHTO Designation: M 218, except that California Test 652 will be used to determine the weight of coating.

Aluminum-coated steel sheet shall conform to the requirements of AASHTO Designation: M 274.

When requested by the ENGINEER, the CONTRACTOR shall receive from the manufacturer of corrugated steel products, a Certificate of Compliance in accordance with the provisions for all pipe material supplied in this section.

## 22-2.3 FABRICATION

Corrugated steel pipe shall be fabricated either by riveting, resistance spot welding or using a helically corrugated steel pipe with a continuous helical lock seam or continuous helical welded seam paralleling the corrugation. Pipe fabricated from 0.052-inch thick sheets shall be helically corrugated steel pipe with a continuous helical lock seam or a continuous helical welded seam.

Annular corrugated steel pipe shall be fabricated from sheets having either 2 2/3" X 1/2" or 3" X 1" corrugations.

### 22-2.3A FABRICATION BY RIVETING

Pipe fabricated by riveting shall conform to the specifications of AASHTO Designation: M 36.

### 22-2.3B FABRICATION BY SPOT WELDING

Pipe fabricated by resistance spot welding shall conform to the specifications of AASHTO Designation: M 36.

### 22-2.3C FABRICATION BY CONTINUOUS HELICAL SEAM

Helically corrugated steel pipe shall conform to the specifications of AASHTO Designation: M 36, and as specified in this section.

Helically corrugated pipe shall be fabricated using corrugation profiles and continuous helical seam pitches as shown in the following table:

#### 22-2.3C (1) FABRICATION BY CONTINUOUS LOCK SEAM

Pipe fabricated with a continuous helical lock seam extending from end to end of each length may be used for full circle and equivalent pipe arch sizes. Fabrication shall conform to the specifications of AASHTO Designation: M 36, except that the profile of the sheet on at least one side of the lock seam and adjacent to the 180 degree fold shall have a minimum retaining offset of one-half the sheet thickness as defined in California Test 662.

#### 22-2.3C (2) FABRICATION BY CONTINUOUS WELDED SEAM

Pipe fabricated with a continuous helical welded seam parallel to the corrugations may be used for full circle and equivalent pipe arch sizes. The welding process shall be so controlled that the combined width of the weld and adjacent spelter or aluminum coating burned by the welding does not exceed 3 times the thickness of the metal. If spelter is damaged by the welding outside the above specified area, the weld and damaged spelter or aluminum adjacent to the weld shall be cleaned and painted. A coating of aluminum shall be applied to the welded area of aluminum coated pipe using the metalizing process in accordance with AWS C2.2, except that surface cleaning will not be required when the metalizing is applied immediately in a continuous operation following the resistance welding. Testing for welded seam quality control shall conform to California Test 665.

#### 22-2.4 END FINISH

The ends of helically corrugated steel pipe may be rerolled to form annular corrugations extending at least 2 corrugations from the pipe end, or to form an upturned flange with or without reformed annular corrugations. The diameter of reformed ends shall not exceed that of the pipe barrel by more than the depth of the corrugation. All types of pipe ends, whether rerolled or not, shall be matched in a joint such that the maximum difference in the diameter of abutting pipe ends is 1/2 inch.

Where the ends of helically corrugated steel lock seam pipe have been rerolled, the lock seam in the rerolled end shall not contain any visible cracks in the base metal and the tensile strength of the lock seam shall be not less than 60 percent of that required for the remainder of the pipe. This requirement shall not apply to the lock seam located within a flange formed in rerolling. The rerolled ends of the pipe and flanges shall exhibit good workmanship and there shall be no open-lock seams.

When corrugated steel pipe is rerolled for coupling with a wing channel coupling or a channel coupling band, the maximum distance from any point on the end of the pipe to the plane, normal to the pipe axis and passing through the outermost portion of said pipe end, shall not exceed 1/2 the width of the channel minus the thickness of the pipe metal. The difference between the minimum and maximum flange diameter shall not exceed 1/2 inch.

Pipe shall be fabricated in such a manner that it can effectively be joined with standard coupling bands that are described in these SPECIFICATIONS or shown on the PLANS AND DRAWINGS.

#### 22-2.5 DAMAGED GALVANIZING

In lieu of the requirements of AASHTO Designation: M 36, damaged galvanized surfaces shall be repaired as provided in accordance to CAL TRANS STANDARD.

When the galvanized surface has been burned by welding, all surfaces of the welded connections shall be thoroughly cleaned by wire brushing and all traces of the welding flux and loose or cracked galvanizing removed, after which the areas shall be repaired as provided in accordance to CAL TRANS STANDARD.

#### 22-2.6 CULVERTS AND CONDUITS

CULVERTS AND CONDUITS shall be of the size, type and thickness shown on the PLANS AND DRAWINGS. Unless otherwise indicated on the PLANS AND DRAWINGS, SPECIAL PROVISIONS or the ENGINEER, corrugated steel pipe shall be coated as provided in Section 22-1.3, "Protective Coatings, Linings and Ravines."

Corrugated steel pipe for CULVERTS AND CONDUITS shall be ordered in such lengths that the number of field connections will be held to a minimum.

When soldered pipe is specified, the outside seams of pipe fabricated by riveting, spot welding or continuous helical lock seam shall be soldered in a workmanlike manner, the solder being sweated into the joints. If the pipe is fabricated by riveting or spot welding, all rivets and spot welds on the circumferential seams shall be spaced at approximately 2 1/2 inch centers with maximum spacing of 3 inches. If the pipe is fabricated by a continuous helical welded seam, soldering will not be required.

After the pipe has been laid and backfill has been placed and compacted to a minimum of 2 feet above the pipe, the pipe line shall be filled with water to a hydrostatic head of 10 feet above the highest point in the line.

A hydrostatic test shall be conducted for a period of not less than 24 hours, during which time an accurate measure of the water required to maintain the test pressure shall be made. Any leakage developed by the test shall not exceed the allowable leakage computed by the following formula:

$$E = 0.00002HI/2LD$$

Where:

E is the allowable leakage in gallons per minute.

H is the difference in elevation in feet between the water surface at 10 feet

above the highest point in the line and the invert elevation of the pipe at its lowest point.

L is the length of CULVERT or CONDUIT or pipe in feet.

D is the internal diameter of the pipe in inches.

The CONTRACTOR shall, at his expense, furnish all water, materials and labor for making the required test. All tests shall be made in the presence of the ENGINEER. Any leakage in excess of the allowable leakage shall be stopped in a manner satisfactory to the ENGINEER, and the test repeated until the total leakage does not exceed the allowable leakage.

All obvious leaks shall be stopped in a manner satisfactory to the ENGINEER, whether or not the leakage from the line exceeds that permitted herein.

Inverted siphons shall not be permitted within DISTRICT IRRIGATION AND DRAINAGE WORKS without the written authorization of the ENGINEER.

## 23.0 MISCELLANEOUS METAL

### 23-0.1 DESCRIPTION

This work shall consist of furnishing and installing miscellaneous iron and steel as shown on the PLANS AND DRAWINGS or as directed by the ENGINEER, and as specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

Miscellaneous iron and steel may be inspected at the fabrication site. The CONTRACTOR shall notify the ENGINEER when materials have been delivered to the fabrication site and shall give the ENGINEER at least 10 days notice after delivery before commencing the fabrication of such miscellaneous metal. Materials to be used shall be made available to the ENGINEER so they can be examined. The ENGINEER shall have free access at all times to any portion of the fabrication site where said material is stored or where work on said material is being performed.

### 23-0.2 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel items shall conform to the dimensions and details shown on the PLANS AND DRAWINGS and as specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

Unless otherwise specified, materials shall conform to the following SPECIFICATIONS:

MATERIALSPECIFICATION

Steel bars, and shapes . . . . .	ASTM Designation:	A36 A575, 576, (AISI or M Grades 1016 through 1030 except Grade 1017)
Bolts and nuts . . . . .	ASTM Designation:	A307
High strength		
Steel bolts, studs,		
And threaded rods		
For general application . .	ASTM Designation:	A449
High strength structural		
Steel bolts, nuts, and		
Washers . . . . .	ASTM Designation	A325
Gray iron castings . . . . .	ASTM Designation	A48, Class 308
Ductile iron castings . . . . .	ASTM Designation	A536, Grade 65 45-12
Carbon-steel castings . . . . .	ASTM Designation	A27, Grade 65-35
Cast iron pipe . . . . .	Commercial quality standard soil	
Steel pipe . . . . .	Commercial quality welded	
Washers and other parts . . . .	Commercial quality	

At the option of the CONTRACTOR, grates shall be fabricated from either structural steel conforming to the requirements of ASTM Designations: A 36 or A 576 Grades 1021, 1022, 1026, 1029 or 1030, ductile iron castings, or carbon-steel castings.

Welding shall conform to the requirements in AWS D1.1.

Fabrication shall be performed in a workmanlike manner in conformance with the practice in modern commercial shops, Burrs, rough and sharp edges, and other flaws shall be removed. Warped pieces shall be straightened after all fabrication and galvanizing.

Raised pattern plates shall be of commercial quality.

Manhole frames and covers shall be fabricated from gray cast iron.



Unless otherwise specified all steel items shall be galvanized in accordance with the provisions in Section 23-0.3, "Galvanizing." Galvanizing shall be performed after fabrication and before assembling component parts. All other cast iron items shall be painted with or dipped in commercial quality asphaltum.

Frames and grates or frames and covers shall be match-marked in pairs before installation. The grates and covers shall fit into their frames without rocking.

### 23-0.3 GALVANIZING

Galvanizing of products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip 1/8 inch thick or thicker, shall conform to the specifications of ASTM Designation: A123, except that complete seal welding of tightly contacting surfaces of such products prior to galvanizing is required only where seal welding is shown on the PLANS AND DRAWINGS or specified in the SPECIAL PROVISIONS. Except for pre-galvanized standard pipe, galvanizing of material 1/8 inch thick or thicker shall be performed after fabrication into the largest practical sections.

Unless otherwise provided, at the option of the CONTRACTOR, material thinner than 1/8 inch shall either be galvanized before fabrication in conformance with the requirements of ASTM Designation: A 525, Coating Designation G210, or after fabrication in conformance with the requirements of ASTM Designation: A 123, except that the weight of zinc coating shall average not less than 1.2 ounces per square foot of actual surface area with no individual specimen having a coating weight of less than 1.0 ounce per square foot.

Galvanizing of standard pipe shall conform to the requirements of ASTM Designation: A 120, except that the weight of the zinc coating for pipe used in fence work and pre-approved by the ENGINEER shall average not less than 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1.0 ounce per square foot of actual surface area. The weight of the zinc coating for any structural shape used in fence work, except for metal line posts for barbed wire and wire mesh fence, shall conform to the above requirement for pipe used in fence work. Galvanizing will not be required for stainless steel and similar corrosion resistant parts.

Fabrication shall include all operations such as shearing, cutting, punching, forming, drilling, milling, bending, welding and riveting.

All welded areas shall be thoroughly cleaned prior to galvanizing to remove all slag or other material that would interfere with the adherence of the zinc. When it is necessary to straighten any sections after galvanizing, such work shall be performed without damage to the zinc coating.

Galvanizing of iron and steel hardware and nuts and bolts, shall conform to the specifications of ASTM Designation: A 153, except whenever threaded studs, bolts, nuts, and washers are specified to conform to ASTM Designation: A307, A 325, A 449 or A 563, and galvanizing is required, they shall be hot-dip zinc coated or mechanically zinc coated in accordance with the requirements of said ASTM Designations. Galvanizing shall be performed after fabrication. Galvanizing of tapped holes will not be required.

Components of bolted assemblies shall be galvanized separately before assembly.

The minimum pitch diameter of the threaded portion of all bolts, anchor bars, or studs shall conform to ANSI Standard: B1.1, having a Class 2 tolerance before galvanizing. After galvanizing, the pitch diameter of the nuts or other internally threaded parts may be tapped over ANSI Standard: B1.1, Class 2B tolerance by the following maximum amounts:

7/16-inch and smaller .....	0.016-inch oversize
1/2-inch through 1 inch .....	0.021-inch oversize
1-1/8-inch and larger .....	0.031-inch oversize

Galvanized surfaces which are specified to be painted after galvanizing shall not be chemically treated after galvanizing and prior to cleaning and painting.

Galvanized surfaces that are abraded or damaged at any time after the application of the zinc coating shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating, after which the cleaned areas shall be painted with 2 applications of un-thinned commercial quality zinc-rich primer (organic vehicle type) conforming essentially to the requirements of Section 91-2.01 in Caltrans Standard. Spray cans shall not be used.

## 24-0 MONUMENTS

### 24-0.1 DESCRIPTION

This work shall consist of constructing cast-in-place Portland cement concrete survey monuments at the locations shown on the PLANS AND DRAWINGS or directed by the ENGINEER and as specified in these SPECIFICATIONS and the SPECIAL PROVISIONS.

Monuments shall conform to the dimensions and details shown on the PLANS AND DRAWINGS.

### 24-0.2 MATERIALS

The concrete portion of monuments shall be constructed in accordance with the provisions in Sections 14-0, "Concrete Structures," and 26-0, 11, Concrete Specifications."

Concrete shall be Class B or minor concrete at the option of the Contractor. A one inch maximum aggregate shall be used.

All concrete shall be thoroughly compacted and shall be cured in accordance with the provisions in Section 26-4.

Survey marker disks for survey monuments will be furnished by a registered Civil Engineer or Land Surveyor at the site of the project.

At the option of the CONTRACTOR, the frame and cover for Type D survey monuments shall be fabricated from either cast steel or gray cast iron. The covers shall fit into the frames without rocking.

The cast steel and gray cast iron frames and covers shall conform to the provisions in Section 55-2, "Materials" in CAL TRANS STANDARDS.

Granular material for Type D survey monuments shall be gravel, crushed gravel, crushed rock, or any combination thereof. Granular material shall not exceed 1 1/2 inches in greatest dimension.

#### 24-0.3 CONSTRUCTION

Survey monuments may be cast-in-place in neat holes without the use of forms, except where forms are shown on the PLANS AND DRAWINGS.

Brass Survey marker disks shall be placed in survey monuments before the concrete has acquired its initial set and shall be firmly bedded in the concrete. The concrete monument shall be so located that when the disk is placed in the center of the monument, the point being referenced will fall within a one inch circle in the center of the disk.

After the monuments have been constructed as specified, any resultant space around them shall be filled with earth, free from rock, or with base and surfacing material. Earthy material shall be watered and tamped into place.

Surplus excavated material remaining after the monuments have been constructed shall be disposed of in a uniform manner along the adjacent roadway or as directed by the ENGINEER.

### 25-0 ENGINEERING FABRICS

#### 25-0.1 DESCRIPTION

Engineering fabrics consisting of filter fabric shall conform to the requirements in this Section 25-0, "Engineering Fabrics."

Engineering fabrics shall be placed in accordance with these SPECIFICATIONS or as specified in the SPECIAL PROVISIONS.

A Certificate of Compliance for each kind of engineering fabric used in the WORK UNIT shall be furnished to the ENGINEER in accordance with the provisions in Section 6-0, "Certificates of Compliance."

Engineering fabrics shall be furnished in protective covers capable of protecting the fabric from ultraviolet rays, abrasion, and water.

#### 25-0.2 FILTER FABRIC

Filter fabric shall be manufactured from polyester, nylon, or polypropylene material, or any combination thereof. The fabric shall be non-woven, shall not act as a wicking agent, shall be permeable, must meet the PLANS AND DRAWINGS and SPECIFICATIONS and be approved by the ENGINEER.

### 26-0 CONCRETE SPECIFICATIONS

#### 26-0.1 GENERAL

##### 26-0.1A DESCRIPTION OF WORK

The extent of concrete work is shown on PLANS AND DRAWINGS.

##### 26-0.1B QUALITY ASSURANCE

CODES AND STANDARDS - Comply with all code provisions of the American Concrete Institute, and the Concrete Reinforcing Steel Institute, "Manual of Standard Practice," current editions.

CONCRETE TESTING SERVICE - CONTRACTOR will employ a testing laboratory to perform all concrete testing and will pay for testing.

If initial concrete tests indicate that materials and/or installed work do not comply with the requirements of these SPECIFICATIONS, the PLANS AND DRAWINGS, or the SPECIAL PROVISIONS, such materials and/or installed work shall be retested, as directed by the ENGINEER, at the CONTRACTOR's expense. If retesting does not indicate compliance to the PLANS AND DRAWINGS and SPECIFICATIONS, the DISTRICT has the option to reject and have removed and replaced all non-conforming concrete at CONTRACTOR's expense.

##### 26-0.1C SUBMITTALS

PRODUCT DATA - Submit manufacturer's product data with application and installation instructions for proprietary materials and items, installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, finish materials and others for approval by the ENGINEER. Furnish three copies of all submittals and allow 20 working days for the return with ENGINEER's comments.

#### 26-0.1D SHOP DRAWINGS

Submit shop drawings for fabrication and placement of form work. Include any special reinforcement required of opening through form work. All such shop drawings shall bear the stamp of a California registered Civil or Structural Engineer.

#### 26-0.1E LABORATORY TEST REPORTS

Submit laboratory test reports for concrete materials and mix design test as specified.

#### 26-0.1F VERIFICATION

Examine substrata ,surfaces ,and site conditions under which work is to be performed.

Correct all unsatisfactory conditions which would prevent proper and timely completion of the work.

Do not proceed until unsatisfactory conditions have been corrected to the ENGINEER's satisfaction.

### 26-1 PRODUCTS

#### 26-1.1 MATERIALS

FORMS FOR EXPOSED FINISH CONCRETE - Unless otherwise indicated, construct form work for concrete surfaces with plywood, metal, metal framed plywood faced or other acceptable panel type materials, to provide continuous, straight, smooth, surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on PLANS AND DRAWINGS. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

Use plywood complying with U.S. Product Standard PS-1 "B-B Concrete Form Plywood," Class I, Exterior Grade or better, milled and edge-sealed, with each piece bearing legible inspection trademark.

FORM TIES - Provide and install factory fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent deflection, and to prevent spalling concrete

surfaces upon removal.

Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 1/2" from the outer concrete surface. Unless otherwise indicated, provide form ties which will leave a hole not larger than 1" diameter in the concrete surface.

## 26-1.2 RELATED MATERIALS

### NON-SHRINK GROUT

CRD-C 588, factory premixed grout.

### PRODUCTS

Subject to compliance with requirements, provide one of the following:

1. Type D, Non-metallic:
  - "Masterflow 713," Master Builders
  - "SonogROUT," Sonneborn-Contech
  - "Euco-NS," Euclid Chemical Co.
  - "Five Star Grout," U.S. Grout Co.
  - "DuragROUT," L & M Construction Chemical Co.

or approved equal.

### LIQUID CHEMICAL CURING, HARDENING A14D SEALING COMPOUND

Ashford Formula: Curecrete Chemical Co. Cenco/Seal 301: Century Concrete Chemicals Cure & Hard: Symons Corp.

or approved equal.

Apply to all exposed interior building slabs and to walks.

### MOISTURE RETAINING COVER

One of the following, complying with ANSI/ASTM C 171.

Waterproof paper  
Polyethylene film  
Polyethylene-coated burlap

or approved equal.

### BONDING COMPOUND

Polyvinyl acetate, rewettable type.

### PRODUCTS

Subject to compliance with requirements, provide one of the following:

"Weldcrete," Larson Products  
"Everbond," L & M Construction Chemicals  
"Euroweld," Euclid Chemical Co.  
"Daraweld," W. R. Grace  
"Sonocrete," Sonneborn-Contech

or approved equal.

### EPOXY ADHESIVE

100% solids, two component material suitable for use on dry or damp surfaces.

### PRODUCTS

Subject to compliance with requirements provide one of the following:

"Thiopoxy," W. R. Grace  
"Sikadur Hi-Mod,11 Sika Chemical Corp.  
"Euco Epoxy," Euclid Chemical Co.  
"Waterstop RX,11 American Colloid Co.

or approved equal

## 26-1.3 PROPORTION AND DESIGN OF MIXES

### 26-1.3A GENERAL

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to DISTRICT for preparing and reporting proposed mix designs. The testing facility shall not be the same as for field quality control.

### 26-1.3B CONCRETE MIX DESIGNS

The design of the concrete mixtures shall be the responsibility of the

CONTRACTOR, and shall be subject to review and approval by the ENGINEER.

Submit written reports to ENGINEER of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by ENGINEER.

Design mix to provide normal weight concrete with the following properties:

Structure Concrete shall have a 28-day minimum compression strength of 3,000

Concrete used in Cast-In-Place Concrete Pipe shall have a 28-day minimum compression strength of 2,500 p.s.i.

ADJUSTMENT TO CONCRETE MIXES - Mix design adjustments may be requested by CONTRACTOR when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to owner and as accepted by ENGINEER. Laboratory test data for revised mix design and strength results must be submitted to and accepted by ENGINEER before using in work.

SLUMP LIMITS - Proportion and design mixes for structure concrete shall result in concrete slump at point of placement shall be 211 to 411.

#### 26-1.3C CONCRETE MIXES

READY MIX CONCRETE - Comply with requirements of ANSI/ASTM C 94, and as herein specified.

Delete references for allowing additional water to be added to batch for materials with insufficient slump. Addition of water to the batch will not be permitted.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C 94 may be required.

### 26-2 EXECUTION

#### 26-2.1 INSTALLATION

##### 26-2.1A FORMS

Design, erect, support, brace and maintain formwork support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape,



alignment elevation and position. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms in compliance with ACI 347, to sizes shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plum work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rust cations, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for formkeyways reglets, recesses, and the like, to prevent swelling and for easy removal.

#### ALLOWABLE TOLERANCE

Variation in cross-sectional dimensions:  $1/8 + 1/4$  inch, variation in surface tolerance:  $1/8$  inch in 1 ft. in any direction as determined by 10 ft. straightedge.

#### PROVISIONS FOR OTHER TRADES

Provide openings in concrete formwork to accommodate work of other trades. Determine size and location on openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

#### CLEANING AND TIGHTENING

Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement if required to eliminate mortar leaks and maintain proper alignment.

#### 26-2.1B CONVEYING

The methods and equipment used for conveying or transporting concrete shall maintain the concrete's required composition and consistency without segregation or loss of slump.

1. Extensive shifting of the mass of fresh concrete by vibrating will not be permitted.

2. Use elephant trunks or adjustable pipe if it is more than 6 feet.
3. Where free drop through tremies exceeds 18 ft. use flow checking devices.

#### 26-2.1C JOINTS

##### CONSTRUCTION JOINTS

Locate and install construction joints, which are shown on PLANS AND DRAWINGS, so as not to impair strength and appearance of the structure, as acceptable to ENGINEER.

Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.

Install Waterstop RX per manufacturers recommendations at locations indicated on the PLANS AND DRAWINGS and as required in the SPECIFICATIONS.

Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

Form joints straight, in accurate alignment, and of uniform width throughout their entire lengths.

#### 26-2.1D INSTALLATION OF EMBEDDED ITEMS

##### GENERAL

Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

##### EDGE FORMS AND SCREED STRIPS FOR SLABS

Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strikeoff templates or accepted compacting type screeds.

#### 26-2.1E PREPARATION OF FORM SURFACES

Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type and in amount, and under conditions of form-coating compound manufacturer's instructions.

## 26-3 CONCRETE PLACEMENT

### 26-3.1 PREPLACEMENT INSPECTION

Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

No concrete shall be placed until formwork, concrete reinforcement, and embedments have been inspected and approved by the ENGINEER. Allow one working day for the ENGINEER's inspection after formwork, etc. are ready for concrete placement.

### 26-3.2 GENERAL

Comply with ACI 304, and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

### 26-3.3 PLACING CONCRETE IN FORMS

Consolidate placed concrete by mechanical vibrating equipment supplemented by handspading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibration to rapidly penetrate place layer and at least 6" into preceding layer.

Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

Employ ample number of vibrators to consolidate the incoming concrete to the proper degree within five minutes after it is deposited.

### 26-3.4 PLACING CONCRETE SLABS

Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Maintain reinforcing in proper position during concrete placement operations.

Bring slab surfaces to correct level with straightedge and strike-off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

#### 26-3.5 COLD WEATHER PLACING

Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

When the mean daily air temperature has fallen to or is expected to fall below 40 degrees F., uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F., and not more than 90 degrees F. at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs approved by the ENGINEER.

#### 26-3.6 HOT WEATHER PLACING

When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing. Ensure complete melting of ice prior to completion of mixing.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

Wet forms thoroughly before placing concrete.

Do not use water-reducing retarding admixture unless otherwise accepted in mix designs approved by the ENGINEER.

#### 26-3.7 SLAB FINISHES

Trowel finish; unless otherwise noted, match existing finish. Use edger with 3/4" radius to round all corners and exposed edges.

## 26-4 CONCRETE CURING AND PROTECTION

### 26-4.1 GENERAL

Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACU 301 procedures. Avoid rapid drying at end of final curing period.

### 26-4.2 CURING METHODS

Perform curing of concrete by moist curing, by curing compound, and by combinations thereof, as herein specified.

Provide moisture curing by one of the following methods:

Keep concrete surface continuously wet by covering with water.

Continuous water-fog spray.

Apply liquid curing compound.

Provide moisture-cover curing as follows:

Cover concrete surfaces with moisture retaining cover for curing concrete, placed at widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

### 26-4.3 LIQUID CHEMICAL CURING HARDENING AND SEALING COMPOUND

Apply to surfaces of all concrete paving, walks, ramps, and to interior concrete slabs. Apply two successive coats in accordance with manufacturer's instructions.

### 26-4.4 REMOVAL OF FORMS

Formwork not supporting the weight of the concrete, such as sides of footings, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F. for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

#### 26-4.5 MISCELLANEOUS CONCRETE ITEMS

Filling-In: Fill-in holes and openings left in concrete after work by other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

#### 26-5 CONCRETE SURFACE REPAIRS

##### 26-5.1 PATCHING DEFECTIVE AREAS

Repair and patch defective areas with cement mortar immediately after removal of forms.

Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surfaces. Thoroughly clean, dampen with water and brushcoat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white Portland Cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strikeoff slightly higher than surrounding surface.

##### 26-5.2 REPAIR OF FORMED SURFACE

Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the ENGINEER. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

##### 26-5.3 REPAIR OF UNFORMED SURFACES

Test unformed surfaces, for smoothness and verify surface plane to tolerances specified for surface finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

Submit proposed repair method to the ENGINEER for approval.

##### 26-5.4 QUALITY CONTROL TESTING DURING CONSTRUCTION

The CONTRACTOR will employ a testing laboratory to perform tests and to submit test reports.

Sampling and testing for quality control during placement of concrete may include the following, as directed by the ENGINEER.

Sampling Fresh Concrete: ASTM C 172, except as modified for slump to comply with ASTM C 94.

26-5.4A SLUMP

ASTM C 143, one test for each concrete load at point of discharge.

26-5.4B AIR CONTENT

ASTM C 17.3, volumetric method; ASTM C 231 pressure concrete; one for each set of compressive strength test specimens.

26-5.4C WATER STOP INSTALLATION REQUIREMENTS

Specifications on all submitted "PLANS AND DRAWINGS" shall state and require that "Water Stop R/X" be installed in accordance with installation instructions recommended by the Manufacturer. The specifications and the approved PLANS AND DRAWINGS shall further require that the Water Stop R/X be held snugly in place with plastic or metal netting or other non-biodegradable material of similar construction. A sample of the netting material proposed to be used shall be submitted to the ENGINEER for approval prior to installation. No substitutions of the Waterstop R/X or netting material will be permitted without the written approval of the ENGINEER.



STANDARD DRAWINGS

ADOPTED JULY 28, 1992



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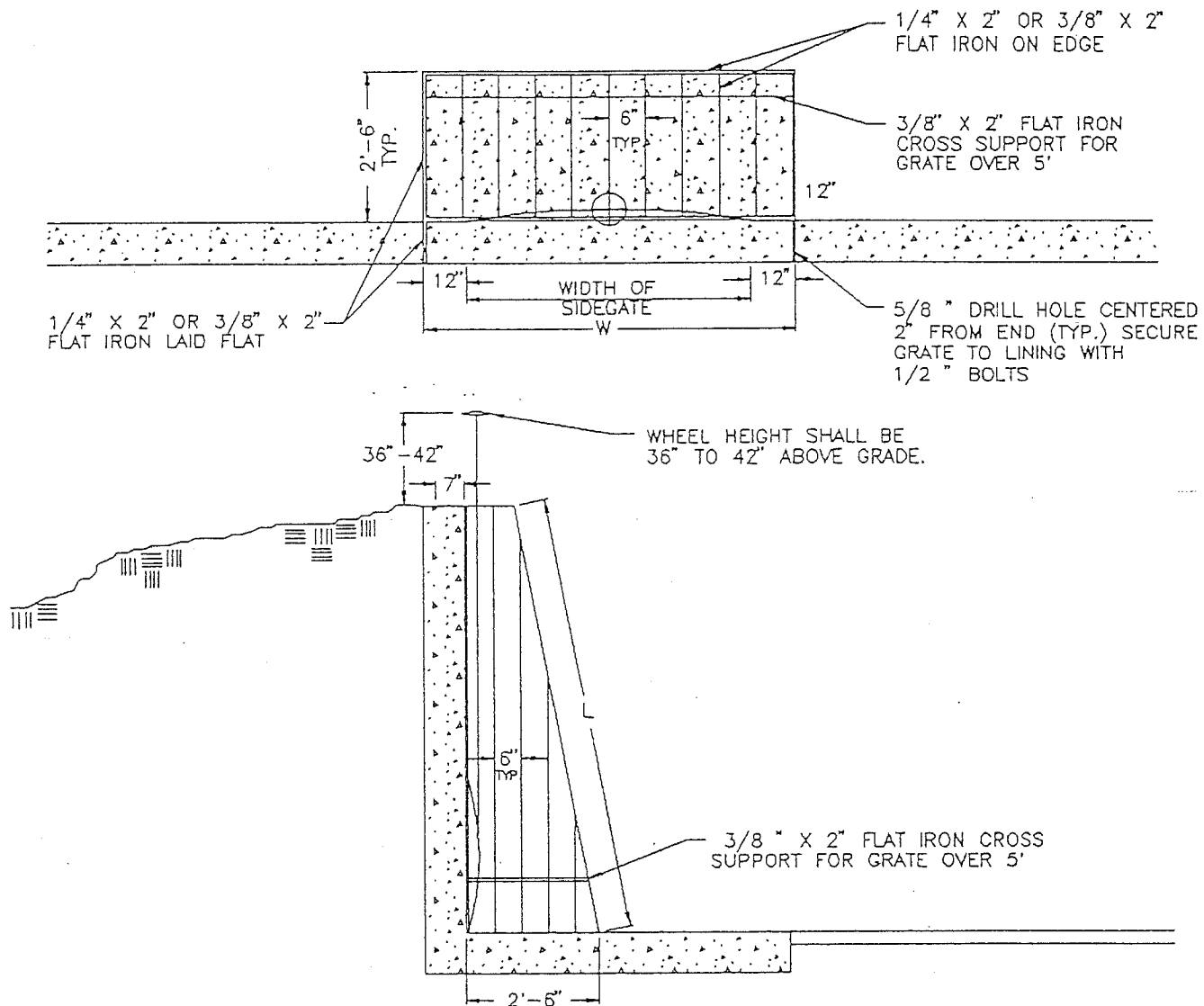
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**NOTE:**

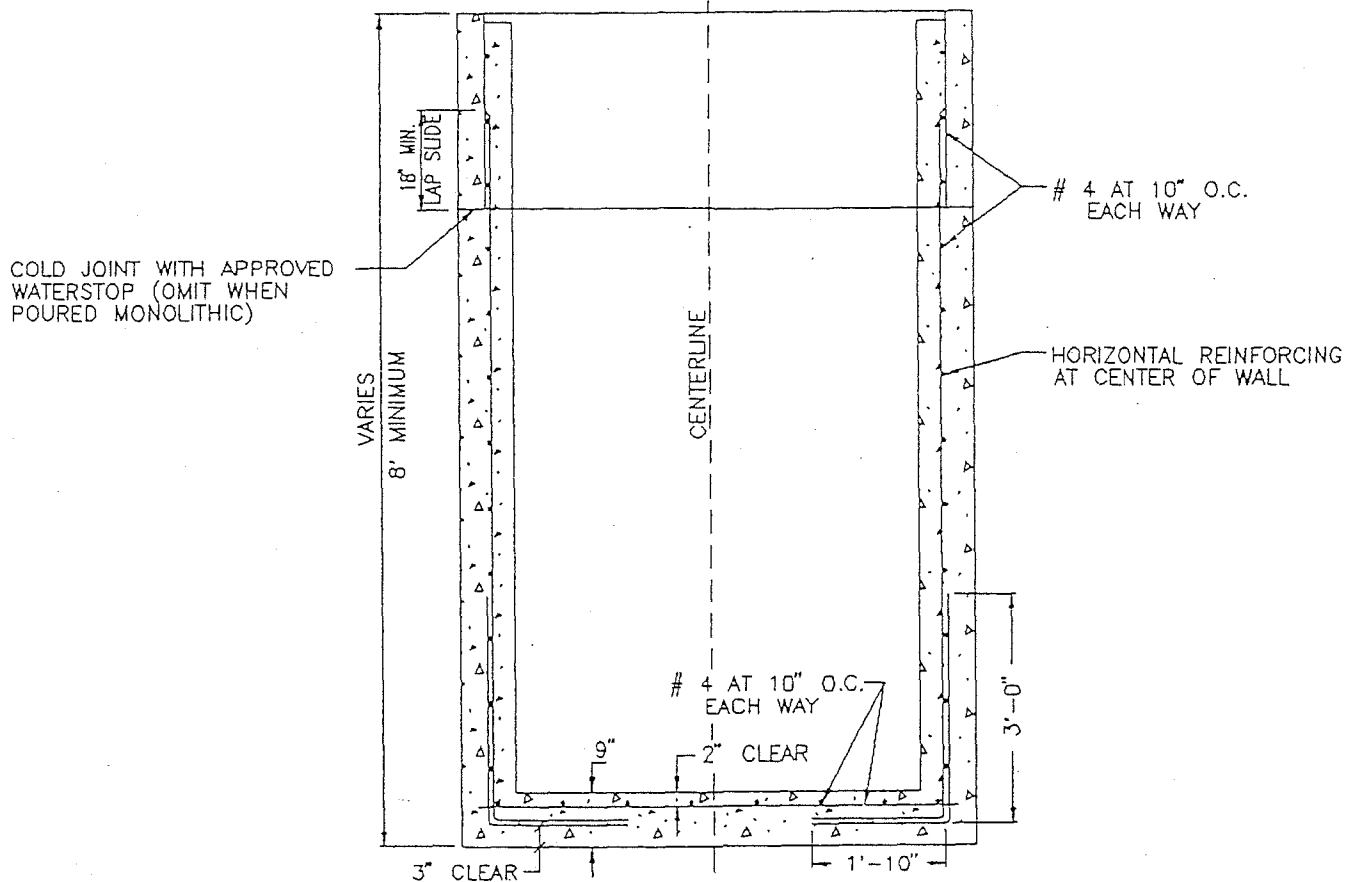
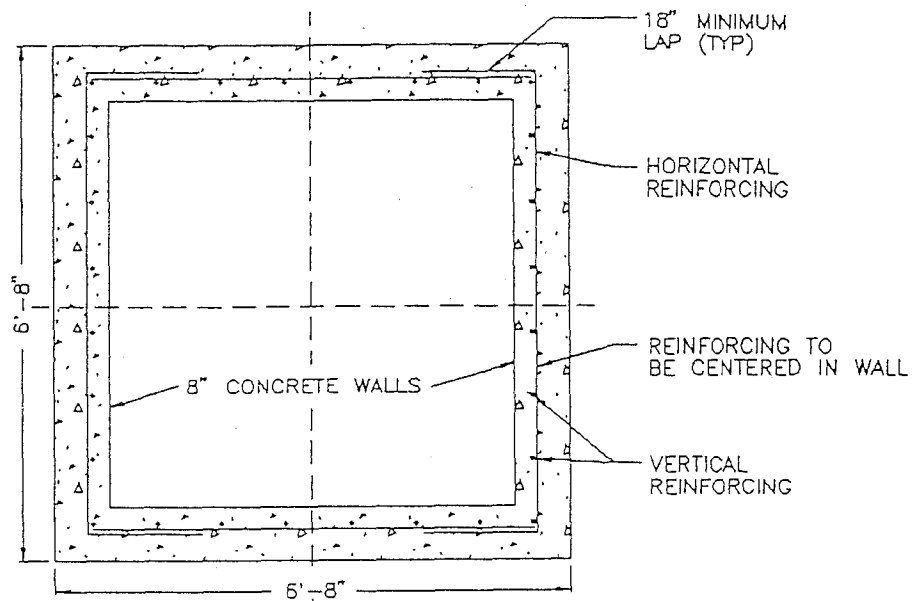
IF L IS LESS THAN 5' LONG USE 1/4" X 2' FLAT IRON.  
 IF L IS GREATER THAN 5' LONG USE 3/8" X 2' FLAT IRON WITH A 3/8" X 2'  
 CROSS SUPPORT PLACED AT 5' FROM TOP.  
 GRATE IS TO BE GALVANIZED BEFORE INSTALLATION.  
 GRATE WIDTH "W" IS SIDEGATE WIDTH PLUS 24".  
 L IS TO BE DETERMINED IN THE FIELD.  
 PAINT ALL EXPOSED STEEL AS PER DISTRICT SPECS.

NO.	REVISED	DATE

GRATE FOR CANAL SIDEGATE  
 WITH VERTICAL WALLS  
 LINED CANAL SECTION

SOUTH SAN JOAQUIN  
 IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	8/09/02
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	8-2-02
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO.	7.09



NO.	REVISED	DATE

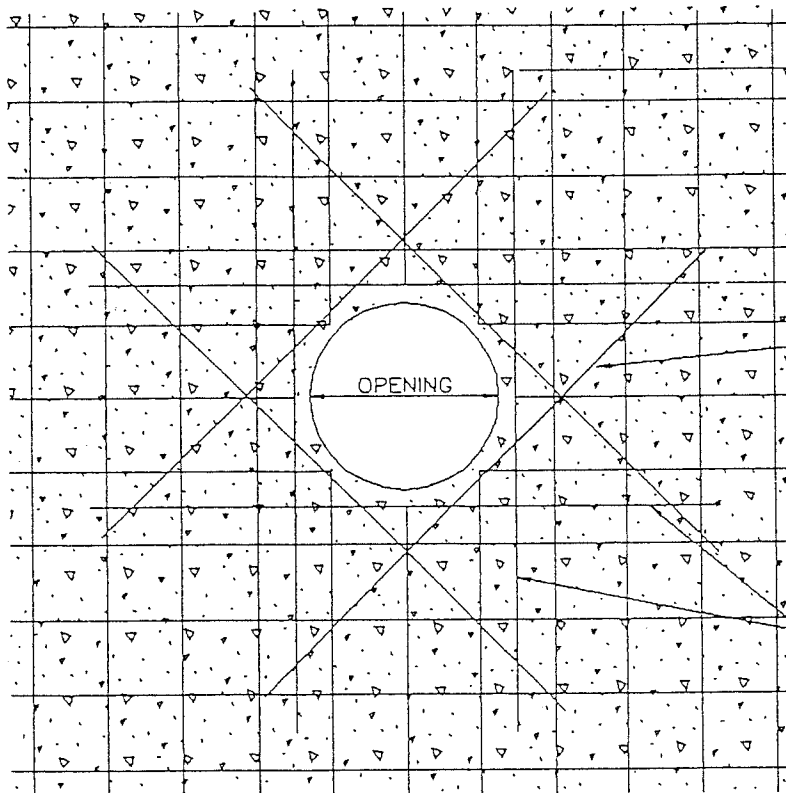
DRAWN BY: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

SCALE: NONE

# TYPICAL REINFORCING DETAIL ALL STRUCTURES SOUTH SAN JOAQUIN IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY: *[Signature]* 8/8/72  
 ENGINEERING DEPT. HEAD  
 APPROVED BY: *[Signature]* 8-23-72  
 PRESIDENT, BOARD OF DIRECTORS  
 STANDARD NO. 1.01



LAITANCE

4-#4 DIAGONAL BARS, MIN. 2 BAR DIAMETERS BEYOND INTERSECTION OF DIAGONAL BARS.

REPLACE INTERRUPTED REINFORCING WITH EQUIVALENT AMOUNT AT SIDES OF OPENINGS. USE EQUAL NUMBER OF BARS ON EACH SIDE. ADDITIONAL HORIZONTAL BARS MUST BE THE SAME LENGTH AS SCHEDULED BARS WITHOUT OPENINGS. ADDITIONAL VERTICAL BARS MUST EXTEND 2 FEET BEYOND OPENING. IF 2 FEET CANNOT BE OBTAINED, USE STD. HOOK INTO PERPENDICULAR WALL OR SLAB.

### BONDING OF CONCRETE SURFACES

BEFORE DEPOSITING NEW CONCRETE ON OR AGAINST CONCRETE WHICH HAS SET, THOROUGHLY ROUGHEN AND CLEAN EXISTING SURFACES OF ALL LAITANCE, FORIEN MATTER AND LOOSE PARTICLES. THIS MAY BE ACCOMPLISHED BY SCRATCHING WITH A STIFF BRISTLE BRUSH OR BROOM WHILE THE NEW CONCRETE IS STILL SOFT OR BY SANDBLASTING OR BUSHHAMMERING EXISTING HARDENED CONCRETE.

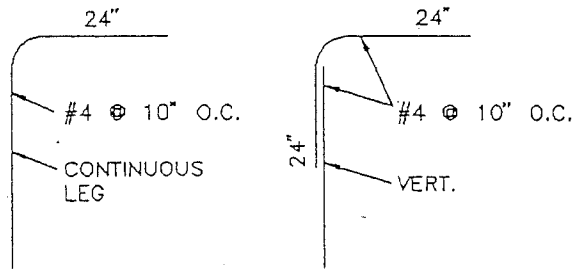
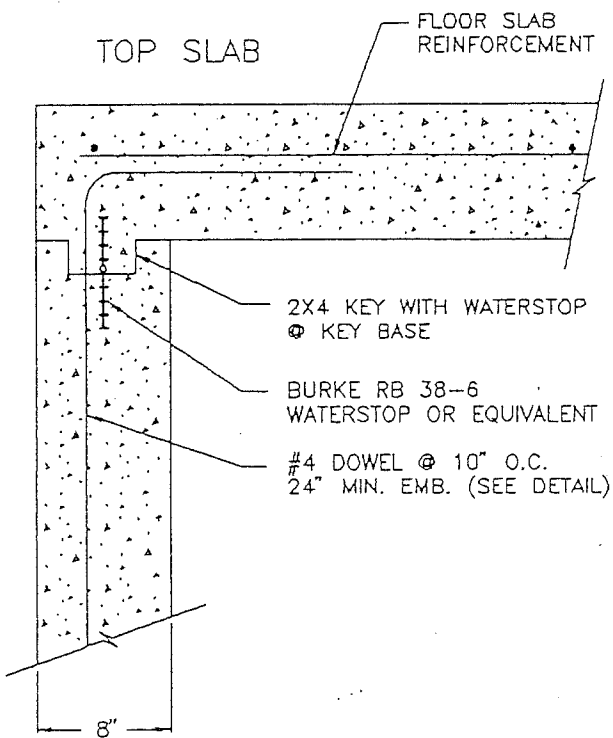
PRIOR TO PLACING NEW CONCRETE, THE EXISTING CONCRETE WILL BE WASHED COMPLETELY CLEAN AND SURFACE DRIED AND INSTALL WATERSTOP RX OR EQUIV.. PLACE FRESH CONCRETE BEFORE GROUT HAS ATTAINED ITS INITIAL SET. THE GROUT MIX WILL CONSIST OF 1 PART CEMENT AND 2 PARTS WELL GRADED, WASHED SAND AGGREGATE.

NO.	REVISED	DATE

TYPICAL OPENING  
REINFORCING DETAIL  
FOR ALL STRUCTURES

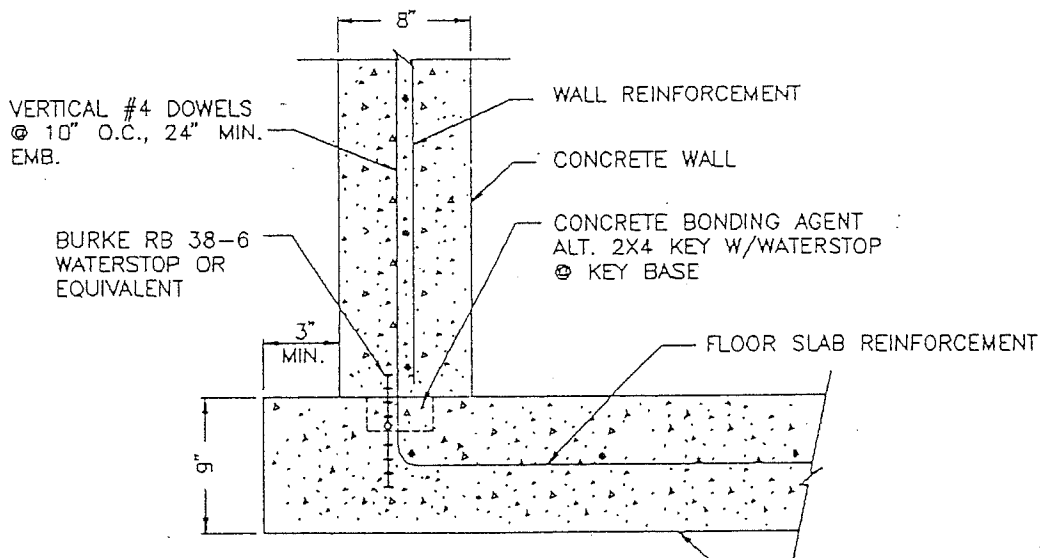
SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>[Signature]</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>[Signature]</i>	8-8-92
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO. 1.02	



DOWEL DETAIL ALTERNATE

TYPICAL CONSTRUCTION  
COLD JOINT



TYPICAL CONSTRUCTION  
COLD JOINT  
(PRESSURE MANHOLE)

NO.	REVISED	DATE

TYPICAL CONSTRUCTION  
COLD JOINT

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	8/8/72
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	DATE
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO.	1.03

RECOMMENDED FOR APPROVAL BY:	
<i>Bill Brown</i>	8-6-74
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Harry M. Pipp</i>	8-5-74
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO.	1.04





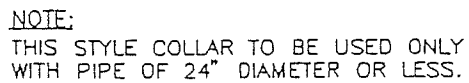
1. ALL METAL SURFACES TO BE PAINTED  
W/ 1 COAT RED RUSTOLEUM PRIMER,  
2ND COAT GREEN RUSTOLEUM, FINAL  
COAT, SAND OR TAN EXT. GLOSS FINISH  
OR APPROVED EQUAL.
2. ALL WELDS ARE 1/4" FILLET ALL  
JOINTS.

Diagram illustrating the installation of a horizontal support bar (labeled 1/2" THROUGH BOLTS) across the three-tiered metal shelving unit. The distance between the vertical support posts is indicated as 8' MAX.

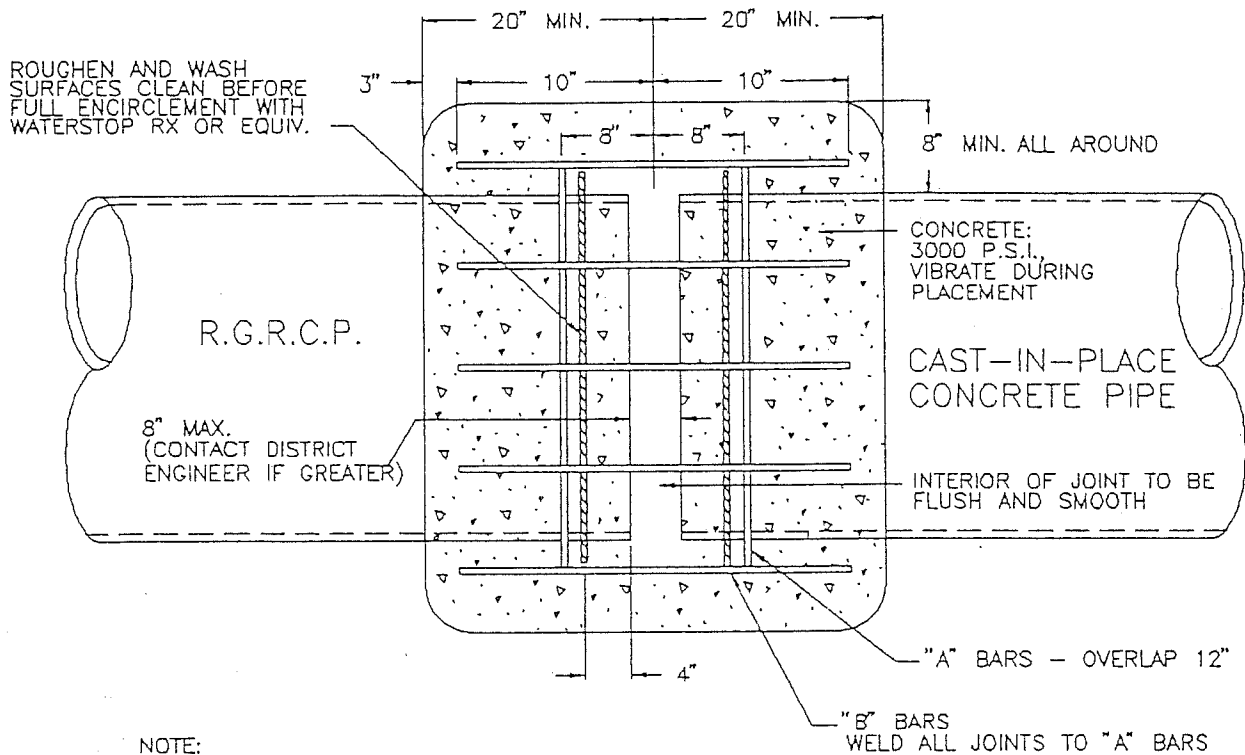
NO.	REVISED	DATE
1	RAY HELLSTROM	6-16-92
DRAWN BY:		
CHECKED BY:		
SCALE: NONE		

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>Rk Bogue</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Plaza La Roca</i>	8-8-92
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO. 1.06	



RECOMMENDED FOR APPROVAL BY:	
<i>R. K. B...</i>	<i>8/8/9</i>
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Harold B...</i>	<i>P. R. G.</i>
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO. 2.01	



**NOTE:**  
CONCRETE TO BE PLACED ONLY AFTER APPROVAL OF S.S.J.I.D.

**NOTE:**  
ALL DIMENSIONS OUT TO OUT UNLESS SPECIFIED OTHERWISE

### REINFORCING BAR SCHEDULE

BAR	SIZE	DESCRIPTION		
"A"	2 - #4	30" PIPE	36" PIPE	42" PIPE
"B"	#4	43" DIA.	50" DIA.	57" DIA.
		9 EA.	10 EA.	12 EA.

**NOTE:**  
ALL "B" BARS TO BE EVENLY SPACED OVER HOOPS

NO.	REVISED	DATE
1	RAY HELLSTROM	7-22-92

DRAWN BY:

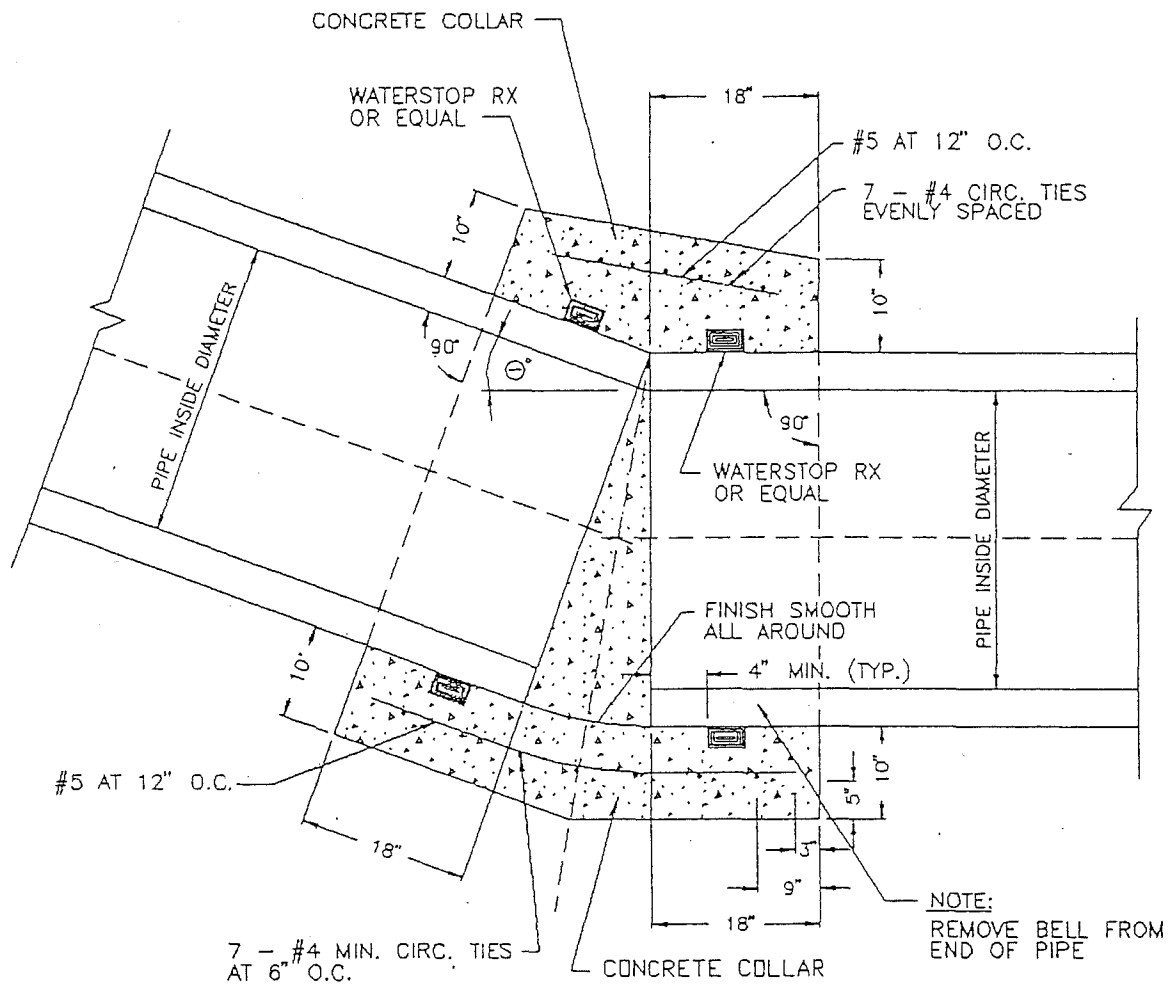
CHECKED BY:

SCALE: NONE

CONCRETE COLLAR FOR  
LARGE DIAMETER PIPE

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>R. B. B.</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Harry H. B.</i>	8-8-92
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO.	2.02



**NOTES:**

1. ANGLE  $\ominus$  SHALL BE DETERMINED IN THE FIELD AND REBAR PLACEMENT APPROVED BY S.S.J.I.D. CONSTRUCTION INSPECTOR PRIOR TO CONCRETE PLACEMENT.
2. CONCRETE SHALL BE A MINIMUM 5 1/2 SACK MIX.
3. CONCRETE SHALL BE VIBRATED AROUND PIPE JOINT DURING PLACEMENT.
4. INSIDE JOINT TO BE SMOOTH FINISH (BRUSHED) & FLUSH.

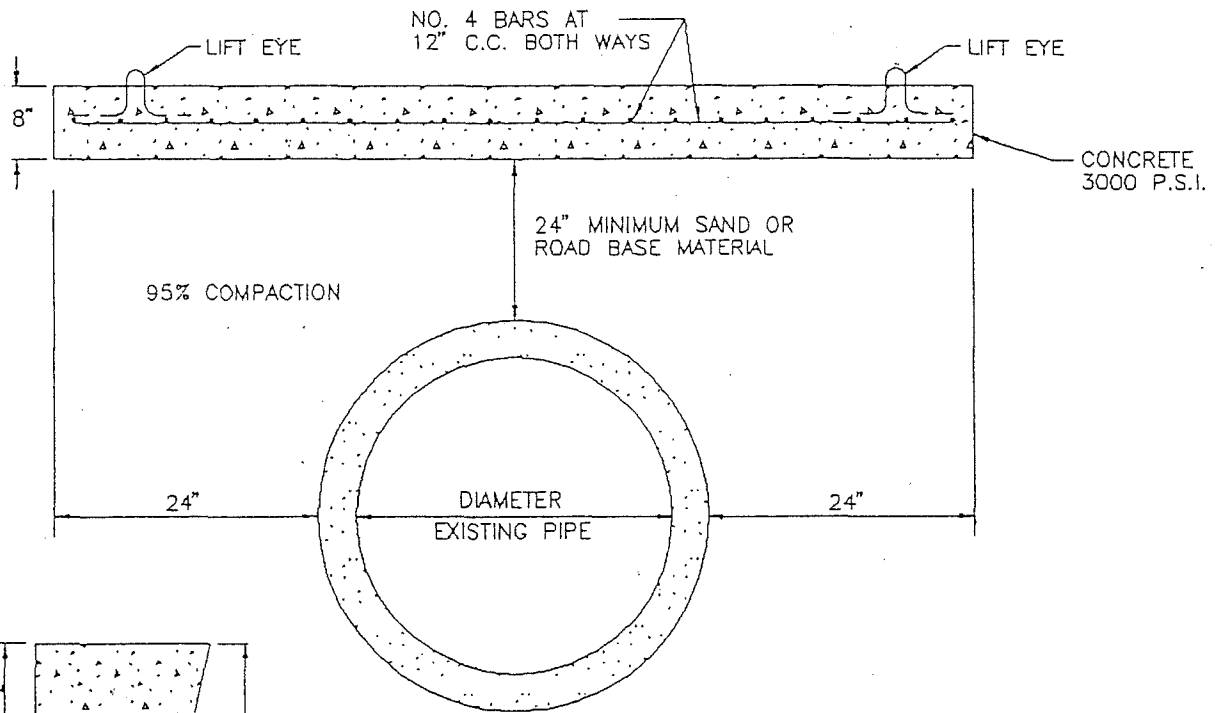
NO.	REVISED	DATE

## ANGLED PIPE JOINT COLLAR

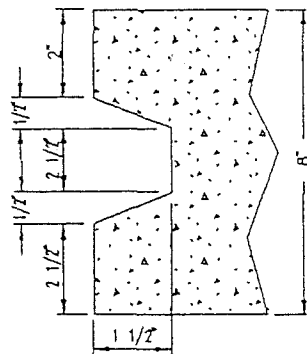
SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	8-2-92
PRESIDENT,	DATE
BOARD OF DIRECTORS	
STANDARD NO.	2.03





NOTE:  
FOR USE IN RURAL/ AGRICULTURE SETTINGS ONLY  
WHERE MINIMUM COVERAGE CANNOT BE  
ACHIEVED, R.G.R.C.P. MUST BE USED.



NO.	REVISED	DATE

DRAWN BY:

CHECKED BY:

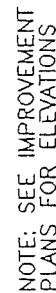
SCALE: NONE

# PROTECTION AT STREETS AND DRIVEWAYS FOR EXISTING CONCRETE PIPE

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

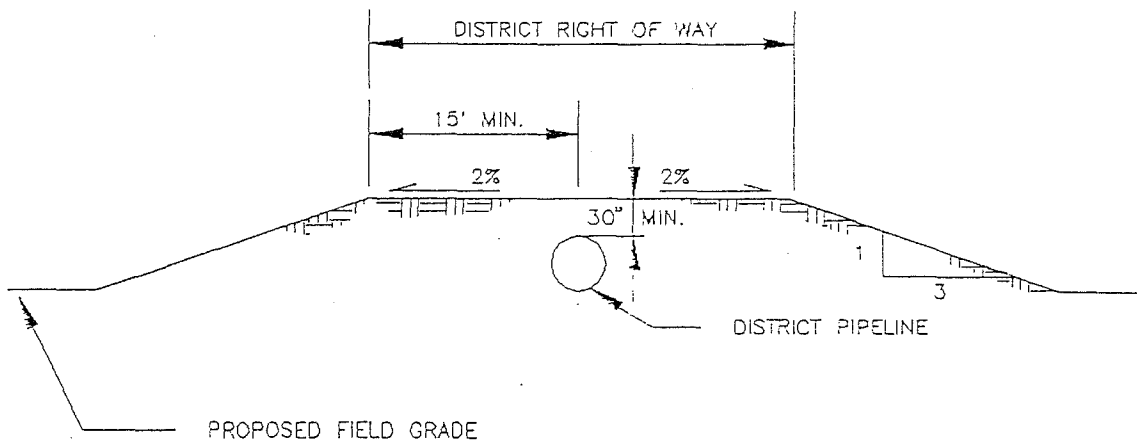
RECOMMENDED FOR APPROVAL BY:	
<i>Wk Bygon</i>	<i>8/8/92</i>
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Harry M. Pys R-92</i>	
PRESIDENT, BOARD OF DIRECTORS	DATE

STANDARD NO. 2.05



RECOMMENDED FOR APPROVAL BY: <i>W. L. Brown</i>		8/2/72
ENGINEERING DEPT. HEAD		DATE
APPROVED BY: <i>W. L. Brown</i>		8-2-72
PRESIDENT, BOARD OF DIRECTORS		DATE
STANDARD NO.		2.06





#### NOTES

UNLESS OTHERWISE SPECIFIED:

1. SURFACE: TO BE COMPACTED TO 90%-95%, W/ 2" TOP SURFACE OF SAND, ROADWAY WIDTH IS MEASURED FROM CENTER LINE OF PIPELINE, ACTUAL WIDTH TO BE DETERMINED BY S.S.J.I.D. ENGINEER. MEASUREMENTS SHOWN ARE TYPICAL.
2. ADJACENT SPRINKLER IRRIGATION IS NOT TO WET ROADWAY OR BANKS.
3. DISTRICT RIGHT OF WAY IS TO REMAIN CLEAR OF ALL OBSTACLES, RUBBISH, EQUIPMENT, ETC. AT ALL TIMES.
4. THIS STANDARD IS TO BE USED AT ALL LOCATIONS WHERE LAND LEVELING OR SOIL EXCAVATION WORK REMOVES SOIL FROM LAND ADJACENT TO DISTRICT PIPELINES.

NO.	REVISED	DATE	PIPELINE ROADWAY CONSTRUCTION	RECOMMENDED FOR APPROVAL BY:
				<i>[Signature]</i> 7/5/12
				ENGINEERING DEPT. HEAD / DATE
				APPROVED (BY):
				<i>[Signature]</i> 7/5/12
DRAWN BY: RAYMOND			SOUTH SAN JOAQUIN IRRIGATION DISTRICT	PRESIDENT, BOARD OF DIRECTORS / DATE
CHECKED BY: SAME				
SCALE: 1"=1'				
				STANDARD NO. 2.07

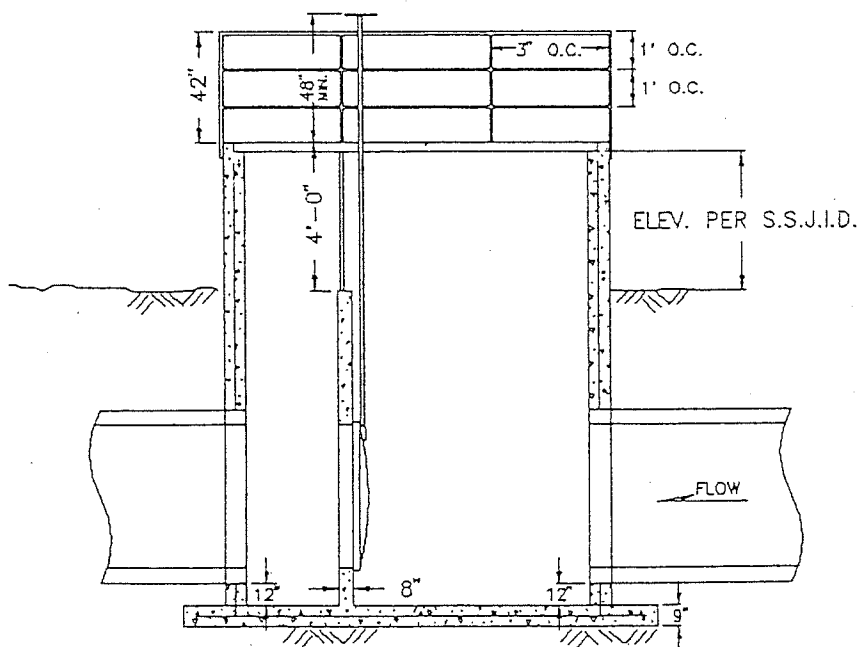
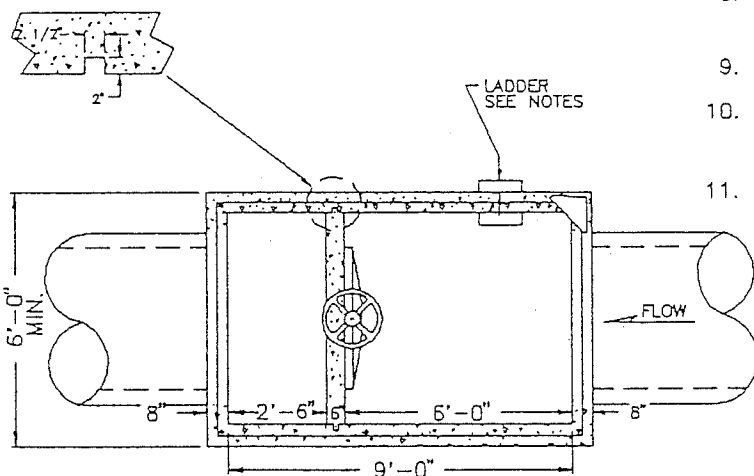
STANDARD NO.3.01

## NOTES

UNLESS OTHERWISE SPECIFIED:

1. MATERIAL: 3000psi, CLASS "A" CEMENT.
2. REINFORCEMENT: #4 REBAR 10" O.C. MIN.  
SEE TYP. REINFORCEMENT DETAIL.
3. JOINTS: ALL COLD JOINTS MUST BE PREPARED  
AS PER S36, TYP. COLD JOINT CONSTR.
4. VENT: 24" MIN., UNLESS SPECIFIED BY  
DISTRICT ENGINEER.
5. GROUND COVER: MIN. 30" FROM TOP OF  
PIPELINE.
6. HOOK-UP: 3 SECTIONS R.G.R.C.P. MIN. WITH R.X.  
WATER STOP IN CONNECTIONS TO STRUCTURE.  
FLUSH FIT WITH SMOOTH INTERIOR FINISH.
7. ALL ELEVATIONS TO BE DETERMINED BY S.S.J.I.D.  
ENGINEER.
8. RAILING IS TO BE INSTALLED ON ALL STRUCTURES  
EXCEEDING 4' ABOVE FIELD GRADE—SEE STANDARD  
FOR DETAILS.
9. BOX TOP: EXPANDED METAL W/ ACCESS DOOR  
AS PER S.S.J.I.D. STANDARDS.
10. GATE: WATERMAN C-10 TYPE OR EQUAL  
W/ ROLLER BEARING TYPE COLLAR W/  
GREASE FITTINGS (NO OIL COLLARS).
11. LADDERS: REQUIRED IF BOX IS 24" ABOVE  
GROUND LEVEL, SEE DISTRICT STANDARDS.

CHANNEL DETAIL  
BOTH SIDES

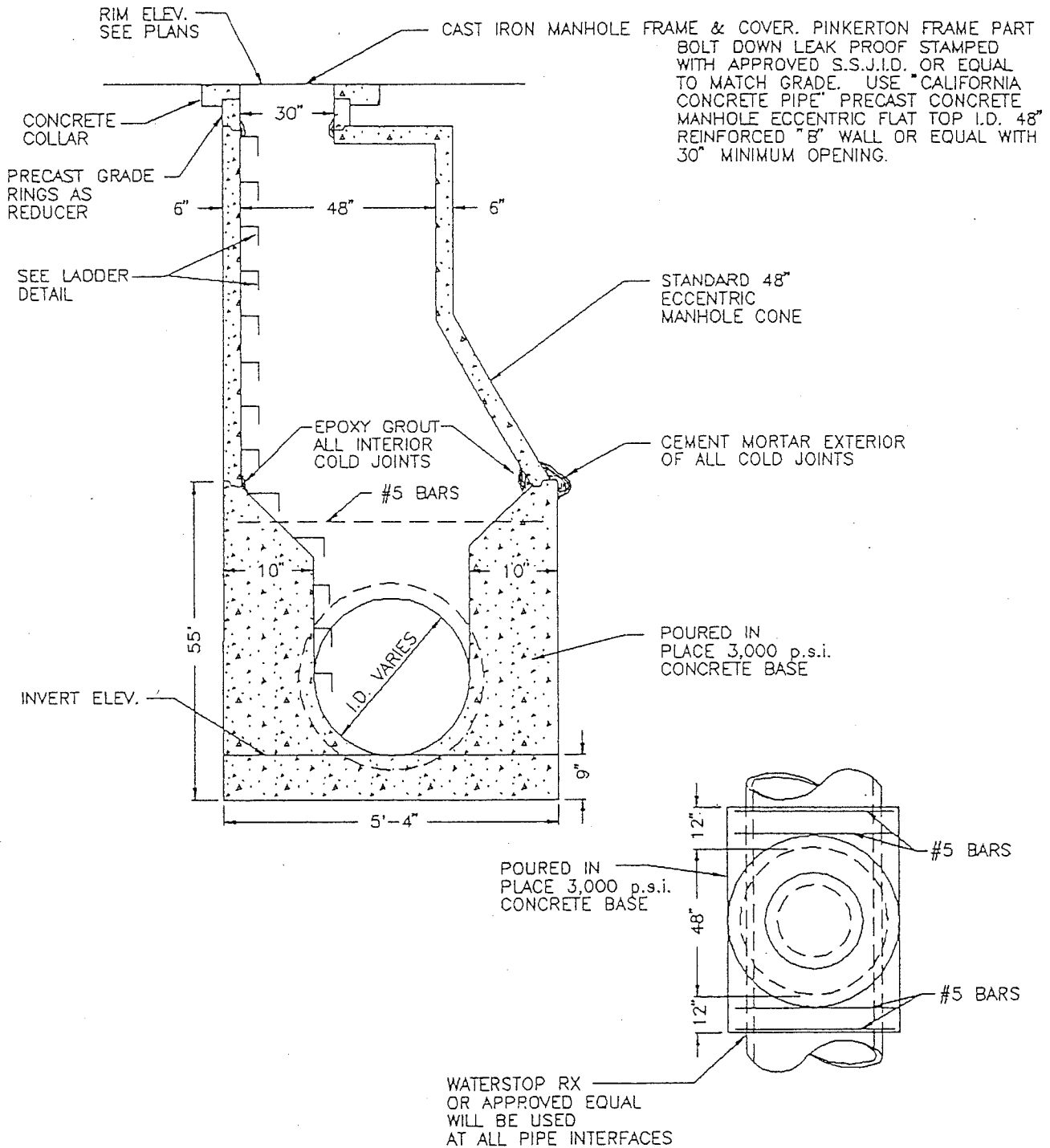


NO.	REVISED	DATE
1	RAY HELLSTROM	6-19-92

## IRRIGATION POUR-OVER BOX DETAIL

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	8/8/92
ENGINEERING/DEPT. HEAD	DATE
APPROVED BY:	8-2-92
PRESIDENT,	DATE
BOARD OF DIRECTORS	
STANDARD NO.	3.02



NO.	REVISED	DATE

DRAWN BY:  
 CHECKED BY:  
 SCALE: NONE

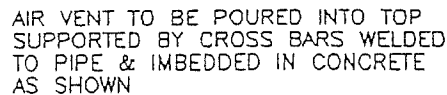
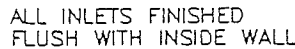
## PRECAST MANHOLE

SOUTH SAN JOAQUIN  
 IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:  
*Rich B...* 8/8/92  
 ENGINEERING DEPT. HEAD  
 APPROVED BY:  
*...* 8/8/92  
 PRESIDENT,  
 BOARD OF DIRECTORS  
 STANDARD NO. 3.03

UNLESS OTHERWISE SPECIFIED:

- SIDEWALK OR FINISH LOT GROUND ELEV.

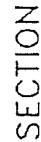


NOTE:  
FLOOR & WALLS OF CHAMBER  
MUST BE INSTALLED IN SINGLE  
POUR. SEE COLD JOINT DISTRICT  
STANDARD DRAWING.

RECOMMENDED FOR APPROVAL BY:	
<i>Wk B...</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Larry A. Pys</i>	8/22/92
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO.	3.04



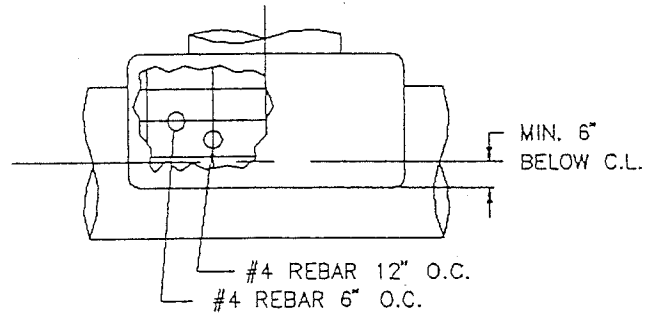
NOTE:  
FLOOR AND WALLS OF CHAMBER MUST BE INSTALLED  
IN A SINGLE POUR. ANY COLD JOINTS TO BE SEALED  
WITH WATERSTOP RX OR EQUAL.  
-FURNISH DESIGN CALCULATIONS FOR STRUCTURES,  
8' OR TALLER.



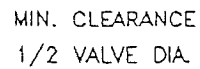
STANDARD NO. 3.05

UNLESS OTHERWISE SPECIFIED:

- SECTION



TOP VIEW



IRRIGATION GATE  
"C" STRUCTURE

RECOMMENDED FOR APPROVAL BY:	
<i>[Signature]</i>	8/8/92
ENGINEERING/DEPT. HEAD	DATE
APPROVED BY:	
<i>[Signature]</i>	8-8-92
PRESIDENT	DATE

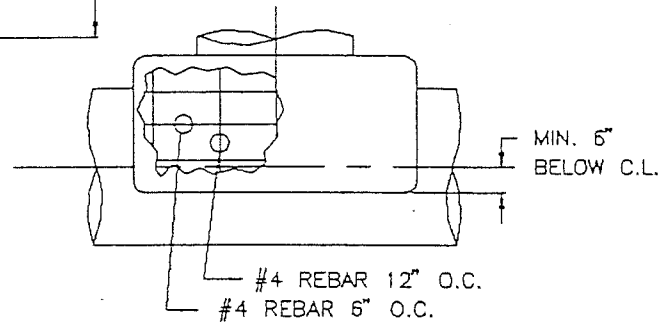
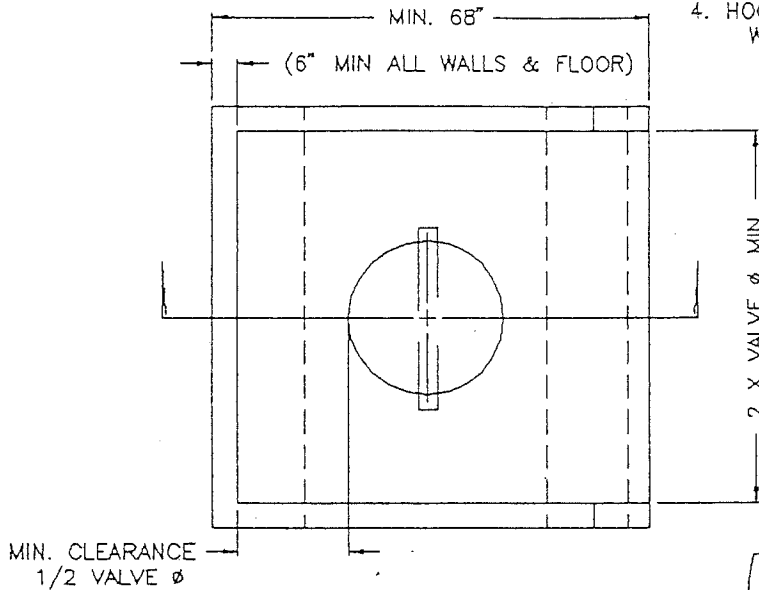
STANDARD NO. 4.01

## NOTES

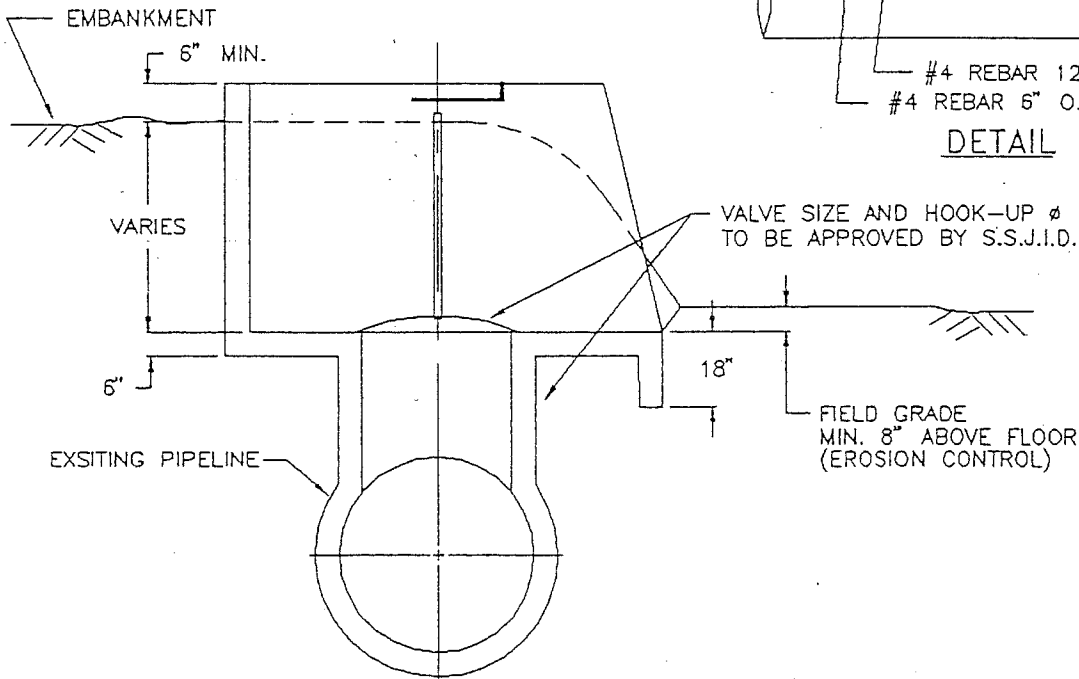
UNLESS OTHERWISE SPECIFIED:

1. MATERIAL: CLASS "A" PORTLAND CONCRETE 3000psi., MIN. 6" THICK.
2. REINFORCING: #4 REBAR @12"X12"O.C. ALL WALLS, & FOOTINGS.
3. VALVE  $\phi$  TO BE APPROVED BY S.S.J.I.D.
4. HOOK-UP: SMOOTH FINISH INTERIOR SURFACES W/ MORTAR.

## TOP VIEW



## DETAIL



## SECTION

NO.	REVISED	DATE
01	RAY HELLSTROM	5-7-92

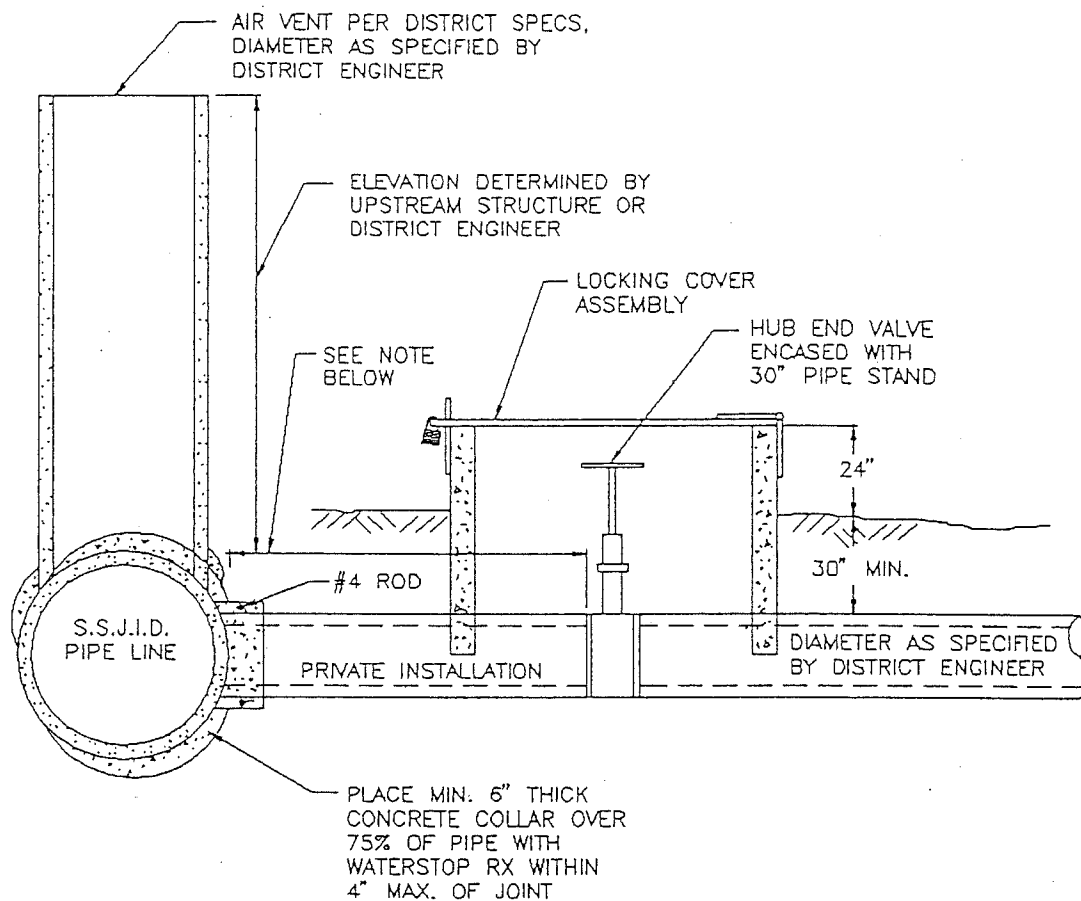
IRRIGATION GATE  
"U" STRUCTURE

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	DATE
<i>[Signature]</i>	8/8/92
ENGINEERING/DEPT. HEAD	DATE
APPROVED BY:	DATE
<i>[Signature]</i>	7-2-92
PRESIDENT,	DATE
BOARD OF DIRECTORS	
STANDARD NO. 4.02	







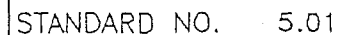
NOTE:  
VALVE ASSEMBLY MAY BE INSTALLED 36" MIN. FROM DISTRICT  
PIPE LINE WHERE THERE IS NO ROADWAY, OR 36" MIN.  
BEYOND WIDTH OF ROADWAY, NORMAL.

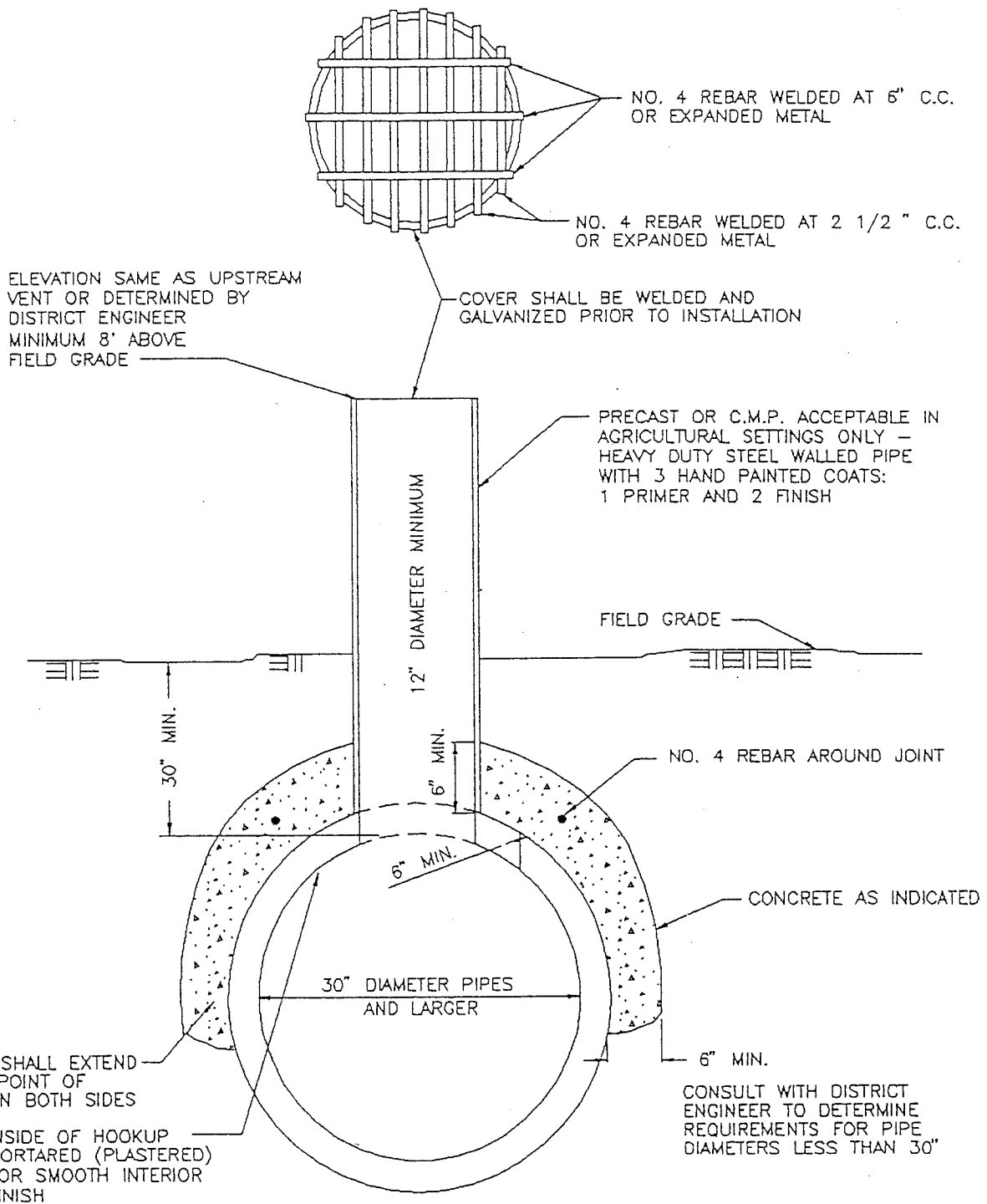
NO.	REVISED	DATE
DRAWN BY:		
CHECKED BY:		

## HUB END VALVE PIPE LINE STRUCTURE

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>R. K. Bogan</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>W. J. Bogan</i>	8-8-92
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO.	4.04





NO.	REVISED	DATE

## AIR VENT

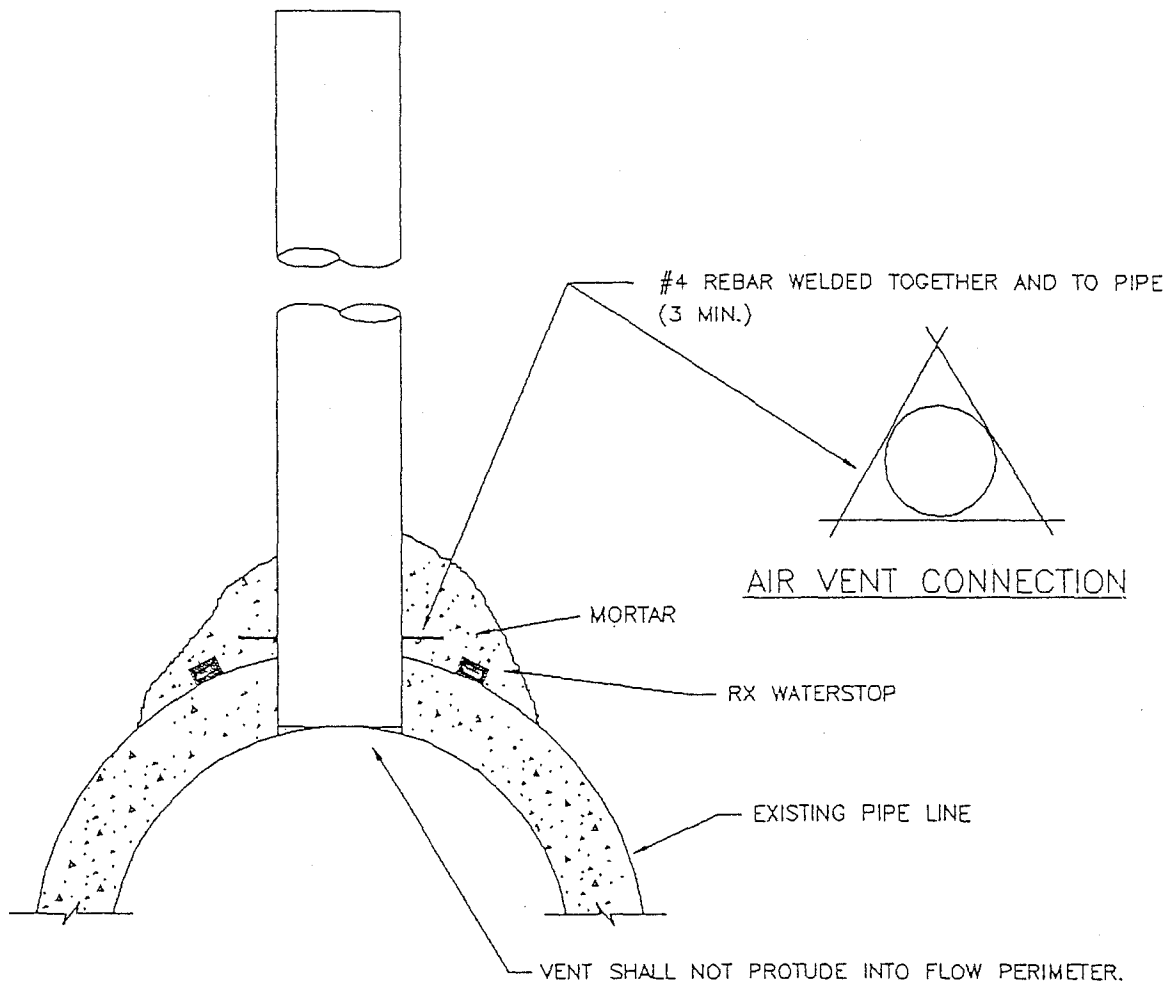
SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY	8/8/97
ENGINEERING DEPT. HEAD	DATE
APPROVED BY	8/8/97
PRESIDENT	DATE
BOARD OF DIRECTORS	DATE
STANDARD NO.	5.02

# NOTE

UNLESS OTHERWISE SPECIFIED:

1. AIR VENT- 10" STEEL WITH EXPANDED METAL COVER WELDED TO TOP.  
ALL PAINTED PER DISTRICT STDS. SPECS.
2. ELEVATION- MIN. 8' ABOVE FINISHED FIELD GRADE AND MUST EQUAL OR EXCEED HEIGHT OF EXISTING VENTS.
3. INSTALLATION- CUT HOLE IN EXISTING PIPE, PLACE AIR VENT IN POSITION, INSTALL WATERSTOP, MORTAR IN PLACE MAKING A WATER TIGHT CONNECTION AND EMBEDDING REBAR FOR SUPPORT.



NO.	REVISED	DATE

DRAWN BY: \_\_\_\_\_  
CHECKED BY: \_\_\_\_\_

## STEEL AIR VENT INSTALLATION

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>Kh. Bani</i>	8/5/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Harry M. P-P-92</i>	DATE
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO. 5.03	



**NOTE:**

SPILL OUTLET SHALL BE REQUIRED WHEN THE DISTRICTS DISTRIBUTION LINE IS A DEAD END OR DOES NOT HAVE A SPILL. SPILL OUTLET SIZE TO BE SPECIFIED BY THE DISTRICT.

4"Ø X 5' LONG GALVANIZED STEEL GUARD POST FILLED WITH CONCRETE. CONCRETE FOOTING SHALL BE 12"ØX24" DEEP. (4 TOTAL)

SPILL OUTLET AS REQ'D. SEE NOTE ABOVE.

TWO WIRE SCREENS. LARGE AND FINE MESH OR AS OTHERWISE APPROVED BY THE DISTRICT.

TO PUMP, FILTER UNIT, AND METER

CAST-IN-PLACE BOX WITH REINFORCING PER DISTRICT STANDARDS. PRE-FABRICATED CONCRETE BOXES SHALL BE APPROVED SUBJECT TO SHOP DRAWING SUBMITTAL AND SSJID APPROVAL.

PVC OR STEEL PIPE. SIZE AND LENGTH TO BE APPROVED BY SSJID.

WATERMAN H30 LINE GATE (FLANGE X FLANGE) LOCATED AT EASEMENT LINE OR LOCATION APPROVED BY SSJID. SIZE TO BE APPROVED BY SSJID.

EXPANDED METAL TOP AND RAILING PER DISTRICT STANDARDS

SPILL OUTLET AS REQ'D. SEE NOTE ABOVE.

NOTE: ALL PROPOSED PUMPING FACILITIES SHALL INCLUDE A METER PER DISTRICT SPECIFICATIONS.

TO PUMP, FILTER UNIT, AND METER

BOX HEIGHT TO MATCH NEAREST UPSTREAM VENT ELEVATION ON MAIN DISTRIBUTION LINE.

NEAREST UPSTREAM VENT

HIGH WATER ELEVATION TO BE DETERMINED BY SSJID

REFER TO SSJID STANDARD DETAILS WHEN CONNECTION IS MADE TO A SSJID CONTROL BOX.

8" PVC RISER

PVC OR STEEL PIPE. SIZE AND LENGTH TO BE APPROVED BY SSJID.

CUT TO FIT AND PLASTER SMOOTH

#4 REBAR DOWELED 3" INTO CONCRETE PIPE 10" O.C. (10 TOTAL). SET WITH SIMPSON S.E.T. EPOXY.

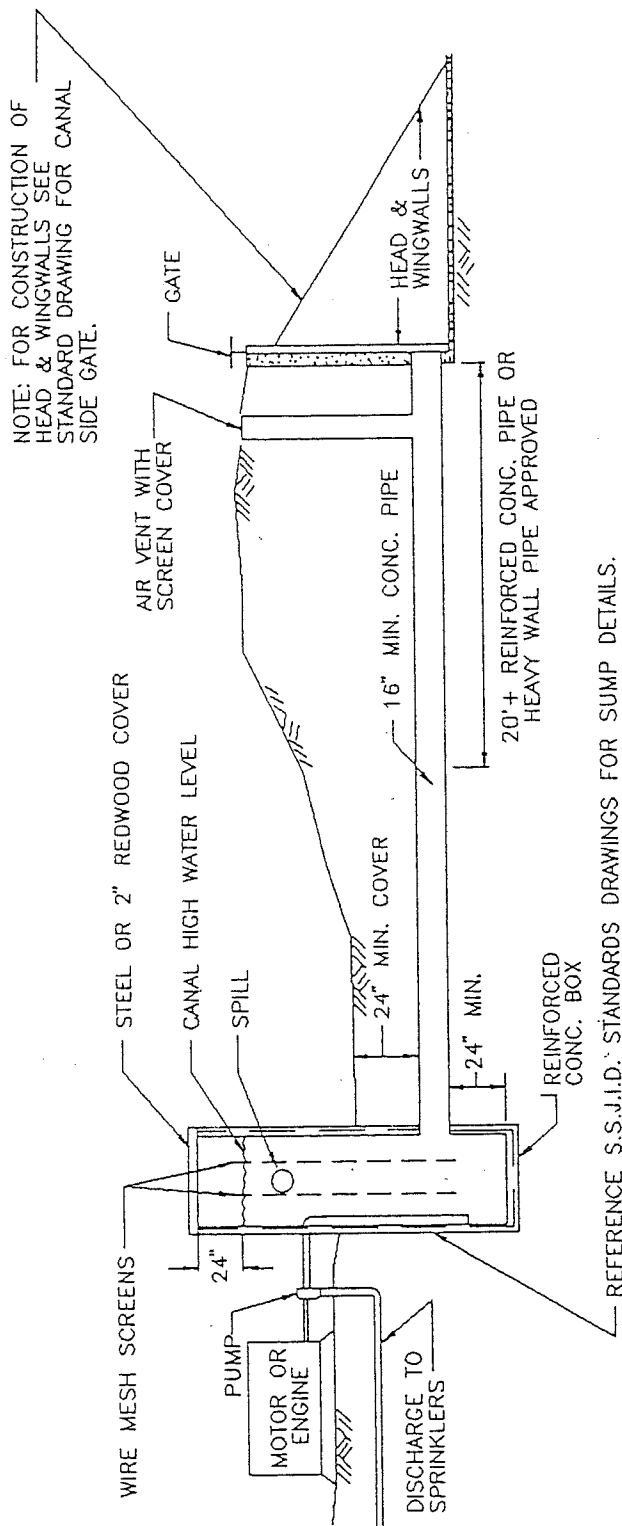
#4 REBAR HOOPS (2 TOTAL)

BOARD APPROVAL DATE: 7/24/12

NO.	REVISED	DATE
1	RAY HELLSTROM	6-16-92
2	RAY HELLSTROM	7-22-92
3	KILLINGSWORTH	7-24-12
DRAWN BY:		
CHECKED BY:		
SCALE: NONE		

# TYPICAL SPRINKLER SUMP INSTALLATION FROM SSJID PIPE LATERAL SOUTH SAN JOAQUIN IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>Sam Bologna</i>	8/14/12
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>Mike A. Helms</i>	8/14/12
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO.	6.01



NOTE:  
DISTRICT PUMP CREW WILL INSTALL A PITOT TUBE IN THE PUMP DISCHARGE PIPE FOR TESTING. A MINIMUM OF EIGHT PIPE DIAMETERS SHALL BE PROVIDED BETWEEN PUMP & FIRST FITTING. (ELL, BEND, VALVE, ETC.)

NO.	REVISED	DATE

DRAWN BY:  
CHECKED BY:  
SCALE: NONE

## SPRINKLER IRRIGATION CONNECTION TO LATERAL

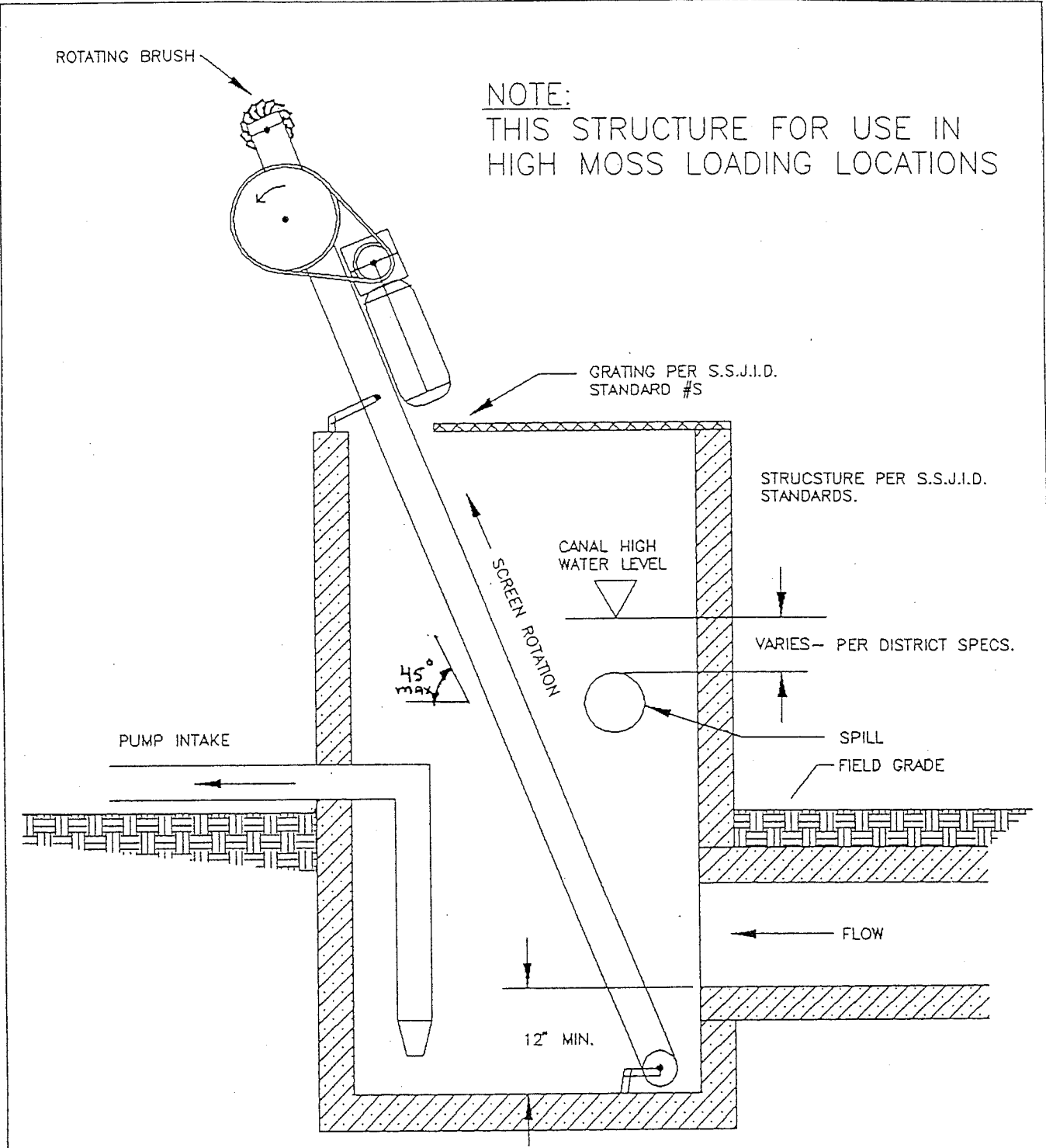
SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>K. K. Ba</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>W. H. Ba</i>	8-8-92
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO.	6.02



UNLESS OTHERWISE SPECIFIED:

- STANDARD NO. 6.03



NOTE:  
THIS STRUCTURE FOR USE IN  
HIGH MOSS LOADING LOCATIONS

NO.	REVISED	DATE

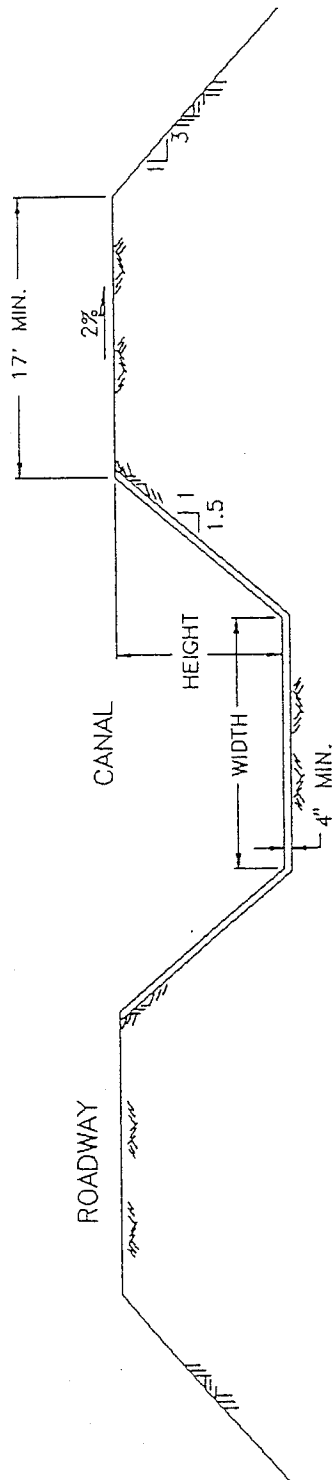
DRAWN BY: RAY HELLSTROM  
CHECKED BY:  
SCALE: NONE

ROTATING SCREEN

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:  
*K. B. Brown* 8/3/92  
ENGINEERING/DEPT. HEAD / DATE  
APPROVED BY:  
*Larry L. Pugh* 8/3/92  
PRESIDENT / DATE  
BOARD OF DIRECTORS

STANDARD NO. 6.04



- NOTES  
UNLESS OTHERWISE SPECIFIED:
1. ROADWAY WIDTH IS A MINIMUM. ACTUAL WIDTH TO BE DETERMINED BY S.S.J.I.D. ENGINEER.
  2. ALL MEASUREMENTS TYPICAL FOR EACH SIDE OF CANAL.
  3. CANAL HEIGHT AND WIDTH TO BE DETERMINED BY S.S.J.I.D.
  4. ROADWAY SURFACE IS TO BE COMPACTED TO 90%-95%, A 2" TOP SURFACE OF SAND IS PREFERRED.
  5. CANAL LINING IS TYPICAL 4" THICK CONCRETE WITH SOIL COMPACTED TO 98%. SEE LINING STD.
  6. ADJACENT SPRINKLER IRRIGATION IS NOT TO WET ROADWAY OR BANKS.

NO.	REVISED	DATE
1	RAY HELLSTROM	6-9-92

## LATERAL AND ROADWAY CONSTRUCTION

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

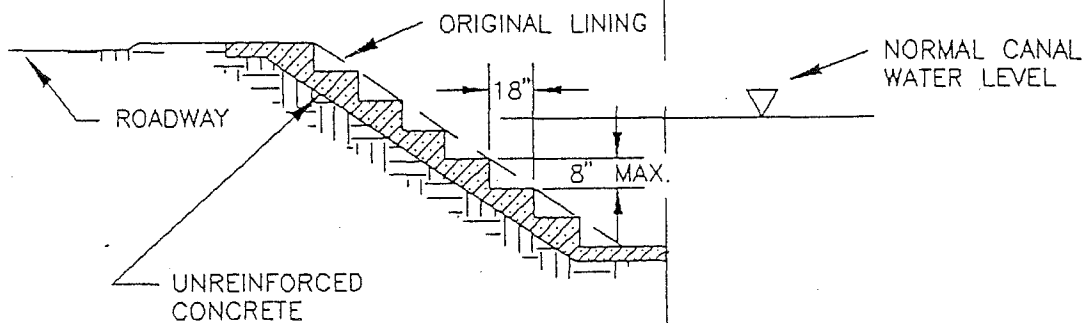
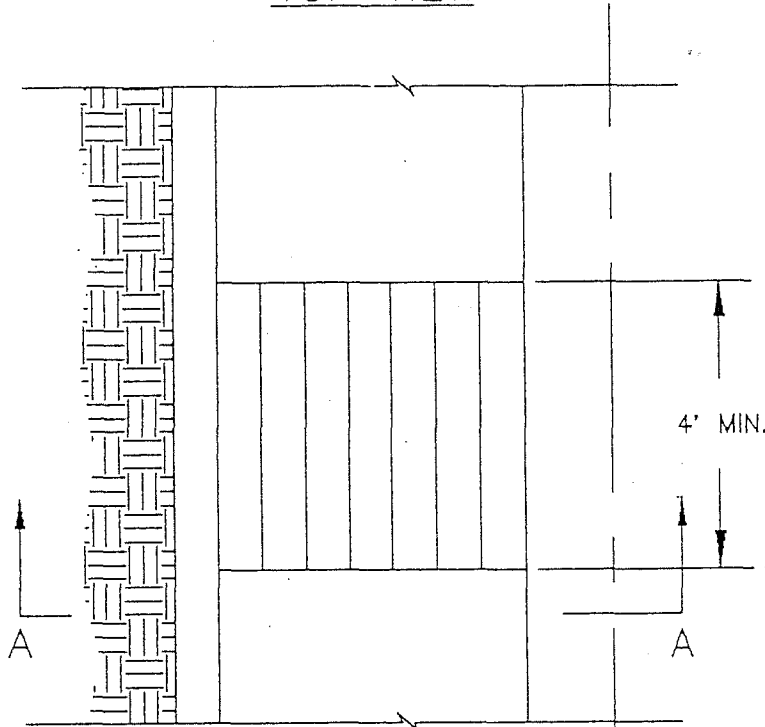
RECOMMENDED FOR APPROVAL BY:	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	8/8/92
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO. 7.01	

## NOTES

UNLESS OTHERWISE SPECIFIED:

1. INSTALL @ 1/8 MILE INTERVAL
- 2.
- 3.
- 4.

## TOP VIEW



## SECTION A-A

NO.	REVISED	DATE

DRAWN BY: RAY HELLSTROM

CHECKED BY:

SCALE: NONE

## CANAL STEPS

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:

*R. B. Brown* 8/8/92

ENGINEERING DEPT. HEAD / DATE

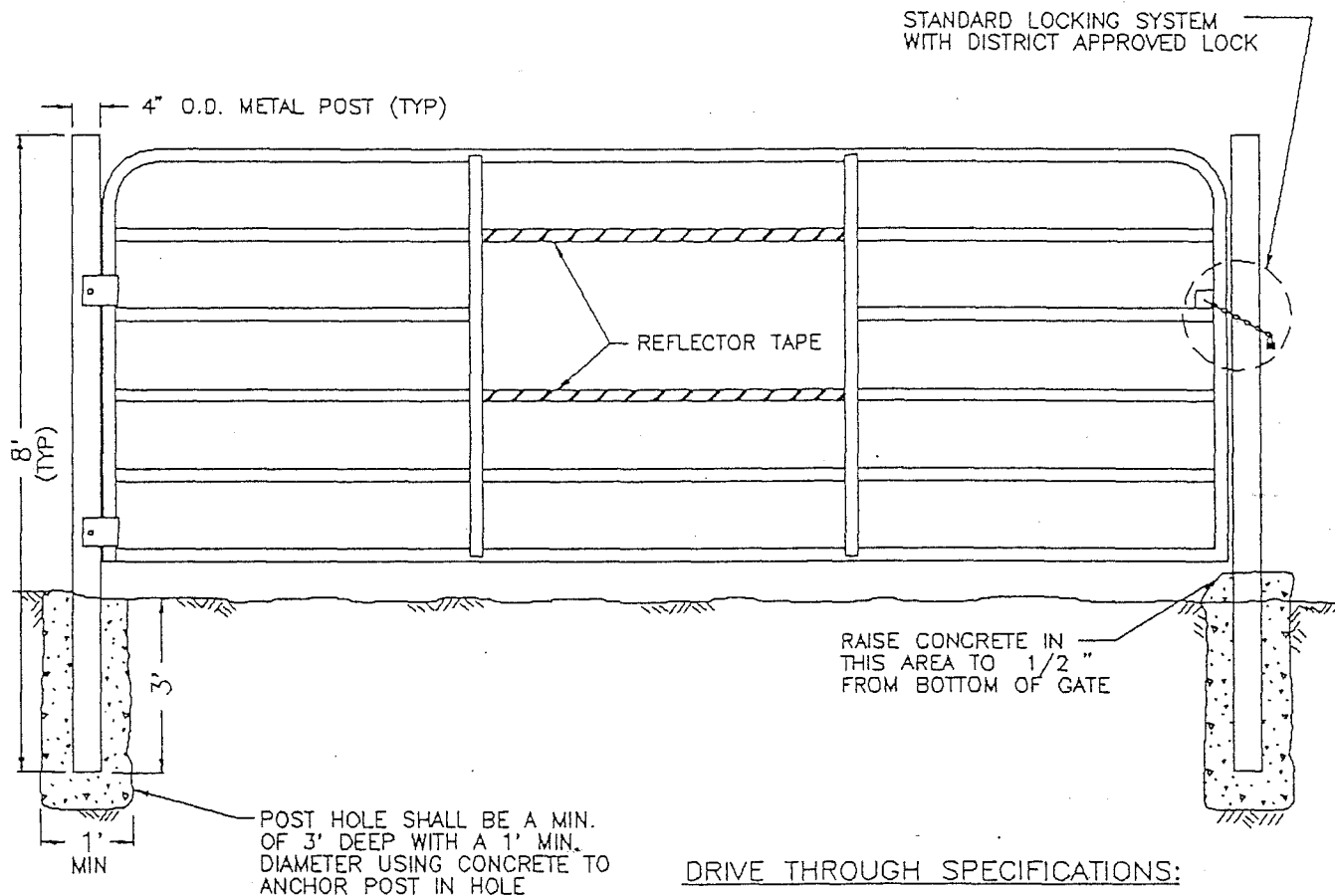
APPROVED BY:

*Harold A. Byrd* 8-8-92

PRESIDENT / DATE

BOARD OF DIRECTORS

STANDARD NO. 7.02



#### DRIVE THROUGH SPECIFICATIONS:

1. HEIGHT - 4.0' MINIMUM  
LENGTH - 12.0' MINIMUM
2. GATE SHALL BE MADE FROM 1" O.D. OR LARGER TUBULAR STEEL.
3. GATE SHALL HAVE 6 HORIZONTAL TUBES EVENLY SPACED.
4. GATE SHALL HAVE 2 METAL HINGES
5. GATE SHALL BE SECURED BY A CHAIN AND S.S.J.I.D. PADLOCK.
6. GATE SHALL HAVE 4 VERTICAL SUPPORTS EVENLY SPACED.
7. GATE POSTS WILL BE PAINTED AS PER DISTRICT STDS. SPECS.
8. INSTALL OUTRIGGERS AS NECESSARY TO PREVENT 2 WHEEL BYPASS TRAFFIC ON SLOPES.

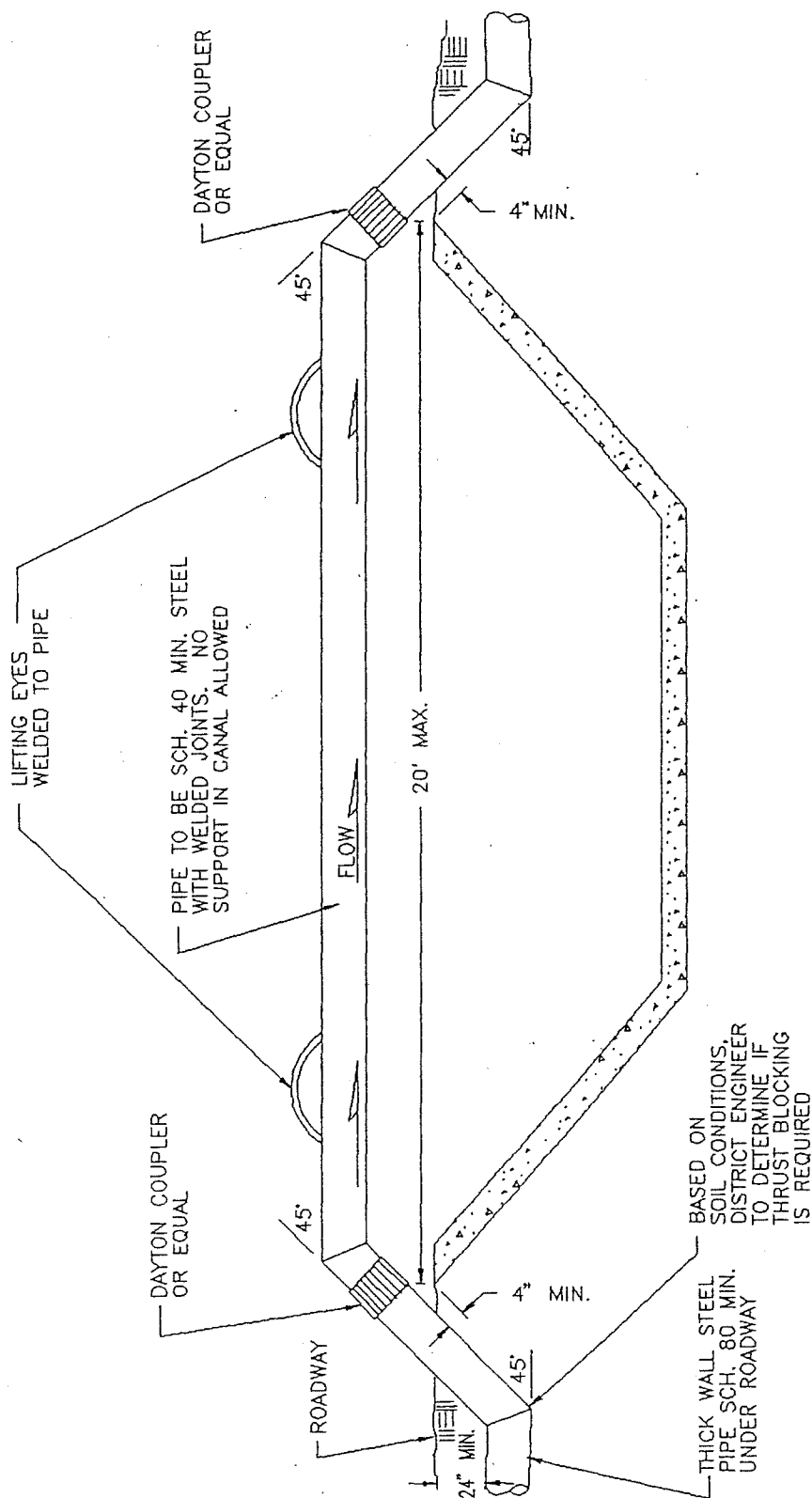
NO.	REVISED	DATE
1	RAY HELLSTROM	7-22-92

DRAWN BY:  
CHECKED BY:  
SCALE: NONE

## METAL GATE FOR CANAL ROADS

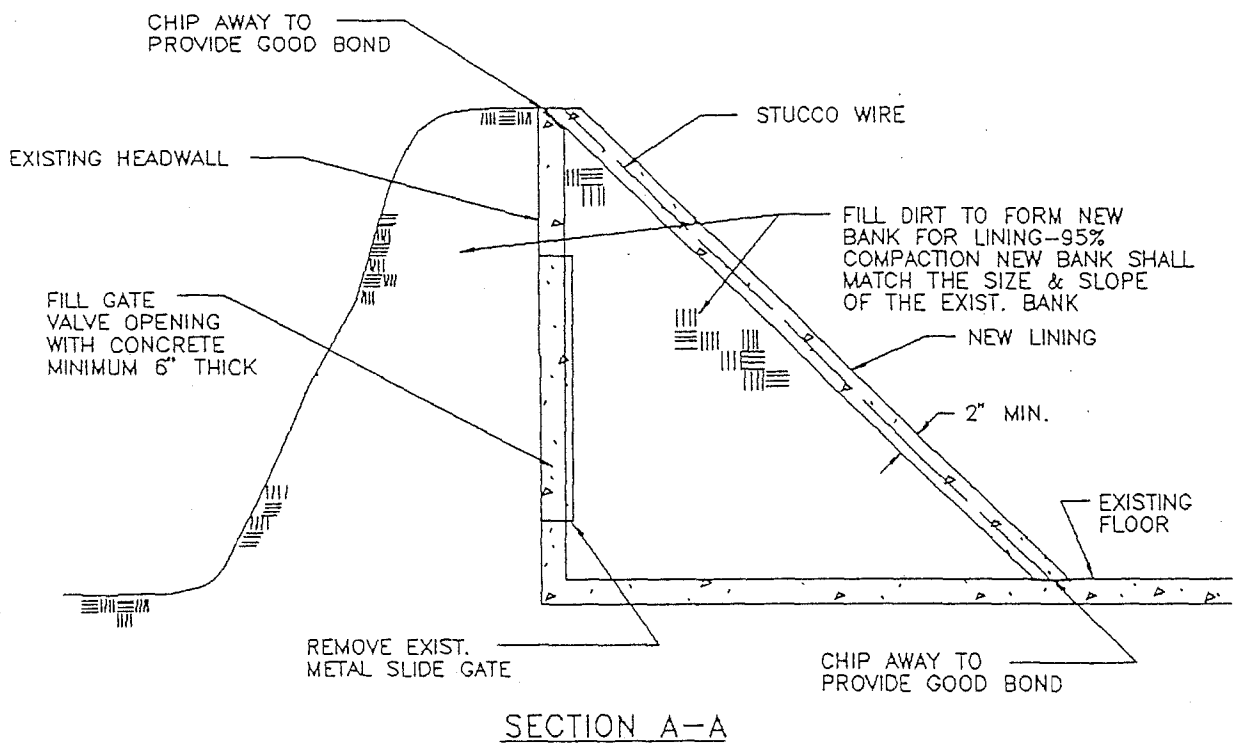
SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	8/3/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	DATE
PRESIDENT:	DATE
BOARD OF DIRECTORS	DATE
STANDARD NO.	7.03

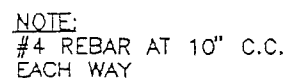


BASED ON  
SOIL CONDITIONS,  
DISTRICT ENGINEER  
TO DETERMINE IF  
THRUST BLOCKING  
IS REQUIRED

NO.	REVISED	DATE



RECOMMENDED FOR APPROVAL BY:	
<i>Rick Brown</i>	8/8/72
ENGINEERING/DEPT. HEAD	DATE
APPROVED BY:	
<i>Walter H. Galt</i>	8-8-72
PRESIDENT	DATE
BOARD OF DIRECTORS	
STANDARD NO.	7.05



NOTE: PAINT. ALL EXPOSED STEEL  
PER DISTRICT STDS. SPECS.

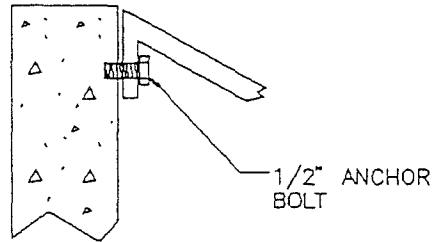
DROP INLET

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
<i>K. L. Brown</i>	8/8/64
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>David L. ...</i>	P.D. 02
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO.	7.06

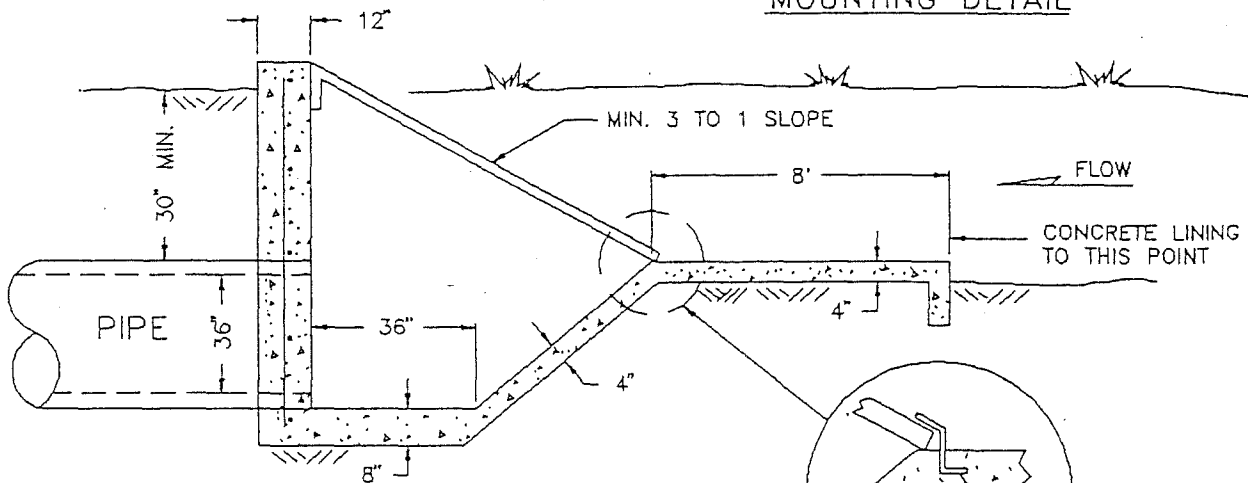


NOTE:  
MOUNTING BRACKET TO BE MADE  
OF 3/8" STRAP IRON 2" WIDE  
(2 REQUIRED)

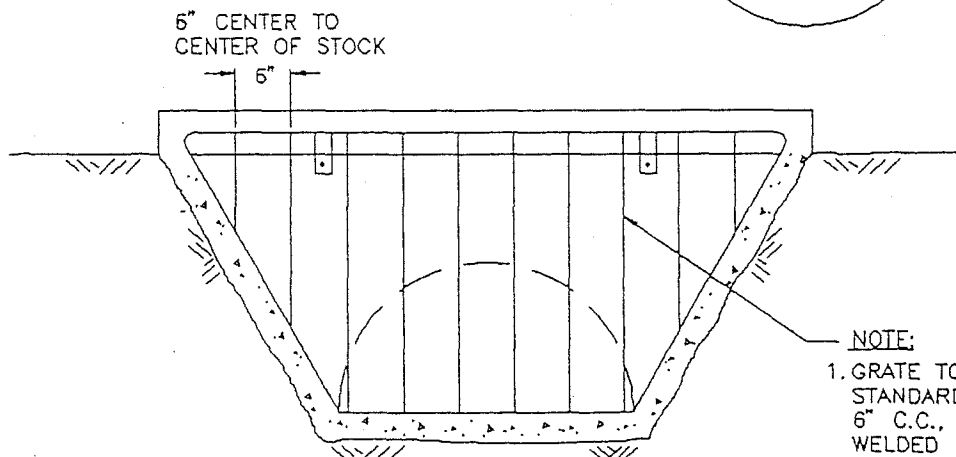
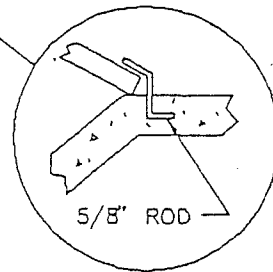


NOTE:  
ROAD DRAINAGE ONLY ON DOWNSTREAM SIDE,  
PROTECT EMBANKMENT

### MOUNTING DETAIL



SIDE VIEW  
NO SCALE



END VIEW  
NO SCALE

NOTE:  
GRATE WILL VARY IN SIZE  
AND SHAPE FROM ONE  
LOCATION TO ANOTHER

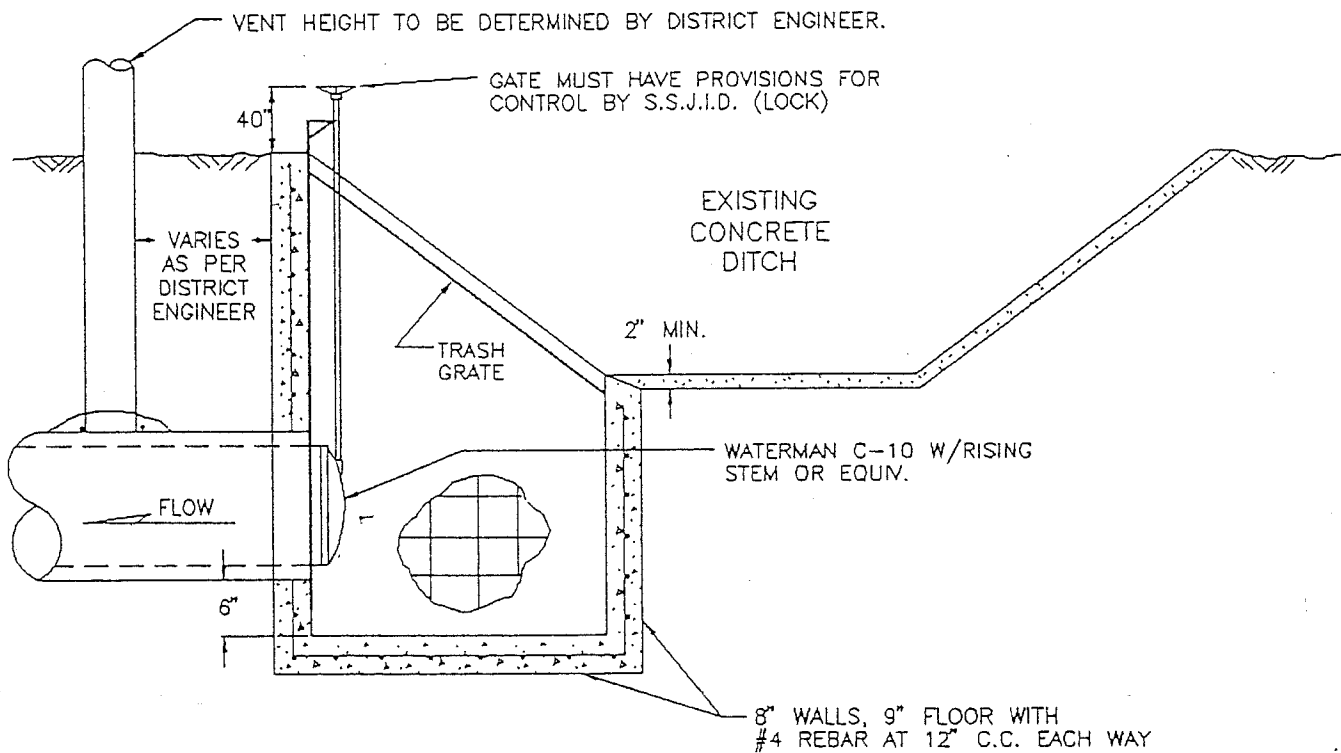
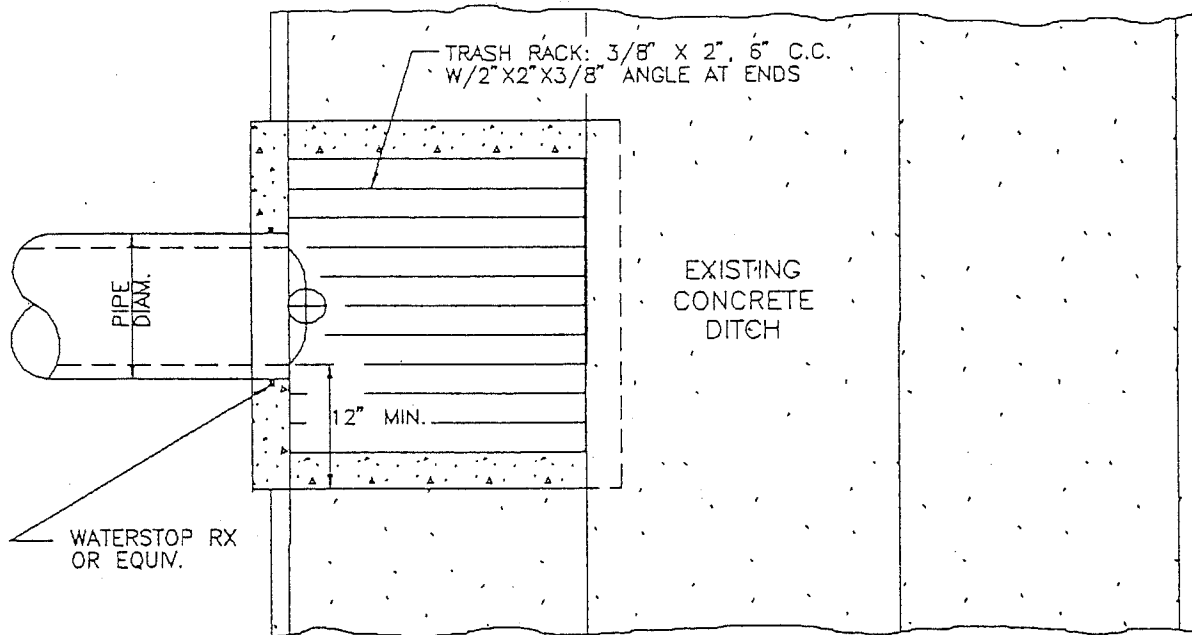
- NOTE:
1. GRATE TO BE MADE OF  
STANDARD 2"X3/8" FLAT  
6" C.C., ALSO TO BE ALL  
WELDED CONSTRUCTION.
  2. PAINT ALL EXPOSED STEEL  
AS PER DISTRICT STDS.

NO.	REVISED	DATE

## TYPICAL GRATE FOR PIPE INLET

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

RECOMMENDED FOR APPROVAL BY:	
ENGINEERING DEPT. HEAD	8/3/72
APPROVED BY:	
PRESIDENT	
BOARD OF DIRECTORS	
DATE	
STANDARD NO.	7.07



NO.	REVISED	DATE

## DITCH CONNECTION

SOUTH SAN JOAQUIN  
IRRIGATION DISTRICT

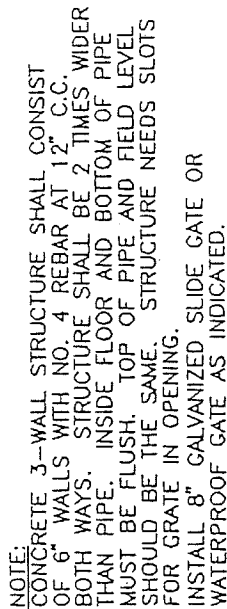
RECOMMENDED FOR APPROVAL BY	
<i>[Signature]</i>	8/8/92
ENGINEERING/DEPT. HEAD	DATE
APPROVED BY	
<i>[Signature]</i>	P.A. 92
PRESIDENT,	DATE
BOARD/OF DIRECTORS	
STANDARD NO.	7.08

DRAWN BY:

CHECKED BY:

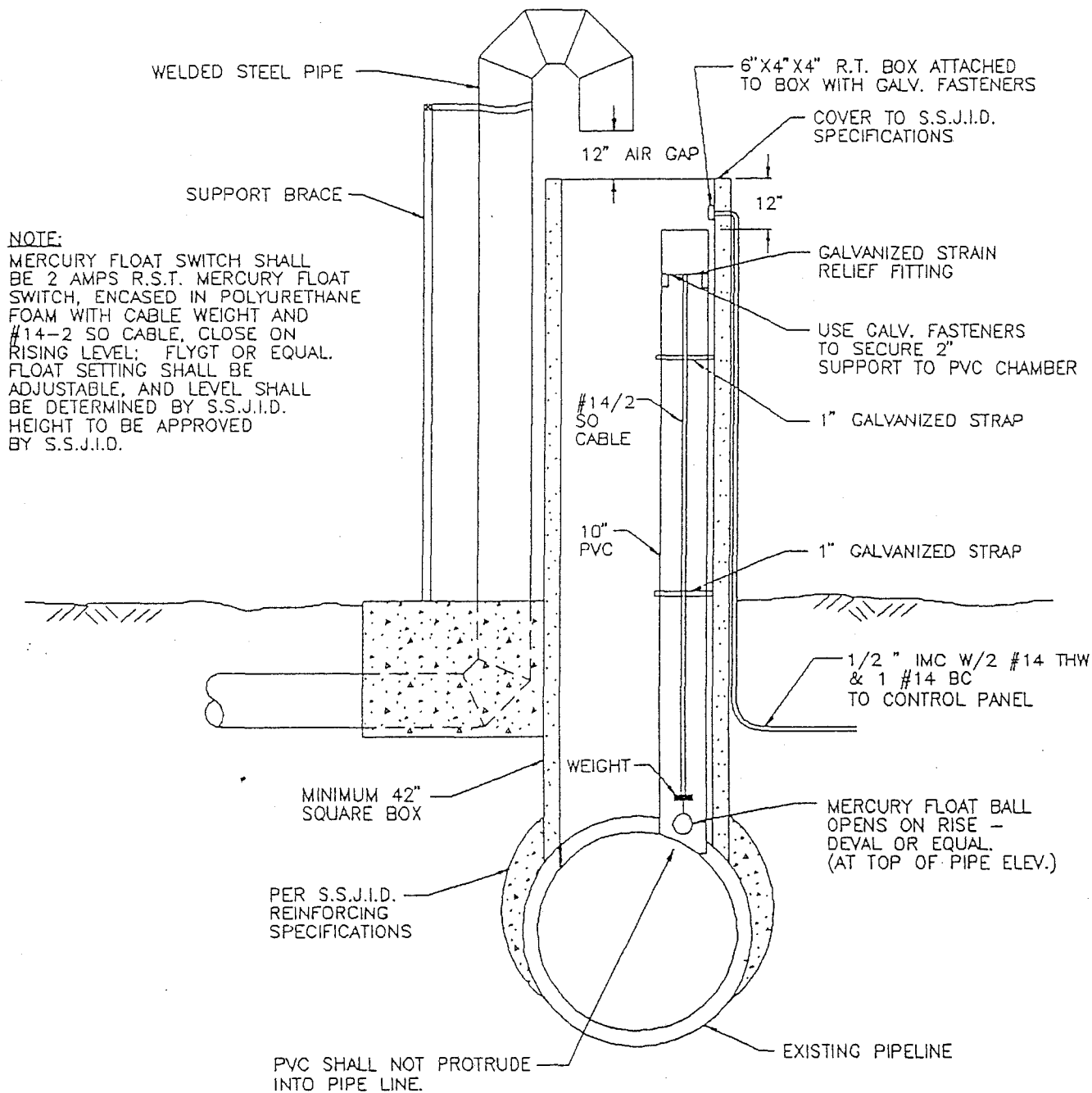
SCALE: NONE





3) 1-8" DIA. DRAIN ALLOWED PER 40 ACRES.

RECOMMENDED FOR APPROVAL BY:	
<i>R. L. B...</i>	8/8/92
ENGINEERING DEPT. HEAD	DATE
APPROVED BY:	
<i>R. L. B...</i>	P. P. 92
PRESIDENT, BOARD OF DIRECTORS	DATE
STANDARD NO. 9.02	



NO.	REVISED	DATE
1	RAY HELLSTROM	8-16-92
DRAWN BY:		
CHECKED BY:		
SCALE: NONE		