

DIVISION FOUR

STANDARDS FOR DRAINAGE

CHAPTER I. GENERAL

Sec. 401-1 General Purpose

- 401-1.01** It is the general purpose of these standards that waters generated by storms, springs, or other sources be mitigated so as to provide reasonable levels of protection for life and property, and the maintenance of necessary access to property or passage of the traveling public on the public highways.
- 401-1.02** To meet this general purpose, it is necessary that these standards reasonably protect life from the direct effects of flood waters, the indirect health effects associated with stagnating water, and the attractive nuisance provided by standing waters. It is necessary to reasonably protect property from the damaging effects of flood waters. Property access for the ingress and egress of emergency vehicles, or the general public should be reasonably provided. The passage of public vehicles on the public highways should also be reasonably ensured.
- 401-1.03** In general, the mitigation measures for the protection of life and property, and the maintenance of emergency vehicle access are based upon the Capital Storm Design Discharge (CSDD). The issues related to property access (by the public) and passage on public highways, and local drainage facility design are based upon the Intermediate Storm Design Discharge (ISDD).
- 401-1.04** The design standards in this section are to be deemed to be minimal and shall not limit the design engineer from using higher standards based upon the engineer's assessment of the protection needs of the development. Alternatives are permissible which are determined by the Director to be of equal or higher quality.
- 401-1.05** The Director may allow such exceptions as he may find to be reasonably required by the specific circumstances, to be in the public interest and in conformity with the general objectives of these standards.
- 401-1.06** Special circumstances may exist that require additional mitigation above and beyond these standards as determined by the Director.

Sec. 401-2 Maintenance

- 401-2.01** All facilities intended for public maintenance shall be designed and constructed subject to the approval of the Director and the maintenance entity, or these standards, whichever is more conservative.
- 401-2.02** All drainage facilities intended for private maintenance shall provide a maintenance plan, subject to the approval of the Director. All such facility maintenance plans shall include, but not be limited to: (a) schedule of cleaning (or clearing), (b) mosquito and vector abatement measures (if applicable), (c) pump maintenance schedule (if applicable), (d) notarized statement by the owner(s) acknowledging his/her/their responsibility and intent to maintain the proposed facility in accordance with the approved maintenance schedule.
- 401-2.03** Subdivisions with privately maintained streets shall have the drainage facilities maintained by a home-owners association or other entity which has the ability to assess fees for maintenance.

CHAPTER II. DEFINITIONS

Sec. 402-1 Definitions:

- 402-1.01** **AGENCY:** refers to the Department of the County of Kern with jurisdiction.
- 402-1.02** **ALLUVIAL FAN:** is a landform originating at an apex and characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.
- 402-1.03** **APEX:** means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.
- 402-1.04** **CAPITAL STORM DESIGN DISCHARGE (CSDD):** is that flow determined based upon a precipitation event having a one percent probability of being equaled or exceeded in any given year, commonly referred to as the 100-year storm.
- 402-1.05** **CLOSED CONDUIT:** is any system of underground drainage facilities, other than culverts.
- 402-1.06** **COMPREHENSIVE DRAINAGE PLAN:** refers to a storm water runoff mitigation plan for multi-phase developments. Such a plan need not be adopted by the County but will be kept on file by the Director.

- 402-1.07** **CONSTRUCTED CHANNEL:** refers to the physical modification of natural channels or the construction of channels.
- 402-1.08** **CONTROL FACILITY:** are those hydraulic structures which mitigate the effects of surface runoff resulting from development, flow pattern modification, or flood flows.
- 402-1.09** **CULVERT:** is a hydraulically short conduit which conveys storm runoff flows through a roadway embankment or past some other type of flow obstruction.
- 402-1.10** **DESIGN PONDING DEPTH:** is the depth to which the design volume will pond in a storm water basin.
- 402-1.11** **DETENTION BASIN:** is a storm water facility designed to affect flood hydrograph peak attenuation.
- 402-1.12** **EMBANKMENT AREA:** is an area of compacted fill material.
- 402-1.13** **ENCROACHMENT:** refers to any change in land use that materially alters the lands flow conveyance potential.
- 402-1.14** **FLOOD CONTROL PLAN:** is a plan for the mitigation of flood flows originating from off-site watersheds or resulting from on-site development.
- 402-1.15** **FLOOD FLOW:** shall be considered to be the CSDD for reference in these standards.
- 402-1.16** **FLOW PATTERN:** refers to any physical tracing resultant from the historic or existing runoff of water.
- 402-1.17** **INTERMEDIATE STORM DESIGN DISCHARGE (ISDD):** is that flow determined based upon a precipitation event having a ten percent probability of being equaled or exceeded in any given year, commonly referred to as the ten-year storm.
- 402-1.18** **LEVEE:** is an embankment whose primary purpose is to furnish drainage or flood protection from storm water run-off and which is, therefore, subject to water loading for periods of only a few days or weeks a year.
- 402-1.19** **MASTER DRAINAGE PLAN:** refers to a comprehensive drainage plan or flood control plan adopted by the County which includes adopted funding mechanisms.

- 402-1.20 NATURAL CHANNEL:** is a flow pattern characterized by incised flow channelization with well defined banks and including the overbank flow areas.
- 402-1.21 NUISANCE FLOW:** shall be considered as those waters originating from within, or adjacent to, the development not resulting from storm runoff.
- 402-1.22 ONE PERCENT RISK FLOW:** is the flow on an alluvial fan based upon the joint probability of the flow distribution at the fan apex and the probability of occurring at the development site.
- 402-1.23 REASONABLE:** in the context of this section refers to the balancing of the utility of the facilities or circumstances described against the gravity of the potential for harm.
- 402-1.24 RETENTION BASIN:** is a terminal storm water facility for the storage of runoff. Commonly referred to as a sump.
- 402-1.25 RETARDATION BASIN:** Synonymous with Detention Basin.
- 402-1.26 SLOPE EASEMENT:** shall include the horizontal dimension from the top to toe of slope plus the setback requirements specified by the Grading Ordinance.
- 402-1.27 SOILS ENGINEER (GEOTECHNICAL ENGINEER):** shall mean an engineer experienced and knowledgeable in the practice of soils engineering (geotechnical engineering).
- 402-1.28 SOILS ENGINEERING (GEOTECHNICAL ENGINEERING):** shall mean the application of the principles of soil mechanics in the investigation, evaluation and design of civil works involving the use of earth materials and the inspection and/or testing of the construction thereof.
- 402-1.29 STRESS AREA:** refers to those locations where the erosion potential is greater than a straight, uniform channel reach, and includes junctions, transitions, and curves.
- 402-1.30 WATERWAY:** refers to any natural channel, artificial channel or closed conduit, which provides a course for drainage water to flow.

Sec. 402-2 Off-Site Capital Storm Design Discharge (CSDD) Mitigation

The CSDD flow determined from the off-site watershed shall consider the total area of the off-site watershed. The watershed development condition may be considered in its existing condition at the time of the proposed development if no control facilities mitigating surface runoff exist, and as undeveloped if adequate control facilities mitigating surface runoff exist.

The design of all structures within the development shall be protected to a minimum of one (1) foot above the water surface associated with the CSDD.

The CSDD flow shall be received into the development without diversion onto adjacent property or causing more than one-foot rise in pre-development water surface and shall be discharged in a manner as similar as possible to the existing condition downstream of the development.

Sec. 402-3 Off-Site Intermediate Storm Design Discharge (ISDD) Mitigation

The ISDD flow shall be based upon the uncontrolled developed watershed proximate to the development when no defined flow pattern exists. When a flow pattern is defined, the ISDD flow determination shall include the total watershed contributing to the flow pattern.

The off-site ISDD shall be mitigated in conjunction with requirements for on-site ISDD flows.

Sec. 402-4 Hydrologic Flow Determinations

The CSDD and ISDD flows shall be calculated in accordance with the current Kern County Hydrology Manual.

CHAPTER III. DRAINAGE PLANS

Sec. 403-1 Authority

403-1.01 County Master Drainage Plans

The County administers master drainage plans (MDP) over some portions of the County. In these MDP areas, the design hydrology is governed by the assumption made and methodology used, in the development of the MDP or its most recent revision. Modifications to the MDP's assumed land uses may result in the requirement of additional permanent facilities being constructed to mitigate unanticipated runoff.

If MDP planned facilities have not been constructed at the time of site development, then temporary facilities will be required to be constructed by the Developer. Such facilities may be abandoned upon completion of the MDP facilities intended to serve the site.

403-1.02 Special Districts

Special Districts, such as Community Service Districts, may prepare comprehensive drainage and/or flood control plans for areas under their jurisdiction. Such plans are subject to the review and approval of the County.

If the Special Districts planned facilities have not been constructed at the time of site development, then temporary facilities will be required to be constructed. Such facilities may be abandoned upon completion of the planned facilities intended to serve the site.

County Service Areas are typically required to be formed for the maintenance of drainage facilities in the absence of another maintenance entity.

403-1.03 Subdivisions

These standards shall apply to the drainage/floodplain management requirements specified for subdivisions improvements in the County's Land Division Ordinance.

If the subdivisions storm runoff mitigation measures are to be constructed as part of a comprehensive drainage plan, then each phase of the development shall be designed to function independently or in conjunction with completed development phases.

403-1.04 Mobile Home/Recreational Vehicle Parks

These standards shall apply to the drainage/floodplain management review of Mobile Home/Recreational Vehicle Parks specified in the County's Zoning Ordinance.

403-1.05 Site Development

These standards shall apply to the drainage/floodplain management requirements specified for site development in the County's Building Code, Grading Code, Floodplain Management Ordinance, and all other pertinent County Ordinances.

CHAPTER IV. ALLUVIAL FAN DEVELOPMENT

Sec. 404-1 Development Policy

Development upon an alluvial fan shall mitigate the effects of the flow at the site of development, which has a one-percent risk of being equaled or exceeded in any given year. Such mitigation shall ensure that the one-percent risk flow will be received into the development site, without causing more than one (1) foot of water surface rise resulting from encroachment at the development site, and discharge the one-percent risk flow in a manner, as close as possible, to the flow pattern existing prior to development of the site.

Sec. 404-2 Flood Control Facility Requirements

The design of structural flood control measures on alluvial fans shall demonstrate that the measures will effectively eliminate alluvial fan flood hazards from the area protected by such measures. The provided analyses must include, but are not limited to, the following:

- 404-2.01** Engineering analyses that quantify the discharges and volumes of water, debris, and sediment movement associated with the flood that has a one percent probability of being exceeded in any year at the apex under current watershed conditions and under potential adverse conditions (e.g., deforestation of the watershed by fire). The potential for debris flow and sediment movement must be assessed using an engineering method acceptable to the Director and Federal Emergency Management Agency (FEMA). The assessment should consider the characteristics and availability of sediment in the drainage basin above the apex and on the alluvial fan.
- 404-2.02** Engineering analyses showing that the measures will accommodate the estimated peak discharges and volumes of water, debris, and sediment, as determined in accordance with Section 404-2.01, and will withstand the associated hydrodynamic and hydrostatic forces.
- 404-2.03** Engineering analyses showing that the measures have been designed to withstand the potential erosion and scour associated with estimated discharges.
- 404-2.04** Engineering analyses or evidence showing that the measures will provide protection from hazards associated with the possible relocation of flow paths from other parts of the fan.
- 404-2.05** Engineering analyses that assess the effect of the project on flood hazards, including depth and velocity of floodwaters and scour and sediment deposition, on other areas of the fan.

404-2.06 Engineering analyses demonstrating that flooding from sources other than the fan apex, including local runoff, is either insignificant or has been accounted for in the design.

CHAPTER V. STREET DRAINAGE

Sec. 405-1 **Design Flow**

405-1.01 The ISDD shall include the evaluation of both on-site and off-site watersheds when applicable.

405-1.02 Street Conveyance

1. For Type "A" subdivisions, the ISDD may exceed the top of a six (6) inch curb by 0.10 feet.
2. For Type "B" subdivisions, the depth of flow contained within the road right of way shall not exceed 0.60 feet for the ISDD.
3. The depth of flow for the CSDD on an Arterial and Collector shall be maintained as not to prohibit reasonable access.
4. For mobile home/recreational vehicle parks, the depth of flow for the ISDD shall not exceed the carrying capacity of the travel way.
5. Where the discharge exceeds the above-mentioned limits, a storm drain or other facilities shall be provided to convey the excess flows.
6. The drainage system shall be free flowing and shall not allow the retention of more than one (1) foot of water measured at the flowline after the flows have subsided.

405-1.03 Sedimentation

In areas suspected of significant sediment yield from an ISDD, the following shall apply:

1. The developer's engineer shall quantify any sediment yield from on-site or off-site properties based upon the ISDD.
2. Sediment yield shall be independent of the runoff event and is to be mitigated separate from the design discharge.
3. Sediment shall not be deposited on the roadway.

4. Higher levels of mitigation may be required in mudslide-mudflow areas.

405-1.04 Erosion

1. Erosion protection measures based on the ISDD shall be established upstream, downstream and through the project by the developer's engineer subject to approval by the Director.

CHAPTER VI. CULVERTS, BRIDGES AND AT-GRADE-CROSSINGS

Sec. 406-1 **General**

406-1.01 All publicly maintained crossings of natural channels shall be bridged or culverted. The minimum length of any culvert shall be from toe-of-slope to toe-of-slope. Additional right-of-way may be required for maintenance of these facilities.

406-1.02 Roadways shall be required to bridge a floodway where encroachment of the floodway is prohibited.

406-1.03 Energy losses for bridge piers, interior walls for multiple box culverts, or other obstructions within the channel shall be predicated upon the obstruction width plus two (2) feet of debris allowance for each obstruction.

Sec. 406-2 **Culverts**

406-2.01 The ISDD for the total upstream watershed under existing conditions shall not exceed soffit of culvert.

406-2.02 The CSDD for the total upstream watershed under existing conditions will be allowed to overtop the roadway until two (2) feet of specific energy is obtained, at which point additional culverts will be required to meet these minimum requirements.

406-2.03 The two (2) feet of specific energy shall be calculated at the crown or high point of the traveled roadway.

406-2.04 The minimum size of any culvert under a publicly maintained roadway shall be 18 inches. For private roads or public access, which are privately maintained, this requirement may be waived.

406-2.05 Culverts shall be designed to have a minimum useful life of 50 years.

Sec. 406-3 Bridges

406-3.01 The lowest portion of the bridge span shall be one (1) foot or 0.2 times the specific energy (whichever is greater) above the water surface elevation when the normal depth of flow for the CSDD is subcritical.

406-3.02 The lowest portion of the bridge span shall be one (1) foot or 0.2 times the specific energy (whichever is greater) above the sequent flow depth when the normal depth of flow for the CSDD is supercritical.

406-3.03 When levee conditions exist, the lowest portion of the bridge span shall also meet the minimum freeboard requirements of the levee.

Sec. 406-4 At-Grade-Crossings

406-4.01 At-grade-crossings shall not be permitted on a publicly maintained roadway and shall not encroach upon a floodway.

CHAPTER VII. CLOSED CONDUIT SYSTEMS, CATCH BASINS

Sec. 407-1 Design

407-1.01 Closed conduit system shall be designed for the total ISDD flow less allowable street flow. (see Chapter V Street Drainage)

407-1.02 A closed conduit system intended to serve on-site lot development shall be designed for the total ISDD originating on-site.

407-1.03 Closed conduit system shall be designed to have a minimum useful life of 50 years.

407-1.04 The minimum size of a closed conduit system within the street right-of-way or intended for public maintenance shall be 18 inches.

407-1.05 The minimum size of a closed conduit system outside of the street right-of-way and intended to be privately maintained shall be eight (8) inches.

407-1.06 The minimum cover over any closed conduit system shall be 24 inches. The minimum cover required within the street right-of-way shall be 30 inches.

407-1.07 Closed conduit system shall be free flowing with no continuous standing water within the pipe.

- 407-1.08** The designed pipe size shall not be allowed to decrease as the system progresses downstream.
- 407-1.09** The minimum slope of any closed conduit system shall be .001(.10 percent) unless otherwise approved by the Director.
- 407-1.10** The hydrologic tie-in design criteria for the closed conduit system shall be based on equal recurrence.
- 407-1.11** Closed conduit system within the street right-of-way or intended for public maintenance shall be Class III reinforced concrete pipe with rubber gasket joints, or cast-in-place concrete pipe unless otherwise approved or required by the Director.
- 407-1.12** The developer's engineer shall plot the hydraulic grade line and the energy grade line profiles for the closed conduit system either on a set of, or on the original, street improvement plans. All calculations and related data for these profiles shall be included with the street improvement plans when submitted.

Sec. 407-2 Location

- 407-2.01** A publicly maintained closed conduit system shall be placed within the road right-of-way or easement unless otherwise approved by the Director.
- 407-2.02** The alignment of a publicly maintained closed conduit system shall be parallel or perpendicular with the centerline of the road unless otherwise approved by the Director.

Sec. 407-3 Freeboard

Within the closed conduit system, the hydraulic grade line shall be at least 0.5 feet below all inlet flowline elevations, and 0.5 feet below the top of non-pressure manholes.

Sec. 407-4 Manholes

- 407-4.01** Within the closed conduit system, manholes shall be provided at all junctions, bends, and at intervals prescribed below:
 - a. Manholes shall be provided at intervals no greater than 300 feet where the conduit diameter is less than or equal to 30 inches.

- b. Manholes shall be provided at intervals no greater than 400 feet where the conduit diameter is larger than 30 inches, but smaller than 48 inches.
- c. Manholes shall be provided at intervals no greater than 500 feet where the conduit diameter is 48 inches or larger.

407-4.02 A pressure manhole shaft and a pressure cover shall be installed in a closed conduit system whenever the energy grade line is less than 0.50 foot below the top of the manhole.

Sec. 407-5 **Losses**

In addition to normal friction losses, energy losses due to entrance and exit conditions, bends, junctions, and transitions shall be computed. The engineer shall supply all data and reference material for calculated losses subject to review and approval by the Director.

Sec. 407-6 **Erosion**

407-6.01 Velocities within the closed conduit system should not exceed 20 feet per second with standard wall RCP, or 10 feet per second for plastic pipe. Where velocities exceed 20 feet per second for RCP, or 10 feet per second for plastic pipe, a special pipe shall be installed as approved by the Director.

407-6.02 Erosion protection against scour velocities shall be provided at the inlet and outlet of the closed conduit system. The engineer shall supply all data and reference material supporting his/her design, subject to approval by the Director.

Sec. 407-7 **Catch Basins**

407-7.01 The inlet design at closed conduit systems (i.e., location, depression, capacity, structural, etc.) shall be subject to review and approval by the Director.

407-7.02 Grate type inlets to the closed conduit system within the street right-of-way shall be allowed only in conjunction with side curb openings and shall be bicycle safe.

407-7.03 The minimum width of opening for any catch basin intended to be publicly maintained shall be three (3) feet and six (6) inches (3.5').

Sec. 407-8 Rights-of-Way/Easements

407-8.01 A right-of-way sufficient to contain the closed conduit and appurtenances plus a minimum of five feet on each side, measured from the edge of the conduit or drainage structure, shall be provided but in no case shall the right-of-way be less than 15-feet in width. Whenever possible, rights-of-way for conduits shall be adjacent to property lines and outside areas where structures are planned. Under no circumstances shall closed conduits and appurtenances be constructed less than 10-feet from any planned or existing structure.

407-8.02 Easements will be required on all closed conduit systems outside of the street right-of-way, which are intended for public maintenance.

407-8.03 Land rights shall be conveyed to the County in one of the following forms, whichever is appropriate:

1. Separate parcel easement dedicated on a subdivision map.
2. Easement dedicated on a subdivision map as part of adjacent lots.
3. Fee simple or easement offered or granted by separate documents.

CHAPTER VIII. RETENTION BASIN DESIGN

Sec. 408-1 Design Volume

The design volume of storm water retention basins shall be based upon the runoff from the ISDD five-day storm event and a volume of nuisance water determined by the engineer. No runoff generated on site from the design storm or from nuisance flows will be allowed to leave the site unless downstream drainage disposal facilities exist to handle the flow. The retention of upstream off-site flows shall not be considered to reduce the size of the required on-site retention facilities or mitigate the runoff from the proposed development. An evaluation of the runoff volumes associated with the site in its existing condition shall not reduce the size of the required drainage facilities. The runoff volume from the ISDD five-day storm shall be calculated using the formula:

$$\text{Runoff Volume (cu.ft.)} = [(D_{10\text{yr-5day}})/12)] (a_i) (\text{Area}) \text{ where;}$$

- $D_{10\text{yr-5day}}$ = depth of rainfall (in.) obtained from NOAA Atlas 14, Vol. 6, Ver. 2.0 (Use procedure outlined in Kern County Engineering Bulletin 11-02
- a_i = average percentage of impervious area; The 'Actual Impervious Cover for Developed Areas' (Figure C-3---Kern County Hydrology Manual) are based on average conditions which may not

apply to a particular study. The a_i may vary greatly even on comparable study sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

Area = Drainage area of total development (sq.ft.)

Sec. 408-2 Hydraulic Design

In the absence of a hydrologic volume routing analysis, the storm drain hydraulic grade line calculations shall assume that 50% of the design storm volume and 100% of the nuisance volume is in the basin when the peak flow rates occur.

Sec. 408-3 Freeboard

Freeboard shall be required for all retention basins having a design water depth exceeding 18 inches. Six (6) inches of freeboard will be required when the design ponding depth within the basin is four (4) feet or less. For basins with a design ponding depth greater than four (4) feet the amount of freeboard required shall be one (1) foot. Freeboard shall be measured from the lowest gutter inlet or top of bank, whichever is lower.

Sec. 408-4 Fencing

Retention basins shall be fenced and provided with gated access when the design ponding depth exceeds 18 inches. All retention basins, regardless of ponding depth, that are maintained by the County or an entity administered by the County shall be enclosed by a six (6) foot high masonry block wall. Exceptions may be made, subject to the Director's approval, for certain master planned facilities intended for multi-purpose use.

408-4.01 The fence shall consist of a six (6) foot high chain link fence of 9 gage fabric with redwood slats or a six (6) foot masonry block wall or approved equal. Fence post footings shall have a minimum diameter of 12 inches and a minimum depth of 30 inches. Masonry block walls shall be designed in accordance with accepted engineering practices. Retaining walls used for basin fencing requirements shall have their design approved by the Director. See Plate Nos. R-77 thru R-82.

408-4.02 Fence setbacks measured from the top of slope shall provide a reasonable maintenance way for the equipment outlined in the

maintenance plan. The following minimum setbacks shall apply:

Design ponding depth	Setback
≤ 18 inches	2 feet
> 18 inches but ≤ 4 feet	5 feet
> 18 inches but ≤ 4 feet and Total basin depth ≥ 5 feet	12 feet
> 4 feet	12 feet
> 8 feet	12 feet (or in accordance with an approved maint- enance plan).

408-4.03 The basin access gate may be chain link, wrought iron, or other as approved by the Director. The double gate is not to be attached directly to the masonry wall. The opening must be sufficient for the 14-foot double gate and anchor posts. If wrought iron is used, a metal mesh privacy screen is to be securely attached to the double gate by rivets or equivalent as approved by the Director. Wrought iron double gates will also require a commercial grade latch or equivalent that can be locked with a County padlock (3/8" shackle diameter). See Plate No. D-11 for specific sizing and material requirements.

Sec. 408-5 **Access**

An equipment access ramp to the bottom of the retention basin shall be provided when the design depth exceeds 18 inches or when the facility is intended for County maintenance.

408-5.01 The ramp shall be a minimum of 12 feet wide with a maximum slope of 15%. The gate to the access ramp shall be 14 feet wide.

Exception - When the design ponding depth is ≤ 4 feet, the maximum slope on the ramp may be increased to 20%.

408-5.02 Ramps shall not be designed to convey drainage water into the sump.

408-5.03 The ramp alignment shall be no more than 45 degrees from the center of the access gate to facilitate maintenance equipment ingress and egress. Other proposed alignments shall have their design approved by the Director.

Sec. 408-6 **Curbing and Rodent Barriers**

408-6.01 In conjunction with fencing, a six (6) inch wide, eighteen (18) inch deep continuous concrete curb shall be provided around the top of the sump. The top of the curb shall be 0.5 feet above the highest adjacent grade. When the sump is fronting on a street, the top of the

curbing shall be a minimum of one (1) foot above the top of the street curb. Ramped access across the curb shall be provided at all gated access points to the sump.

408-6.02 Rodent barriers will be required on the sides of the sump in proximity to open space, agricultural areas or lots one (1) acre or larger. The bottom of the rodent barrier shall be a minimum of 42 inches below finish grade.

Exception - Rodent barriers may be omitted when the design water depth is four (4) feet or less.

Sec. 408-7 **General Construction Requirements**

408-7.01 General construction requirements for retention facilities shall be in accordance with Plate Nos. D-1, D-2, and D-3.

408-7.02 Retention facilities shall have the design volume contained entirely in cut.

408-7.03 Slopes shall be designed no steeper than is safe and no steeper than two (2) horizontal to one (1) vertical. A slope stability analysis will be required when the design water depth exceeds eight (8) feet and side slopes are steeper than 3:1.

408-7.04 The minimum bottom dimension for retention basins with a design depth greater than four (4) feet shall be 20 feet. For design water depths 4 feet or less, the minimum bottom width shall be no less than that required for maintenance equipment specified in the maintenance plan.

408-7.05 The maintenance way shall be sloped away from the top of bank at a minimum 2%.

408-7.06 Drainage basins intended for County maintenance shall be located on a lot dedicated exclusively for drainage/recreational purposes.

Sec. 408-8 **Testing**

408-8.01 Retention basins shall not be permitted unless it can be demonstrated, to the satisfaction of the Director, that the basin will completely drain the design volume within seven (7) days.

408-8.02 Testing of the proposed retention basin shall be provided by a Soils Engineer and shall include, but need not be limited to, an analysis of the soils boring logs and the establishment of the drainage rates of the

soils encountered. A minimum of one (1) boring shall be logged within the proposed sump location. This boring shall be advanced below the invert of the basin to a depth equivalent to at least three (3) times the design ponding depth. Testing methods used to establish soil drainage rates shall be approved by the Director.

CHAPTER IX. DETENTION BASIN DESIGN

Sec. 409-1 Design Flow

The design flow into the basin shall be the ISDD five-day runoff hydrograph. Hydrograph design and mass ratios shall be in accordance with the Kern County Hydrology Manual. The outflow hydrograph shall not extend beyond five days from the end of the inflow hydrograph. Infiltration effects from the detention facility shall not be included in the calculation of the outflow hydrograph.

Sec. 409-2 Facility Design

Sizing and placement of detention facilities shall not aggravate the potential for downstream flooding.

Requirements for fencing, curbing, setbacks, access, and freeboard shall be in accordance with retention basin design.

409-2.01 Detention basins shall be provided with a concreted low flow bypass, or approved equivalent, for the conveyance of nuisance flows to the outlet.

409-2.02 An emergency spillway will be incorporated in the design of all detention basins.

Sec. 409-3 Sedimentation

Sediment yield shall be determined and mitigation provided by the developer's engineer.

Sec. 409-4 Duplex Pump Station (Wet Well) Design Specifications

Pumps used in conjunction with detention facilities shall have their design approved by the Director. Specific design criteria shall include the use of an automated duplex pump, and an alarm system. The pump system shall be designed to pass a minimum two (2) inch sphere and for reliability and low maintenance. Pump maintenance shall be included in the facility maintenance plan.

409-4.01 Pump station shall be designed to drain the sump in five (5) to seven (7) days with one (1) pump running. However, the minimum flow rate shall be 100 gpm.

- 409-4.02** Pump station shall be a duplex system which automatically alternates between pumps at the end of each cycle.
- 409-4.03** The pump station shall either include a lag pump design or automatic controls, which will start the second pump if the first fails to pump.
- 409-4.04** Pumps shall be minimum one (1) HP.
- 409-4.05** Pump station shall be designed to allow easy removal of pumps for maintenance, without requiring personnel to enter into a wet well or similar enclosed structure. A “cage” style pump system, where the pump is located in a cage structure at the bottom of the basin, will not be allowed.
- 409-4.06** Pumps and pump station inlet structure shall be screened to prohibit plugging by debris.
- 409-4.07** The pump station (including the electrical/control panel) shall be located next to the entrance of the basin outside of the maintenance way.
- 409-4.08** The receiver wet well shall consist of one 60” diameter concrete precast manhole sections with single offset R-3 rubber gasket joints per ASTM C478, latest edition or approved equal. Duplex pump system shall be equipped with two (2) one (1) HP (minimum), 115V, non-clog, explosion proof, sump pumps with alarm and alarm switch, check valves, ball valves, discharge line, pump lift out assembly, and electrical junction box. Include a traffic-rated 30” x 42” hatch with lockable, steel hinged access with safety grate.
- 409-4.09** The lifting assembly shall be best suited for the pump arrangement. All cables, etc. are to be stainless steel nylon coated. All slide metal surfaces must be considered non-sparking, by URL, to prevent spark ignition in wet well.
- 409-4.10** The valve vault shall consist of one 42” diameter concrete precast manhole section (conforming to ASTM C478 with single offset R-3 gasket joints) with gate valves, swing check valves, and adjustable pipe supports or equivalent. Include a 24” x 24” hatch with lockable, hinged steel access door with safety grate.
- 409-4.11** Sump pump wiring shall be connected to a waterproof electrical control panel in a NEMA (3R) enclosure or equivalent. The splicing of pump leads to the Junction Box and from the Junction Box to the control panel is not allowed.

- 409-4.12** A four (4) inch thick reinforced concrete pad (minimum cementitious material of 590 lb./cu. yd.) will be required to encompass the precast top slabs, manholes and control panel.
- 409-4.13** All electrical conduits and connectors shall be sealed water-tight and gas-tight using bitumastic paint.
- 409-4.14** All pipe or conduit wall penetrations shall be sealed with a neoprene seal.
- 409-4.15** All exposed steel (pipe, valves, flanges, elbows, and control box exterior) shall be primed with zinc-chromate primer and painted with an epoxy enamel finish. Color to be grey unless otherwise approved.
- 409-4.16** A water level staff shall be placed in the sump. The staff may be either anchored to the sideslope of the sump or be attached to the outlet structure, as approved by the Director. The bottom portion of the staff shall be painted black and white, alternating at one-foot increments, to an elevation equivalent to the half full-depth of the sump. The top portion of the staff shall be painted red and white, alternating at one-foot increments, to one (1) foot above design water surface.
- 409-4.17** All controls shall be mounted in a NEMA (3R) metal enclosure or equivalent. The control panel and all electrical components shall bear the Underwriter's Laboratory (UL) Label. All circuit breakers shall have operators extending through the control panel door. All motor starter overload resets, selector switches, push buttons and pilot lights shall be mounted on the control panel door. The control panel shall be enclosed in a vandal resistant enclosure with provisions for locking with a County's lock three-eighths (3/8) inch shank pad lock or approved equal.
- 409-4.18** The control for each pump shall include a thermal magnetic circuit breaker, rotary hand-off-automatic switch, and magnetic motor starter with ambient compensated overload relays and quicktrip heaters. The pump control circuit shall include a door interlock switch to de-energize the control circuit when the control panel door is open, a control mounted transformer with fused 115 volt secondary, and a door mounted control circuit disconnect switch.
- 409-4.19** Pump operation shall be controlled by three (3) bulb type liquid level sensors. An intrinsically safe pilot circuit shall be provided for each level sensor to reduce the power to the sensor to a level incapable of

releasing sufficient electrical or thermal energy to ignite explosive gases.

- 409-4.20** A fourth level sensor, with intrinsically safe circuit, shall be furnished for indication of high-water alarm condition. High water alarm shall be indicated by a panel-mounted pilot light and external audible alarm with silence button.
- 409-4.21** The controls shall provide for lead/lag sequencing of the pumps, an automatic alternator shall alternate the lead/lag duty on each succeeding pump cycle. An outer pump seal leakage detection system shall be included in the control enclosure. When the motor probes sense the presence of moisture in the oil seal chamber, a relay coil will illuminate a panel mounted indicating alarm lamp to indicate possible outer motor seal failure and the alarm light.
- 409-4.22** The pump station shall have a Hand-Off-Auto switch and an automatic low water shut-off and have green (run) and red (alarm) indicator lights visible from the road/street.
- 409-4.23** Control panel shall contain an “hour meter” for each pump.
- 409-4.24** Control panel shall contain a switched GFI 115-volt duplex electrical outlet.
- 409-4.25** Control panel shall include an emergency generator hook-up connection.
- 409-4.26** The discharge piping from the gate valve assembly shall be pressure rated and conform to AWWA C900 and Class 165. The discharge piping shall be pressure tested per ASTM standards, or approved equal. The installation of the discharge piping shall incorporate thrust blocks per Kern County Development Standards Plate Nos. L-7 and S-15.
- 409-4.27** System Testing—Installed pumps, controls and pipes shall be tested in accordance with recommendations of the manufacturer prior to acceptance by the Kern County Public Works Department.
- 409-4.28** Prior to acceptance, two (2) complete operation and maintenance manuals, with wiring and interconnect diagrams for all equipment and controls (including power pedestal), model and serial numbers of the sump pumps in binders, one (1) digital copy, one (1) set of as-built drawings on mylar, and one (1) digital copy shall be furnished to the County. The as-built drawings shall show the location of the electrical conduit from the power pedestal to the control panel.

CHAPTER X. CONSTRUCTED CHANNEL DESIGN CRITERIA

Sec. 410-1 Design Flow

Constructed channels shall be designed to carry the CSDD plus freeboard.

Sec. 410-2 Freeboard

410-2.01 The minimum freeboard between the design water surface, and the top of bank of the channel shall be five-tenths (0.50) feet or two-tenths (0.20) of the specific energy, whichever is greater.

410-2.02 If the designed water surface is within the embankment area, the design and construction of the channel shall be in accordance with the levee design criteria, including freeboard requirements.

410-2.03 The minimum freeboard requirements for bridges, culverts, and utility crossings which span open channels and which are existing, planned or projected at the time of channel design shall be in accordance with the requirements specified in Sections 406-2 and 406-3.

410-2.04 Superelevation resultant from directional modification shall be considered prior to computing the required freeboard.

Sec. 410-3 Hydraulic Design

410-3.01 Channels shall be designed with proper allowance for hydraulic losses for all planned and projected future crossings or other obstructions to maintain clearance and freeboard as required.

410-3.02 The water surface and the energy grade line profile shall be computed and plotted for all constructed channels and at locations where natural channels modifications are proposed.

410-3.03 Constructed channels shall not be designed with a slope in the range of $\pm 20\%$ of critical slope unless freeboard equal to the height for instability waves is added.

410-3.04 A minimum velocity of two (2) feet per second shall be maintained for lined channels to prevent sedimentation.

Sec. 410-4 Structural Design

410-4.01 The minimum bottom width of constructed channels shall be ten (10) feet. A triangular channel may be permitted when the channel side slopes are four (4) to one (1) or flatter.

- 410-4.02** The minimum centerline radii for curves in constructed channels shall be three (3) times the top width of the design water surface.
- 410-4.03** Design of slopes shall be predicated upon results of an investigation by a Soil Engineer, subject to the approval of the Director.
- 410-4.04** Adequate bank protection and drop structures shall be provided where the slopes in the channel are steep and high velocities are present.
- 410-4.05** Bank protection shall be provided based on the design engineer's recommendations, subject to the approval of the Director. Stress area protection shall extend downstream from the end of the stress area a distance equal to ten (10) times the design water depth, unless the engineer can show that the erosion potential is not excessive.
- 410-4.06** At drop structures or in other locations where a hydraulic jump may occur, bank protection shall be provided through the hydraulic jump for a minimum distance of six (6) times the sum of the sequent depth and the depth of freeboard. This protection shall cover the invert and extend to the height of the sequent depth plus the height of the freeboard. The protection material may be either concrete, concreted-rock slope protection, sacked concrete, air-blown mortar or other approved alternative.
- 410-4.07** All channel lining materials and methods shall be specified by the engineer and approved by the Director.
- 410-4.08** All appurtenant drainage facilities shall be constructed and areas adjacent to channels graded so that erosion will be prevented within the channel right-of-way.
- 410-4.09** Waterways shall enter the main channel at an angle not exceeding 25 degrees.

Sec. 410-5 **Erosion**

The engineer shall provide recommendations on all necessary mitigation measures for erosion including bank protection and bottom stabilization of the channel, subject to the approval of the Director.

Sec. 410-6 Fencing

- 410-6.01** Constructed channels with slopes steeper than four (4) to one (1) with specific energy, at any point, greater than 1.5 feet shall be fenced in its entirety.
- 410-6.02** A six (6) foot high nine (9) gage chain link fence fabric with tension wire shall be installed on each side of the right-of-way.
- 410-6.03** At all road intersections, fencing shall be installed to prevent public access to constructed channels.
- 410-6.04** A 14-foot wide chain link drive gate shall be provided at all points of vehicular access.

Sec. 410-7 Easements/Right-of Ways and Maintenance Ways

- 410-7.01** Right-of-ways for constructed channels with side slopes steeper than four (4) to one (1) shall be provided as follows:
- a. The right-of-way for channels with top widths greater than 50 feet, as measured to the top of freeboard, shall include the top width of the channel, two maintenance ways (one on each side of the channel), slope easements (when applicable), and interceptor ditch area (when applicable). The maintenance ways shall be a minimum of 15 feet wide. Runoff from the maintenance ways shall be mitigated.
 - b. The right-of-way for channels with top widths of 50 feet or less, as measured to the top of freeboard, shall include the top width of the channel, one maintenance way on either side of the channel, slope easements (when applicable), and interceptor ditch area (when applicable). The maintenance way shall be a minimum of 15 feet wide. Runoff from the maintenance way shall be mitigated.
- 410-7.02** The right-of-way for constructed channels with side slopes four (4) to one (1) or flatter shall be sufficient to contain the top width of the channel (measured from top of freeboard) plus slope easements as needed. A minimum of five (5) feet on either side of the channel shall be provided for maintenance purposes.
- 410-7.03** Right-of-way for turn-around: Turn-around distance and radii:

At the terminus and at intervals not to exceed one channel mile, turn around areas shall be provided. The minimum inside radii for maintenance roads shall be 40 feet.

410-7.04 Tributary waterways shall be conveyed under maintenance roads in closed conduits or culverts as applicable. Where open channel tributaries cross a maintenance road, a convenient turn-around area shall be provided for maintenance vehicles. The minimum diameter of a turn-around shall be 40 feet.

410-7.05 Right-of-Way for Channels Intersecting Public Roads:

At intersections of the channel with public roads, sufficient right-of-way shall be provided to permit access from the public road to the maintenance road as approved by the Director.

In the event that the channel right-of-way does not intersect a public road, a turn-around or a 15-foot wide access right-of-way shall be provided from a public road to the channel right-of-way at intervals not to exceed one (1) channel mile.

Sec. 410-8 Sedimentation

The determination of sediment yield and proposed mitigation measures of such shall be prepared and recommended by a qualified registered civil engineer, subject to the approval of the Director.

CHAPTER XI. LEVEE DESIGN

Sec. 411-1 Design Flow

Levees shall be designed to accommodate for the CSDD plus freeboard.

Sec. 411-2 Freeboard

411-2.01 The minimum freeboard between the designed CSDD water surface and the levee's top of bank shall be three (3) feet or two-tenths (0.20) times the specific energy plus one (1) foot, whichever is greater.

411-2.02 An additional one (1) foot, above this minimum of freeboard, shall be required within 100 feet of either side of structures within the levee or whenever the flow is constricted, such as at bridges. An additional five-tenths (0.50) foot above the minimum is also required at the upstream end, tapering to the minimum at the downstream end of the levee.

Sec. 411-3 Hydraulic Design

See Section 410-3 Hydraulic Design for details.

Sec. 411-4 Structural Design

Levees shall be designed in accordance with the latest revision of the Corps of Engineers Design and Construction of Levees, Engineer Manual, EM1110-2-1913.

Sec. 411-5 Erosion

Mitigation measure for erosion protection shall be prepared and recommended by a registered civil engineer, subject to the approval of the Director.

Sec. 411-6 Fencing

Fencing requirements for levees shall be in accordance with the criteria contained in the constructed channel design, Section 410-6.

Sec. 411-7 Easements/Right-Of-Way

Access, easements and right-of-way shall be in accordance with the requirements set forth in Section 410-7. (Constructed Channels).

Sec. 411-8 Sedimentation

Mitigation measures shall be prepared and recommended by a qualified, registered engineer, subject to the approval of the Director.

Sec. 411-9 Maintenance

The County, including a County Service Area (CSA), will not assume the responsibility for a levee. Control and maintenance of a levee shall be provided by an entity with the authority to impose taxes, and/or special assessments for levee matters. To ensure proper compliance, a control and maintenance plan shall be established and said plan shall be subject to the approval of the Director.

CHAPTER XII. NATURAL CHANNELS

Sec. 412-1 Delineation

All natural channels shall be identified and clearly delineated on the plans with the appropriate floodplain designation.

For defined natural channels, the Floodplain and Floodway Boundaries shall be delineated, subject to the approval of the Director.

Sec. 412-2 Setback

The minimum setback from the top of bank of a natural channel with side slopes steeper than two (2) horizontal to one (1) vertical, shall be a two (2) to one (1) slope plus a 10-foot wide buffer strip. The setback shall be measured from the toe of the slope. Where the slopes are flatter than two (2) to one (1), the required setback shall be a minimum of 10 feet from the Floodway limit.

Sec. 412-3 Tie-Ins

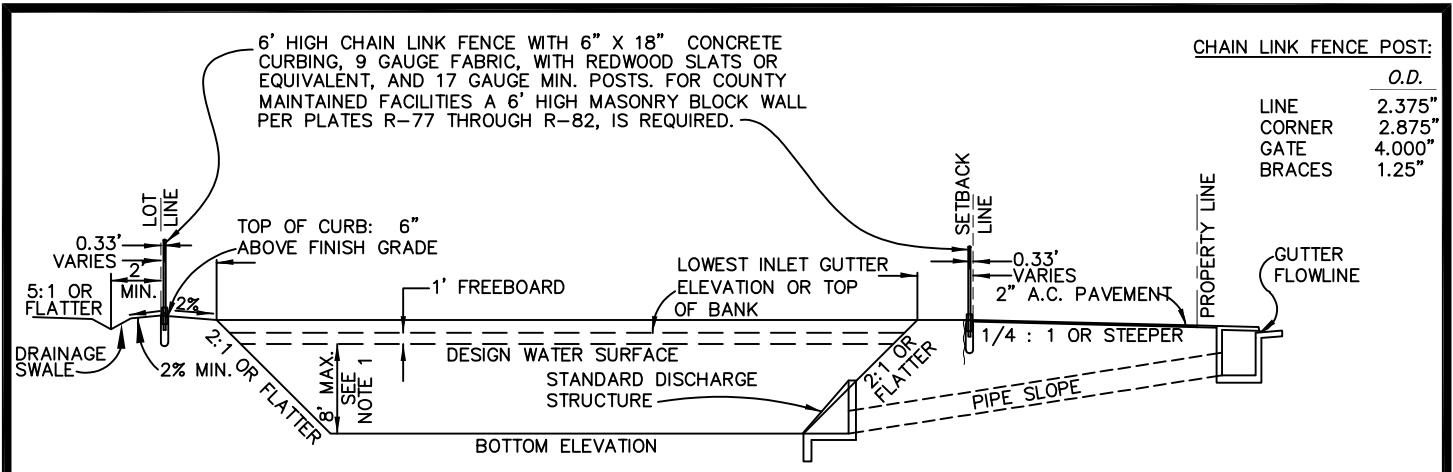
Where natural channels merge into constructed channels, the tie-ins shall be designed in a manner to dissipate energy and protect against erosion. The design for such tie-ins shall be in accordance with acceptable engineering practices and approved by the Director.

Sec. 412-4 Relocation

Should an existing natural channel be relocated, the channel shall be designed in accordance with the criteria specified herein for constructed channels.

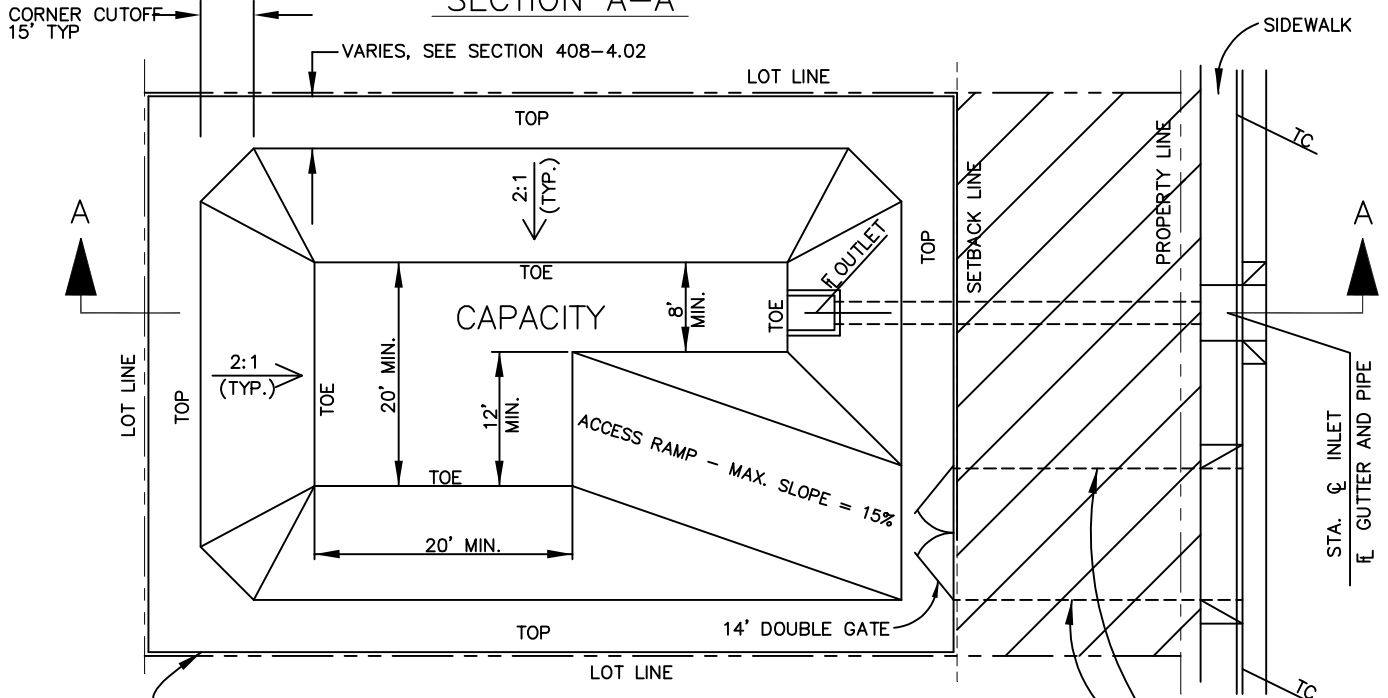
Sec. 412-5 Use of Natural Facilities

All applicable Federal and State permits and requirements shall be required for any operation that would discharge dredged or fill material in any waters of the United States (normally channels identified with blue lines on the U.S.G.S. maps).



CHAIN LINK FENCE POST:	
	O.D.
LINE	2.375"
CORNER	2.875"
GATE	4.000"
BRACES	1.25"

SECTION A-A



CONSTRUCT 6' HIGH CHAIN LINK FENCE WITH CONCRETE CURBING AND REDWOOD SLATS OR EQUIVALENT. COUNTY MAINTAINED FACILITIES REQUIRE A 6' HIGH MASONRY BLOCK WALL.

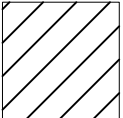
NOTES:


- MAY EXCEED 8' IF SIDE SLOPES ARE 3:1 OR FLATTER; OR A SLOPE STABILITY ANALYSIS IS PROVIDED.
- VARIATIONS TO THE DIMENSION MAY BE APPROVED BY THE DIRECTOR.
- ADDITIONAL REQUIREMENTS MAY BE IMPOSED AS PART OF THE CONDITIONS ISSUED.
- COMPACT O.G. TO 95% FOR MINIMUM OF SIX (6) INCHES UNDER 2" A.C.
- WHEN FENCE IS SET ON FRONT R/W LINE SIDEWALK SHALL BE FULL WIDTH.
- TACK WELD FABRIC AND HARDWARE TO POSTS.
- TREAT BLOCK WALL WITH ANTI-GRAFFITI PRODUCT SUBJECT TO APPROVAL OF THE DIRECTOR.
- CONSTRUCT 6" X 18" CONCRETE CURB UNDER GATE W/ TWO (2) #4 REBAR TOP AND BOTTOM.

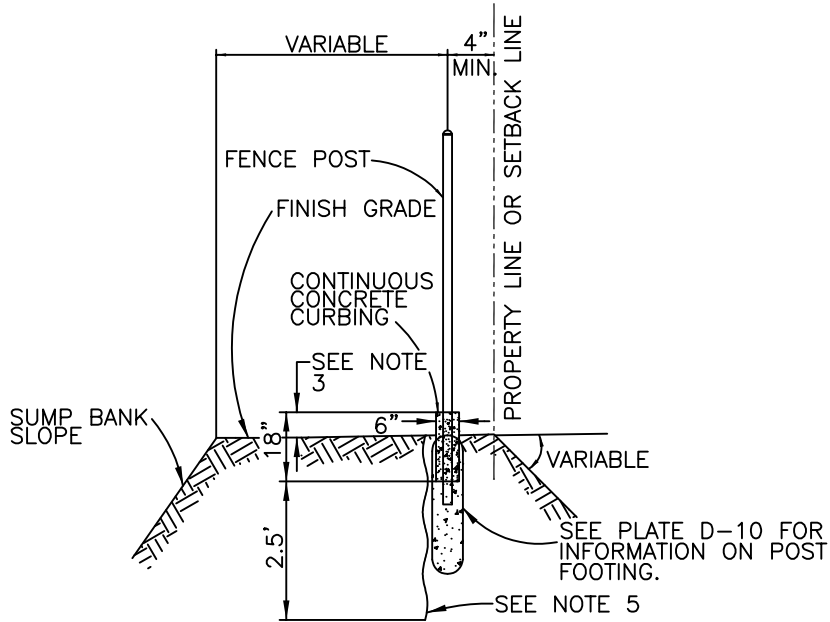
SUMP PLAN

LEGEND

- TOP - TOP OF CURB
- FG - FINISH GRADE
- OG - ORIGINAL GROUND

 INDICATES 2" A.C. OVER NATIVE SOIL WHICH HAS BEEN TREATED WITH A PERMANENT SOIL STERILANT SUBJECT TO THE APPROVAL OF THE DIRECTOR.

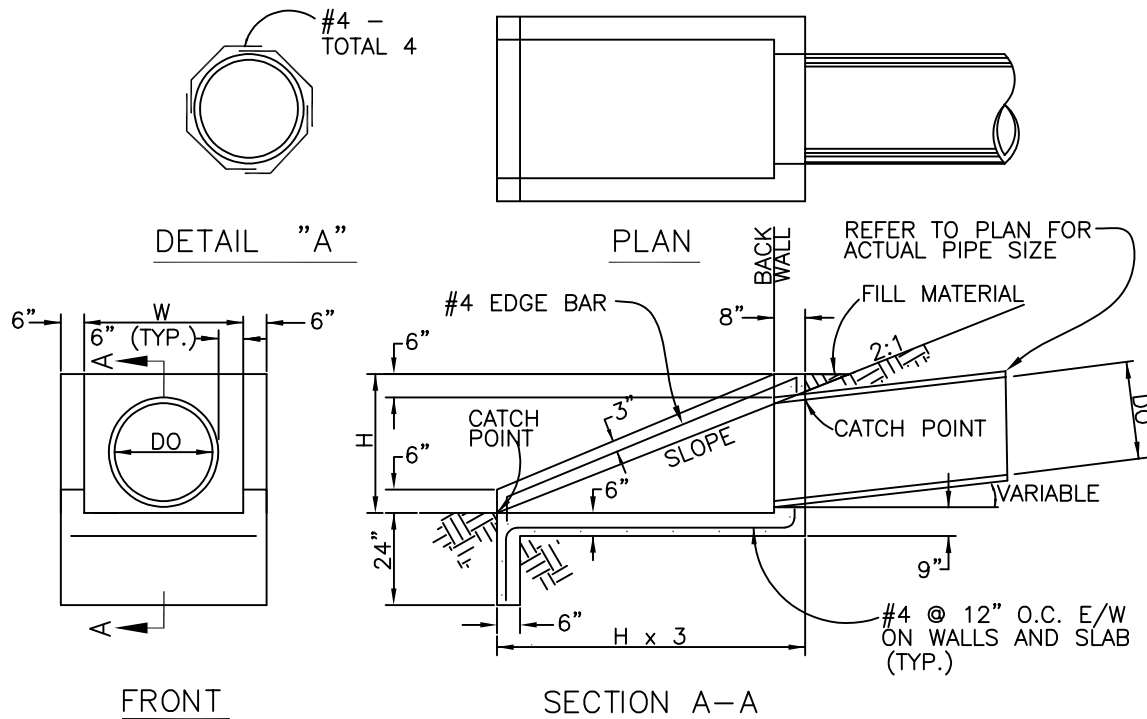
	<p>SUMP DETAILS</p> <p>COUNTY OF KERN STATE OF CALIFORNIA DEVELOPMENT STANDARD</p>	<table border="1"> <thead> <tr> <th>REVISIONS DATE</th> <th>DESC</th> </tr> </thead> <tbody> <tr><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td></tr> <tr><td>-</td><td>-</td></tr> </tbody> </table>	REVISIONS DATE	DESC	-	-	-	-	-	-	-	-	-	-	-	-	<p>DRAFTED BY: R.R.P.</p> <p>DESIGNED BY: J.R.C.</p> <p>DATE DRAFTED: 09/30/23</p> <p>APPROVED BY: J.R.C.</p>	<p>PLATE NO.</p> <p>D-1</p>
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NOTES:

1. CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 505 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
2. CONCRETE SHALL BE TROWELED SMOOTH AND BRUSH FINISHED.
3. VARIES FROM 3" TO 6" ABOVE FINISH GRADE.
4. SUBGRADE PREP. SHALL BE CONSTRUCTED TRUE TO GRADE AND CROSS SECTION WITH COMPACTION AT 90% TO DEPTH OF 6".
5. RODENT BARRIER - 26 GAUGE CORRUGATED GALVANIZED IRON SHEETING, 3' HIGH, WITH 6" MIN. OVERLAP ON ENDS. CONCRETE SHALL BE USED IN LIEU OF RODENT BARRIER AS APPROVED BY THE ENGINEER.

CURBING AND RODENT BARRIER DETAILS



DISCHARGE STRUCTURE



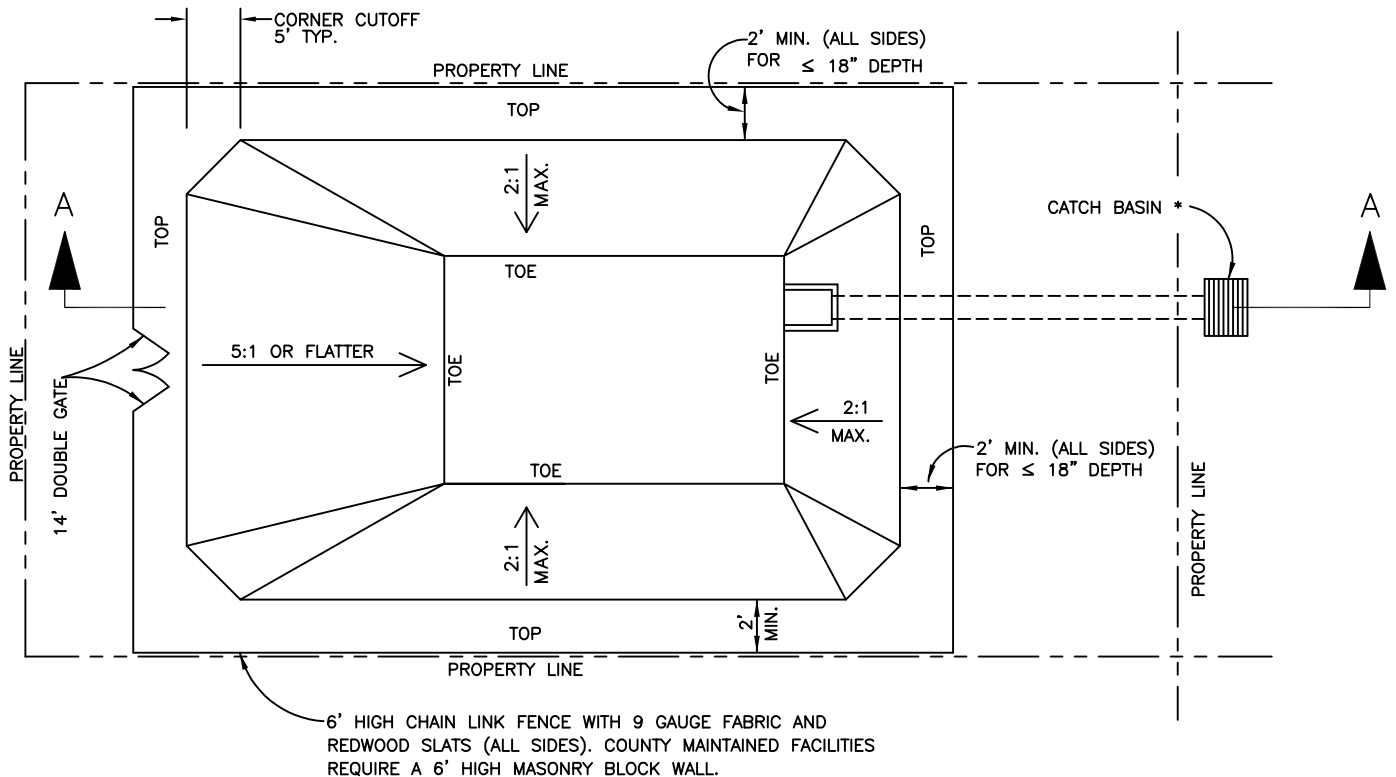
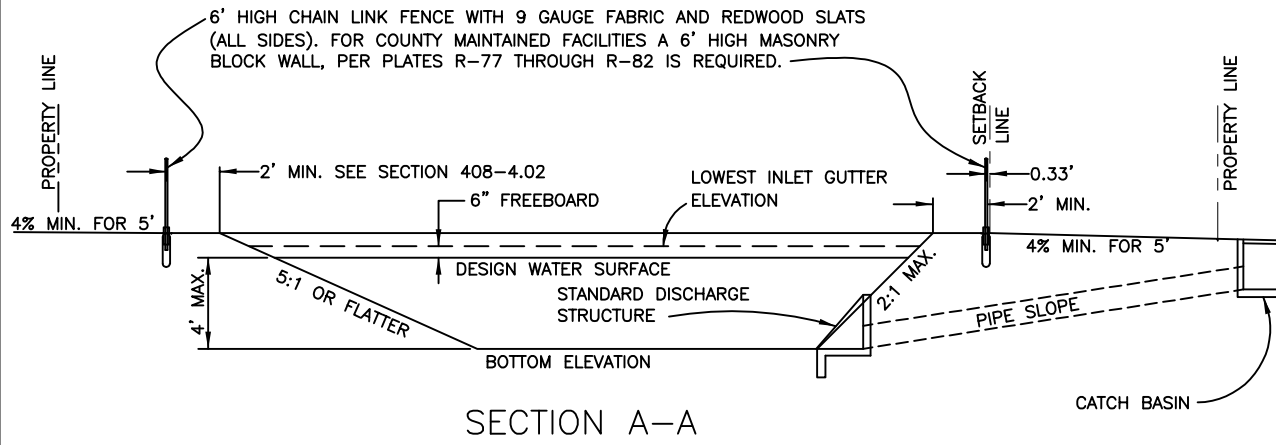
CURBING, RODENT BARRIER, AND DISCHARGE STRUCTURE DETAILS

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

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DESIGNED BY:	J.R.C.
DATE DRAFTED:	09/30/23
APPROVED BY:	J.R.C.

PLATE NO.
D-2



NOTE:

SEE ADDITIONAL NOTES AND REQUIREMENTS FOR CHAIN-LINK FENCES AND MASONRY WALLS ON PLATE D-1

* NO CURB AND GUTTER SHOWN



SHALLOW SUMP DETAILS

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

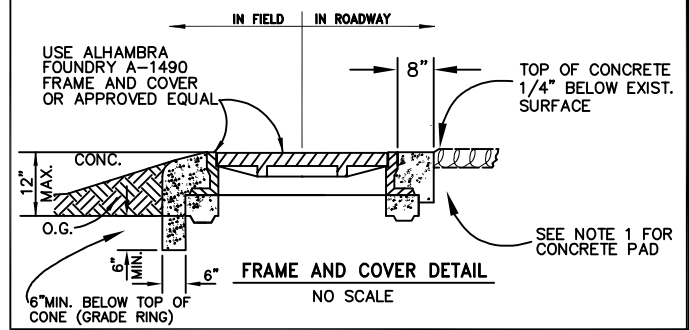
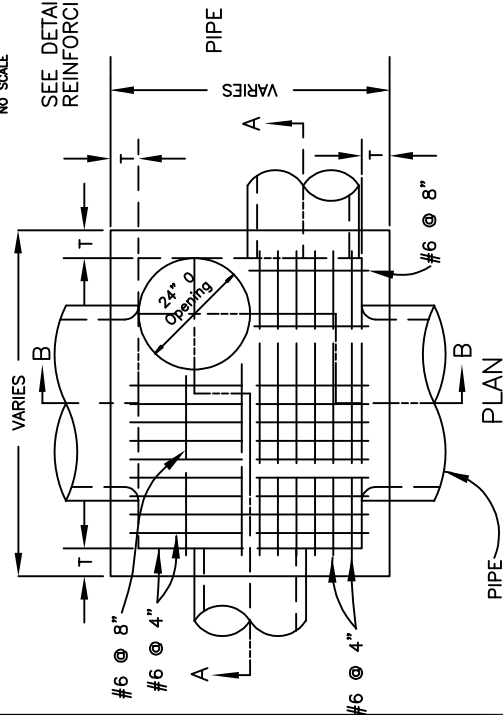
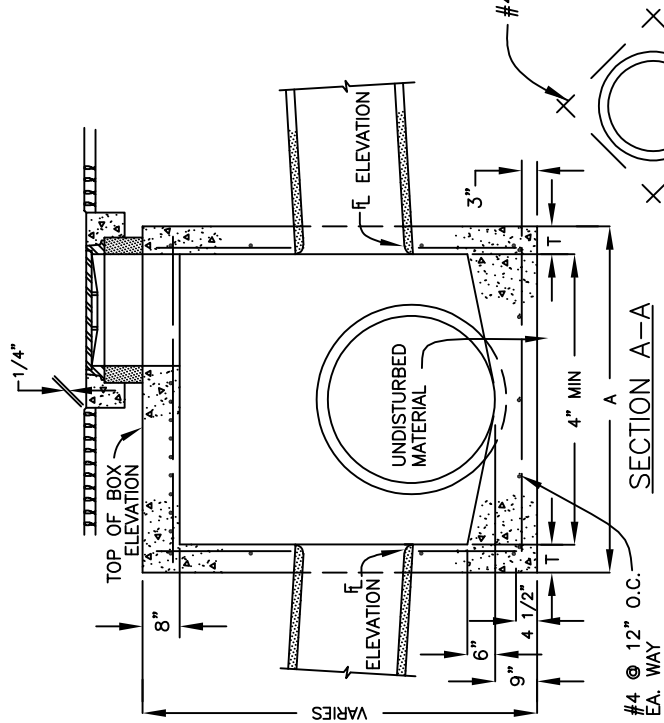
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DESIGNED BY:	J.R.C.
DATE DRAFTED:	09/30/23
APPROVED BY:	J.R.C.

PLATE NO.
D-3

NOTES:

1. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 590 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
2. WALL REINFORCING NOT REQUIRED WHEN H = 8' OR LESS AND THE UNSUPPORTED LENGTH OF ALL WALLS = 7' OR LESS. WALLS EXCEEDING EITHER LIMIT SHALL BE REINFORCED WITH #4 BARS AT 18" CENTERS PLACED 1 1/2" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.
3. GALVANIZING - SEE STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS.
4. T = 6" WHEN H = 8' OR LESS AND THE UNSUPPORTED LENGTH OF ALL WALLS = 7' OR LESS. WALLS EXCEEDING EITHER LIMIT SHALL HAVE T = 8".
5. LOCATION OF FRAME AND COVER TO BE DETERMINED BY THE ENGINEER.
6. PRECAST ALTERNATIVE IS OPTIONAL. SEE SECTION 51-1.02 OF STANDARD SPECIFICATIONS.



TRAFFIC FRAME AND COVER SET TO GRADE AS DIRECTED BY THE ENGINEER. COVER AND FRAME MACHINED TO FIT. COVER TO HAVE RADIAL BLOCK TREAD, FRAME TO HAVE FLANGE DOWN, APPROXIMATE WEIGHT-315 POUNDS. SEE NOTE #5

PRECAST CONCRETE ADJUSTMENT RINGS

SECTION B-B

VARIES

#4 @ 12" O.C. EA. WAY

TYPE "B" MINOR STRUCTURE



TYPE "B" MINOR STRUCTURE - JUNCTION BOX

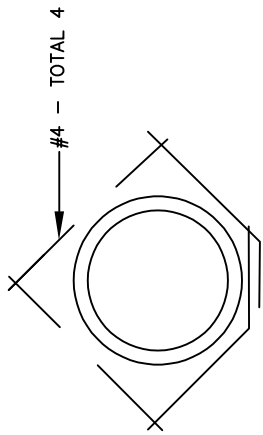
COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

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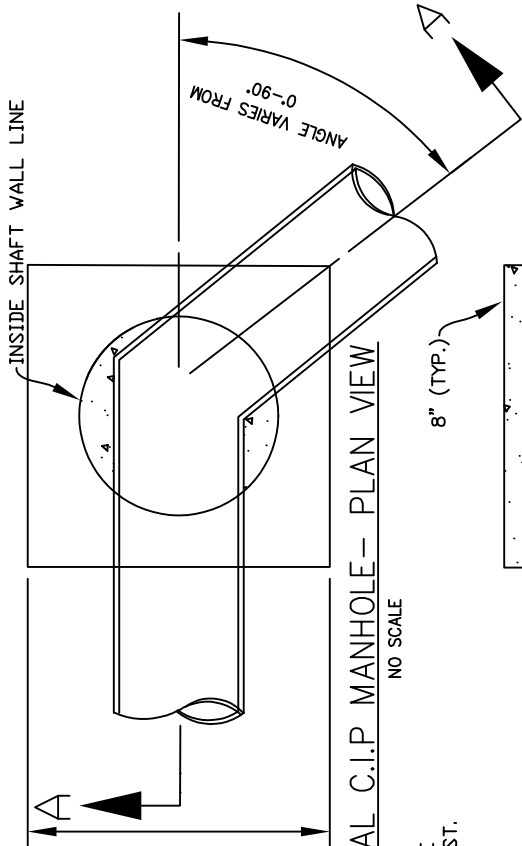
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DESIGNED BY:	J.R.C.
DATE DRAFTED:	09/30/23
APPROVED BY:	J.R.C.

PLATE NO.

D-4



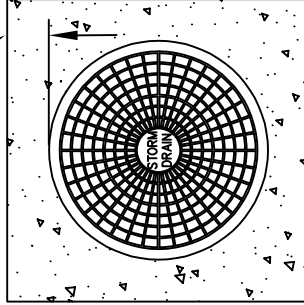
W=52" MIN. WITH 36" MANHOLE
W=64" MIN. WITH 48" MANHOLE



TYPICAL C.I.P. MANHOLE - PLAN VIEW

NO SCALE

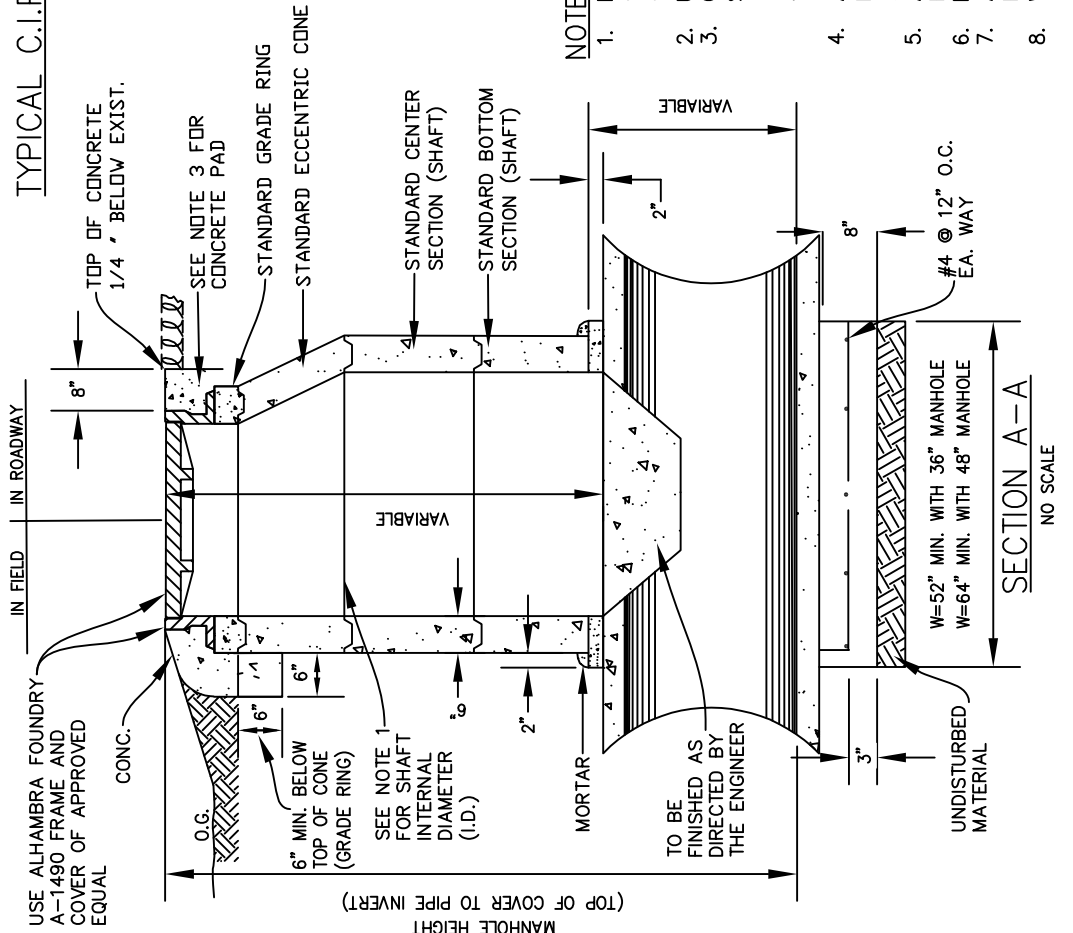
8" (TYP.)



MANHOLE COVER AND CONCRETE PAD

NO SCALE

MANHOLE HEIGHT
(TOP OF COVER TO PIPE INVERT)



DETAIL A
NO SCALE

SECTION A-A
NO SCALE

NOTES:

1. MANHOLE CONSTRUCTED ON CONCRETE PIPE OF 36" I.D. OR GREATER SHALL USE 48" SHAFT; CONCRETE PIPE WITH LESS THAN 36" I.D. SHALL USE 36" SHAFT.
2. USE COMBINATION OF CONE AND SHAFT AS DIRECTED BY THE ENGINEER. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 590 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
3. ALL REINFORCING TO BE NO.4 BARS AT 12" O.C., 1 1/2" CLEAR OF INSIDE FACE UNLESS OTHERWISE NOTED. SEE DETAIL "A" FOR REINFORCING AROUND PIPE.
4. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED AFTER FABRICATION EXCEPT FRAME AND COVER.
5. LOCATION OF FRAME AND COVER TO BE DETERMINED BY THE ENGINEER.
6. ALL REINFORCEMENT FOR SURFACES IN CONTACT WITH THE GROUND SHALL BE PROTECTED WITH NOT LESS THAN 2" OF CONCRETE.
7. WORDING ON MANHOLE TO READ "STORM DRAIN".



TYPE "C" MINOR STRUCTURE
MANHOLE

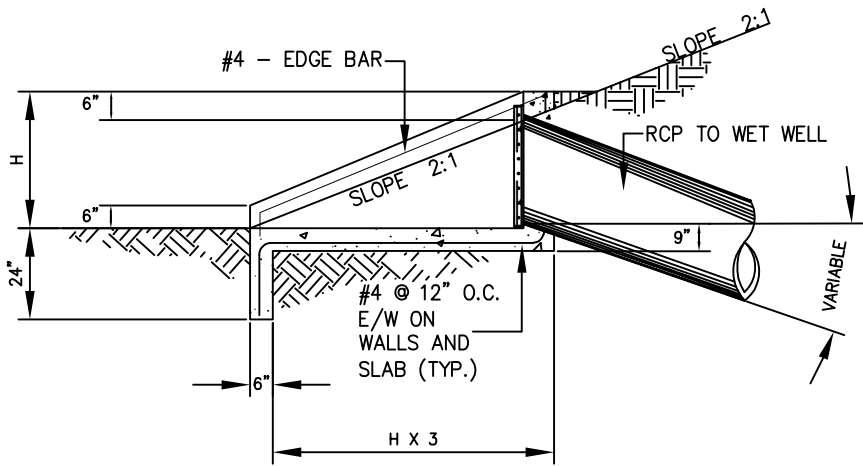
COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

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DESIGNED BY:	J.R.C.
DATE DRAFTED:	09/30/23
APPROVED BY:	J.R.C.

PLATE NO.

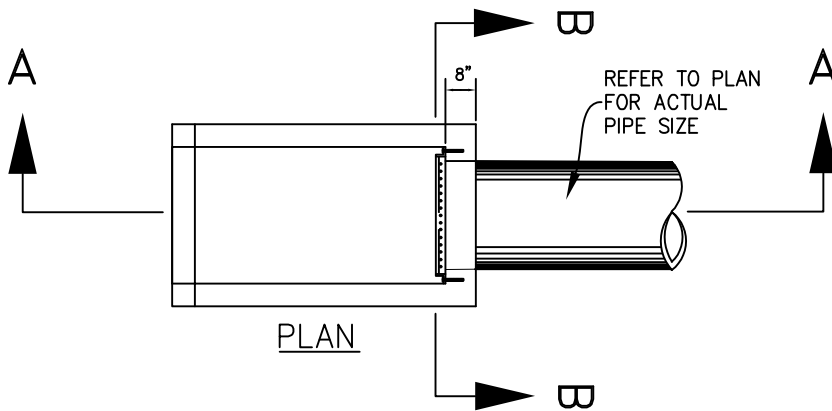
D-5



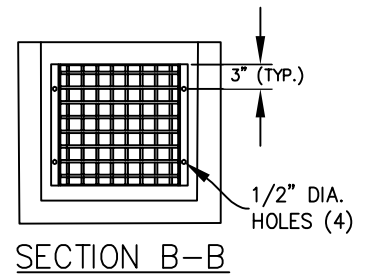
SECTION A-A

NOTE:

1. PIPE DETAIL REFER TO PLATE D-2.



PLAN



SECTION B-B

GRATE NOTES:

1. GRATE FABRICATED OR EQUIVALENT SHELF ITEM—ALL PARTS & PRODUCTS GALVANIZED.
2. FRAME CONSTRUCTED W/ 1/4" X 3/4" X 2" X LENGTH (VARIES TO PIPE SIZE) ANGLE IRON.
3. MIN. FOUR - 3/8" X 3" S.S. RED HEAD ANCHOR BOLTS FLAT LOCK WASHER, 2 EA PER VERTICAL ANGLE 3" FROM TOP & BOTTOM OF FRAME.
4. FOUR - 1/2" DIA. HOLES IN FRAME.
5. GRATE OPENING 1-3/16" X 2" O.C.
6. 1/4" DIA. ROD WELDED TO FRAME ON ALL SIDES.



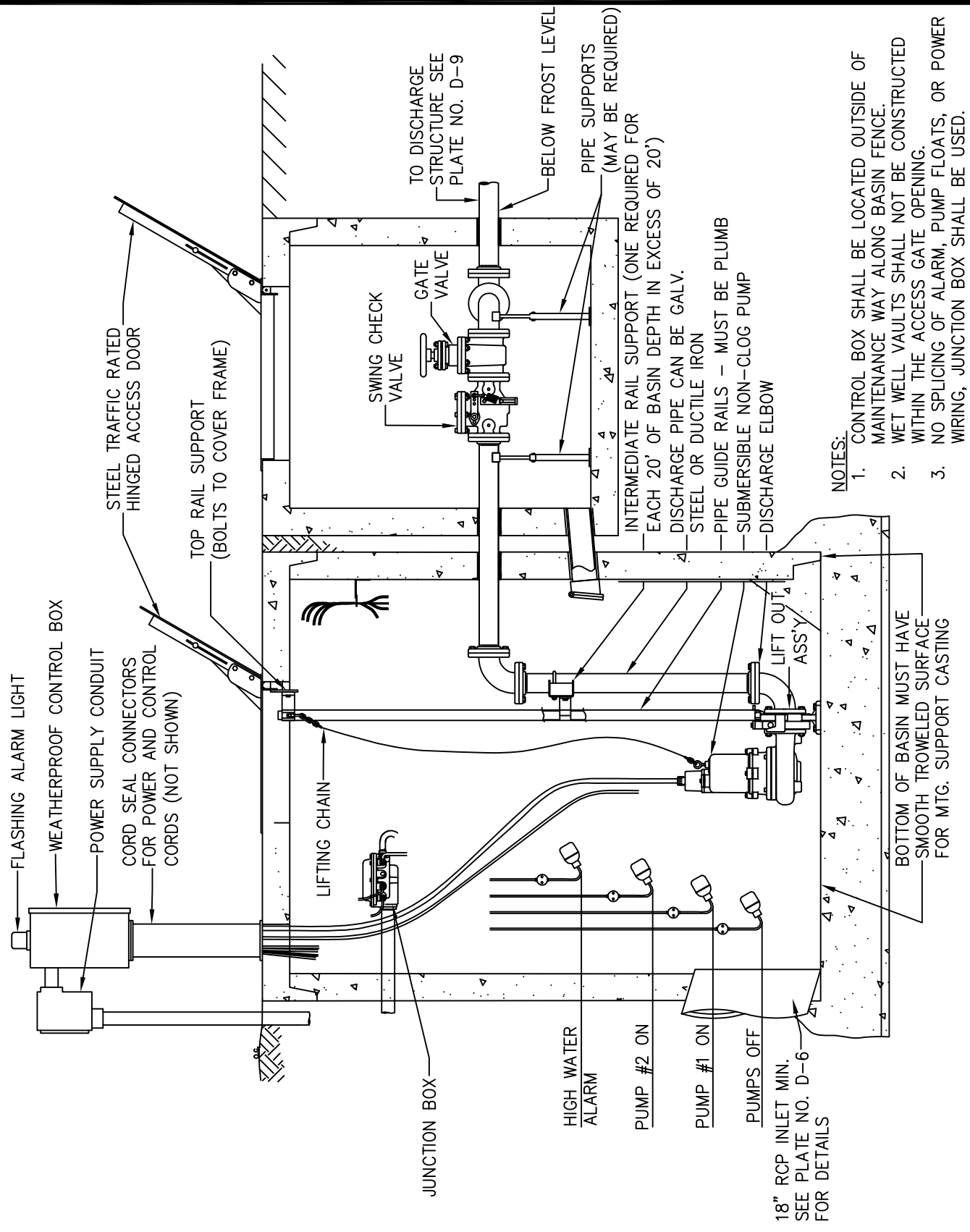
PUMP STATION
INLET STRUCTURE

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

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PLATE NO.
D-6



- NOTES:
- CONTROL BOX SHALL BE LOCATED OUTSIDE OF MAINTENANCE WAY ALONG BASIN FENCE.
 - WET WELL VAULTS SHALL NOT BE CONSTRUCTED WITHIN THE ACCESS GATE OPENING.
 - NO SPLICING OF ALARM, PUMP FLOATS, OR POWER WIRING; JUNCTION BOX SHALL BE USED.



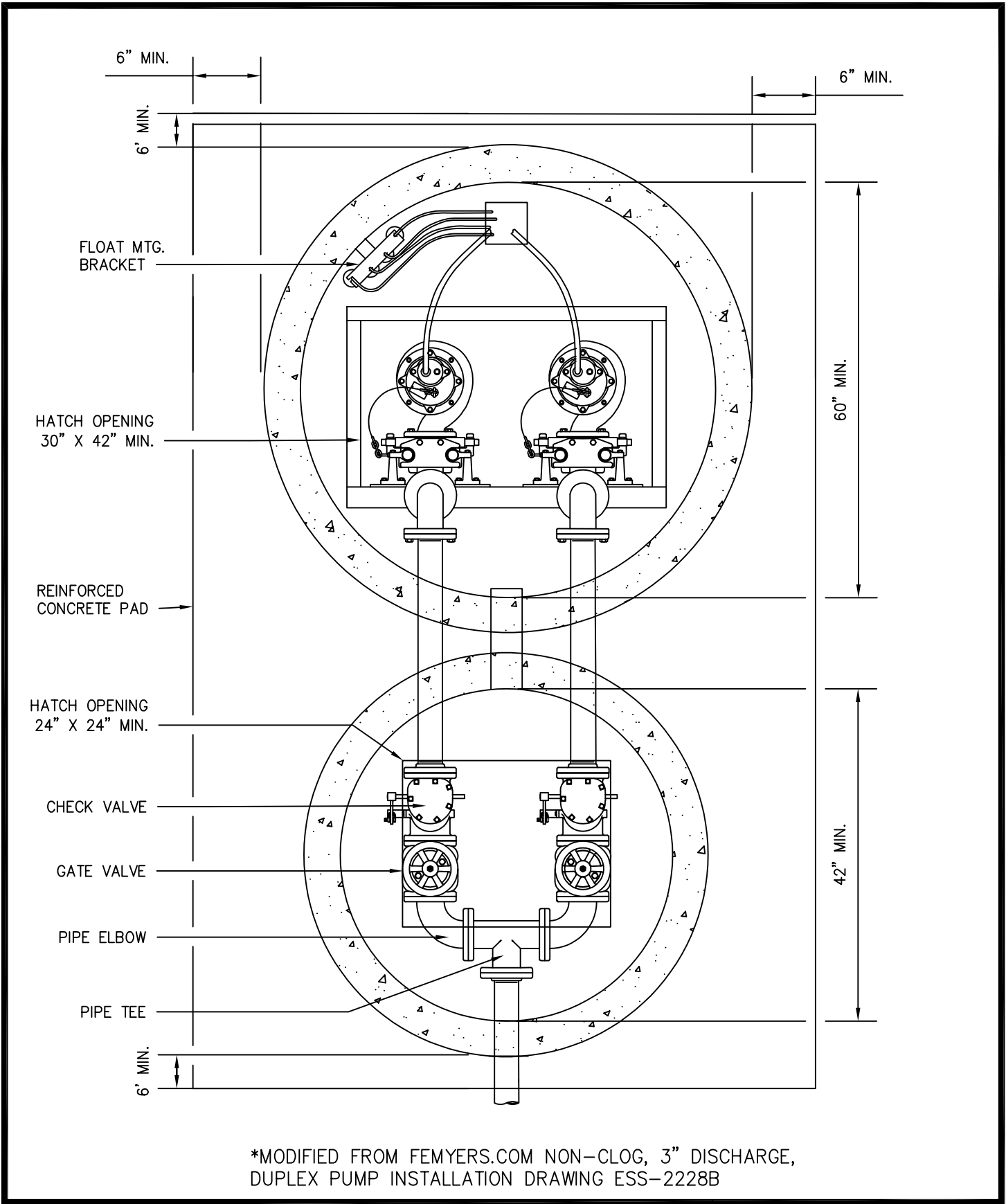
DUPLUX PUMP STATION

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STATE OF CALIFORNIA
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D-7



*MODIFIED FROM FEMYERS.COM NON-CLOG, 3" DISCHARGE, DUPLEX PUMP INSTALLATION DRAWING ESS-2228B



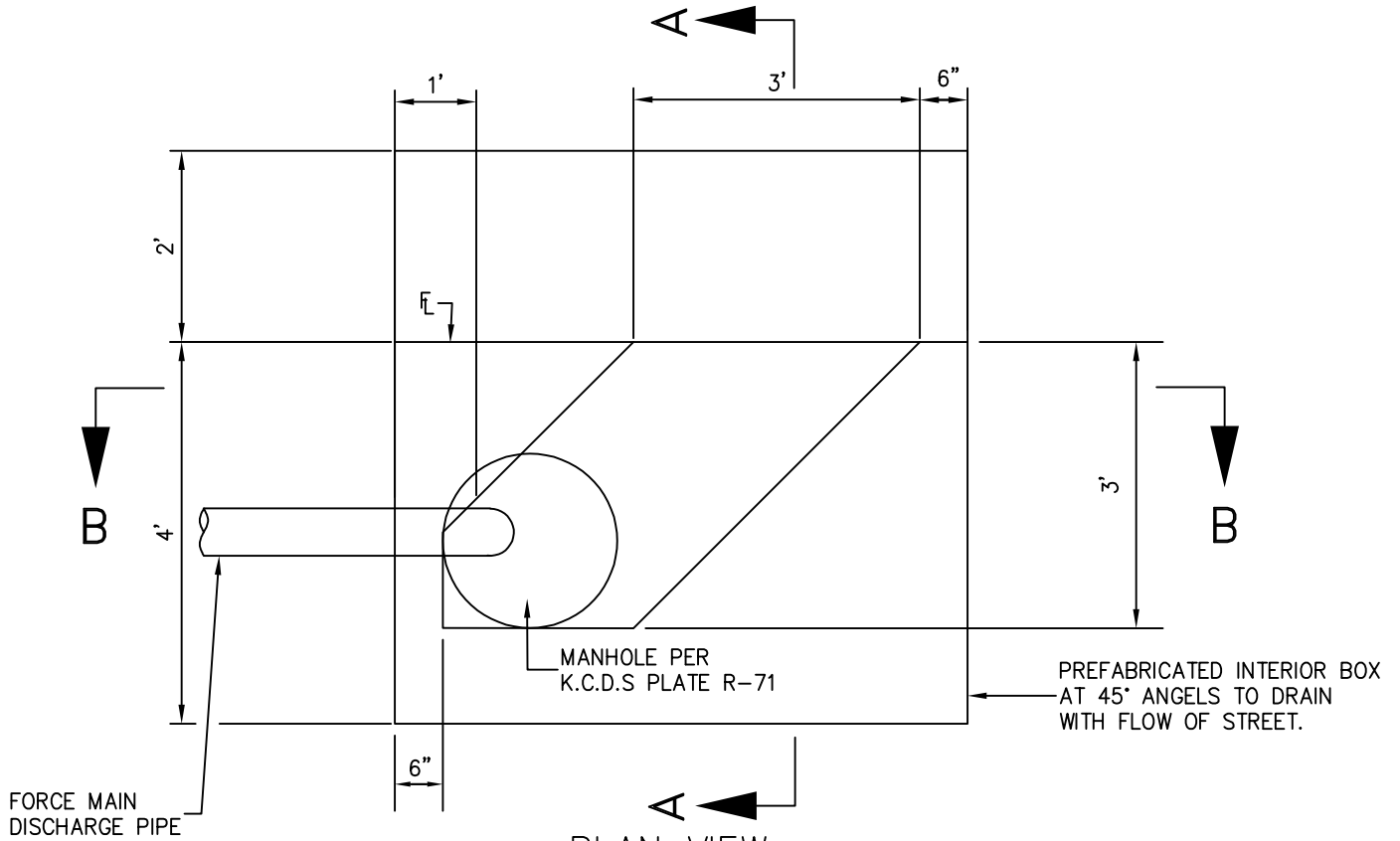
**PLAN VIEW
DUPLEX PUMPS**

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

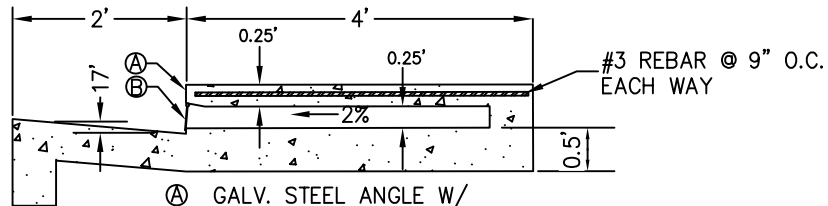
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PLATE NO.
D-8

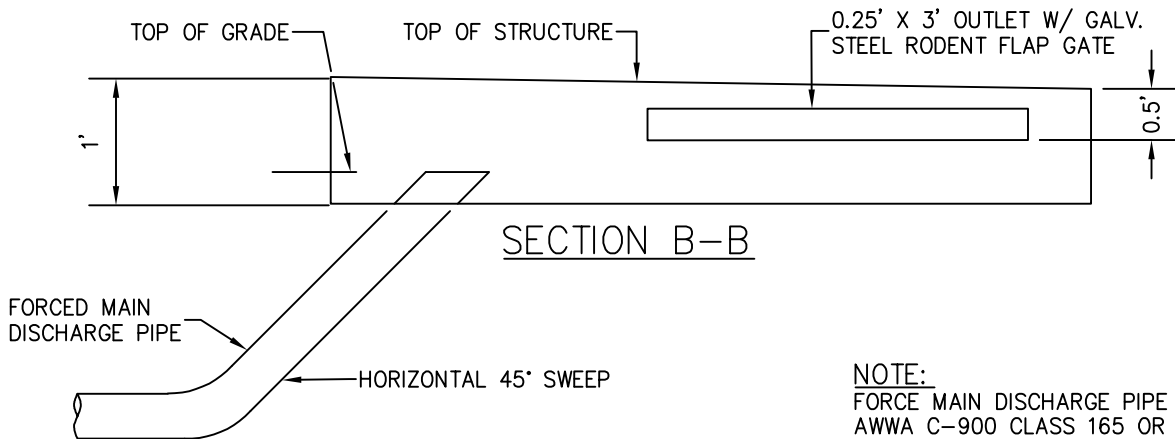


PLAN VIEW



- Ⓐ GALV. STEEL ANGLE W/
ANCHOR BOLTS @ 12" O.C.
- Ⓑ GALV. STEEL RODENT FLAP
W/ MIN OF 2 HINGES.

SECTION A-A



SECTION B-B

NOTE:
FORCE MAIN DISCHARGE PIPE MUST BE
AWWA C-900 CLASS 165 OR EQUIVALENT



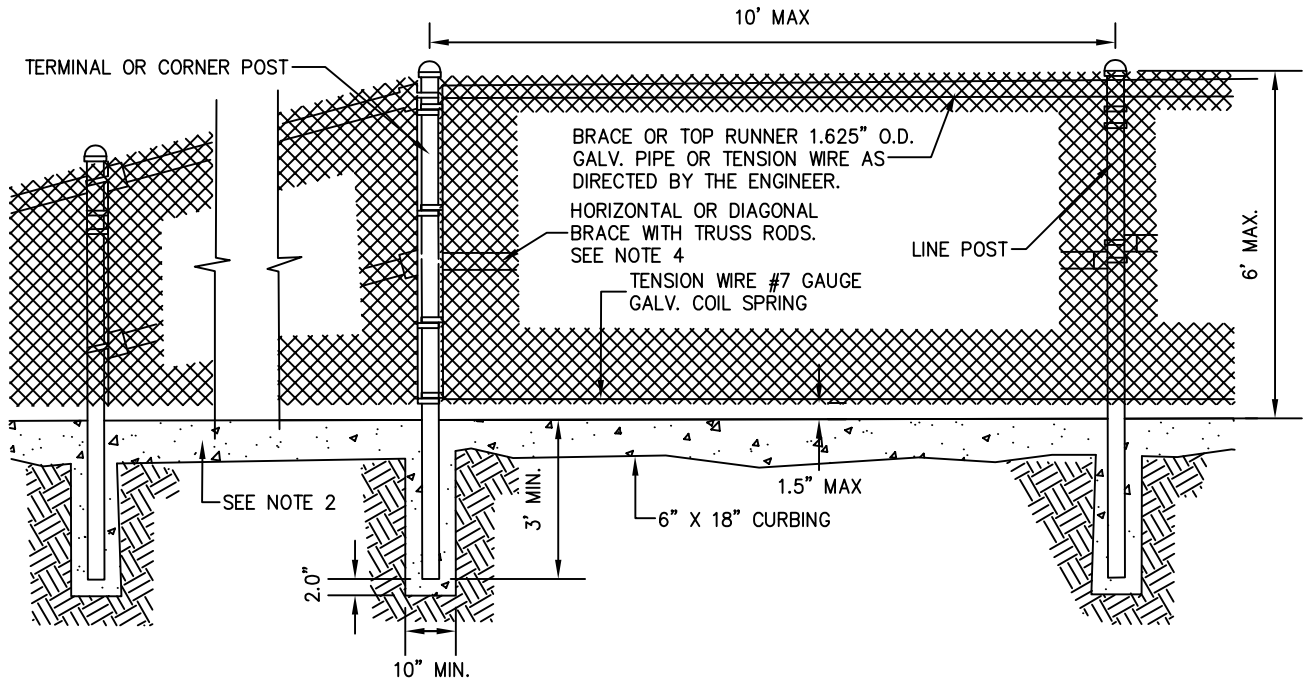
PUMP STATION DISCHARGE
STRUCTURE

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

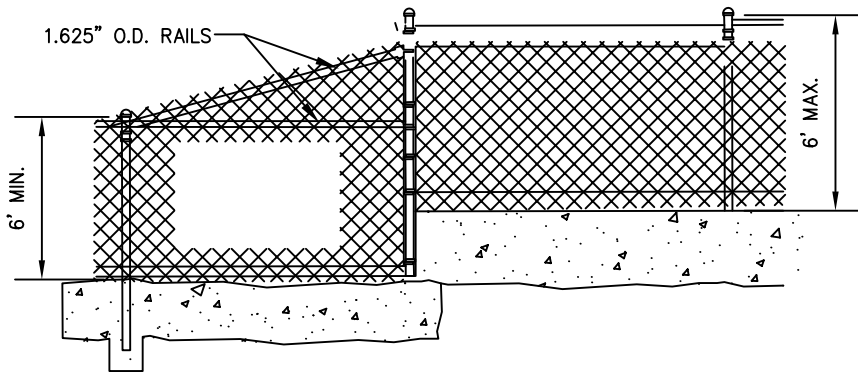
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PLATE NO.
D-9



TYPICAL CHAIN LINK FENCE DETAIL



TYPICAL DETAIL AT CULVERT ENDWALLS

FENCING SPECIFICATIONS:

1. FENCING FABRIC SHALL BE 9 GAUGE, 2" MESH, AFTER WEAVING, KNUCKLED TOP AND BOTTOM. 6" HIGH GALV.
2. CORNER POSTS SHALL BE 2-7/8" O.D. GALV. PIPE.
3. LINE POST 2-3/8" O.D. GALV. PIPE.
4. PRIVACY SLATS SHALL BE 2-3/16" X 1/4".

NOTES:

1. INSTALLATION OF FENCING AND GATES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF "STANDARD SPECIFICATION, STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION," APPROVED CURRENT EDITION.
2. CONCRETE CURBING SHALL BE CONSTRUCTED UNDER ALL FENCES. CURBING SHALL BE 6" X 18", MINOR CONCRETE. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 505 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
3. CORNER POST SHALL BE INSTALLED AT ALL ANGLES IN FENCE LINE IN EXCESS OF 10".
4. END, CORNER, AND GATE POSTS SHALL BE BRACED TO THE NEAREST LINE POST WITH GALV. DIAGONAL OR HORIZONTAL BRACES USED AS COMPRESSION MEMBERS AND GALV. 0.375" STEEL TRUSS RODS WITH TURNBUCKLES OR TRUSS TIGHTENER USED AS TENSION MEMBERS.
5. FABRIC SHALL BE FASTENED TO GATE POST, TERMINAL POST, OR CORNER POST WITH 3" X 3/4" STRETCHER BAR BONDS AT 8" ON CENTER.
6. FABRIC SHALL BE FASTENED TO LINE POST, LAST RUNNER, AND BOTTOM TENSION WIRES WITH FABRIC BONDS SPACED APPROX. 14" APART.
7. FABRIC SHALL CONFORM TO ASTM A-392, CLASS 1.
8. SUBGRADE PREPARATION SHALL BE CONSTRUCTED TRUE TO GRADE AND CROSS SECTION WITH COMPACTION OF 85% TO A DEPTH OF 0.5".
9. WHEN REDWOOD SUBURBAN SCREEN, OR EQUIVALENT IS REQUIRED IT SHALL BE CONSTRUCTED SO THAT THE SLATS ARE LOCKED INTO POSITION AND CAN ONLY BE REMOVED WITH TOOLS.
10. FENCE FABRIC IS TO BE TACK WELDED TO POSTS IN THREE PLACES (TOP, CENTER, AND BOTTOM). FENCE HARDWARE IS TO BE TACK WELDED AND GROUND SMOOTH. ALL EXPOSED METAL PARTS ARE TO BE GALV. PRIOR TO INSTALLATION.



CHAIN LINK FENCING SPECIFICATIONS

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

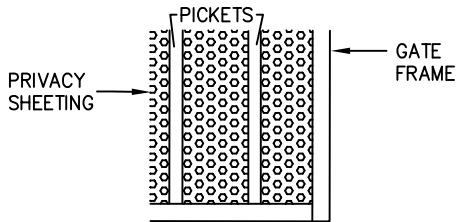
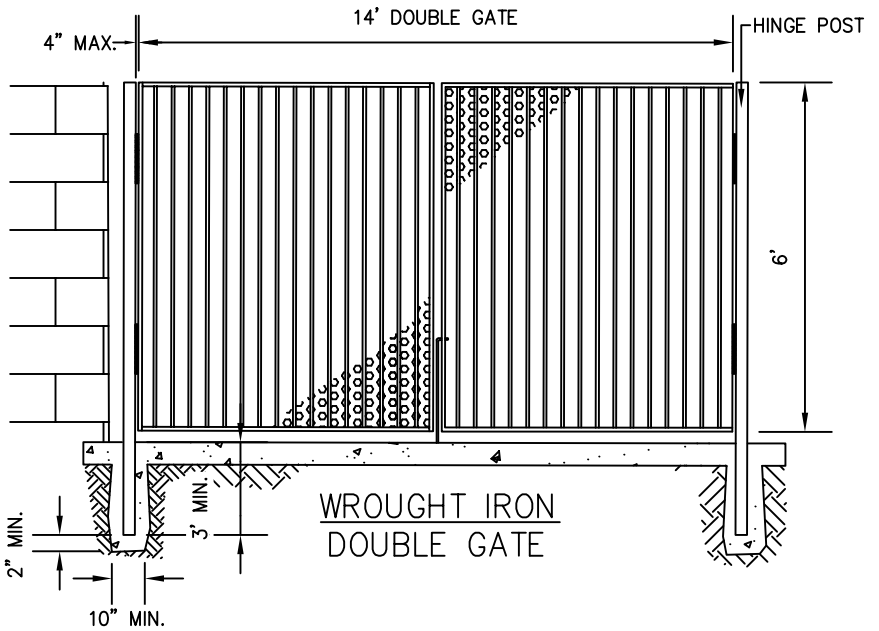
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PLATE NO.
D-10

WROUGHT IRON GATE SPECS:

1. HINGE POST SHALL BE A MIN. OF 4X4X3/16" SQ TUBING.
2. GATE FRAME SHALL BE A MIN. 1-1/2" SQ. TUBING.
3. PICKETS SHALL BE A MIN. 3/4" SQ. TUBING WITH 4" MAX. CLEAR DIMENSION.
4. PRIVACY SHEETING SHALL BE PERFORATED SHEET METAL, 24 GAUGE, 1/16" DIM HOLE, 1/8" STAGGERED CENTER.
5. GATE SHALL BE A 14' DOUBLE GATE.
6. GATE LATCH SHALL HAVE COMMERCIAL GRADE LOCKING DEVICE WITH 3/8" PADLOCK SHANK OR A LOCKING DEVICE THAT CAN BE KEYPED TO THE STANDARD PUBLIC WORKS KEY-CORE.
7. HINGES SHALL BE COMMERCIAL GRADE AND SIZED APPROPRIATELY FOR THE WEIGHT OF THE GATE AND PRIVACY SHEETING.

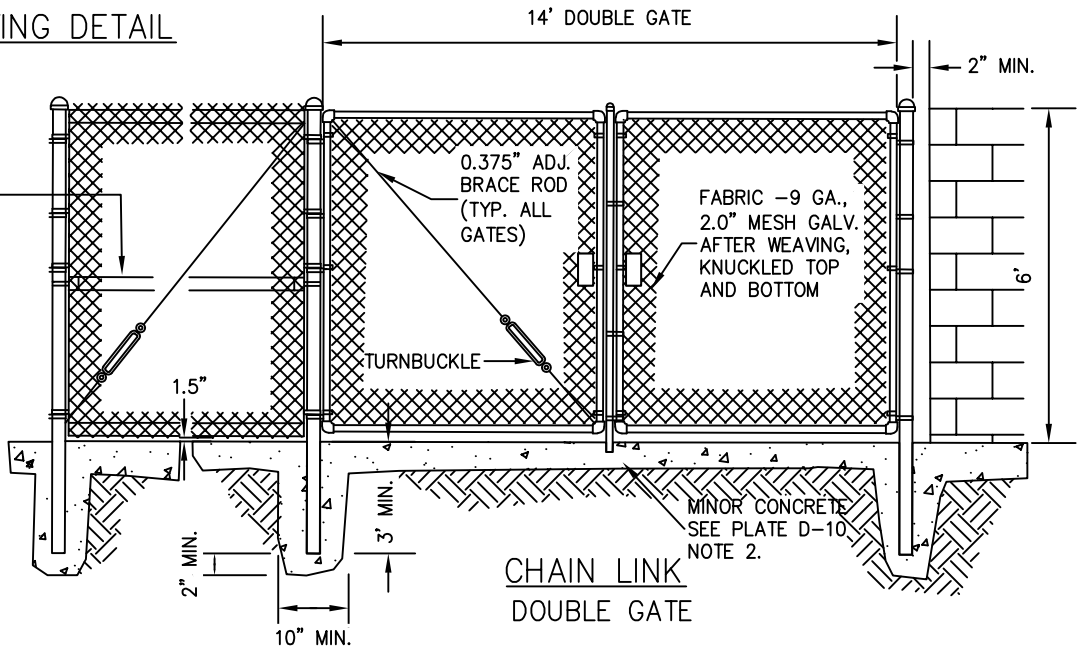


PRIVACY SHEETING DETAIL

HORIZONTAL OR DIAGONAL BRACE WITH TRUSS RODS.

DOUBLE DRIVE GATE:

WIDTH-14'
 HEIGHT-6'
 FRAME-1.875" O.D. GALV. PIPE 2.72LB/FT
 COMMERCIAL LOCKING DEVICE WITH DROP ROD



NOTES:

1. CURBING AS SPECIFIED BY COUNTY OF KERN DEVELOPMENT STANDARDS, PLATES D-2 AND D-10.
2. END, CORNER, AND GATE POSTS SHALL BE BRACED TO THE NEAREST LINE POST WITH GALV. DIAGONAL OR HORIZONTAL BRACES USED AS COMPRESSION MEMBERS AND GALV. 0.375" STEEL TRUSS RODS WITH TURNBUCKLES OR TRUSS TIGHTENERS USED AS TENSION MEMBERS.
3. WHEN REDWOOD SUBURBAN SCREEN, OR EQUIVALENT, IS REQUIRED IT SHALL BE CONSTRUCTED SO THAT THE SLATS ARE LOCKED INTO POSITION AND CAN ONLY BE REMOVED WITH TOOLS.
4. FRAMES SHALL BE MADE WITH FITTINGS OR WELDS GROUND SMOOTH, AND GALVANIZED.
5. CHAIN LINK FENCE FABRIC SHALL CONFORM TO ASTM: A-392, CLASS 1, AND BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 80-4 OF THE "STANDARD SPECIFICATIONS, STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION," APPROVED CURRENT EDITION.
6. NO THUMB LATCHES.
7. THE POST AND HINGE GAUGE MUST BE APPROPRIATE FOR THE WEIGHT OF THE GATES AND PRIVACY SHEETING.



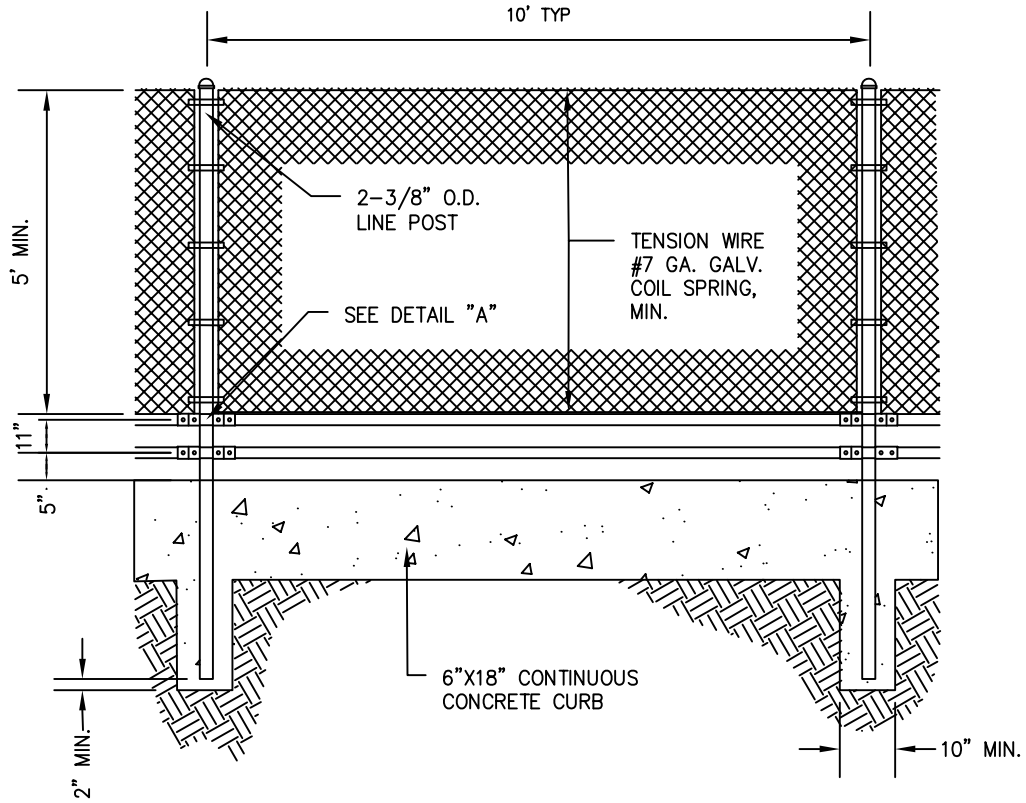
DOUBLE GATE SPECIFICATIONS

COUNTY OF KERN
 STATE OF CALIFORNIA
 DEVELOPMENT STANDARD

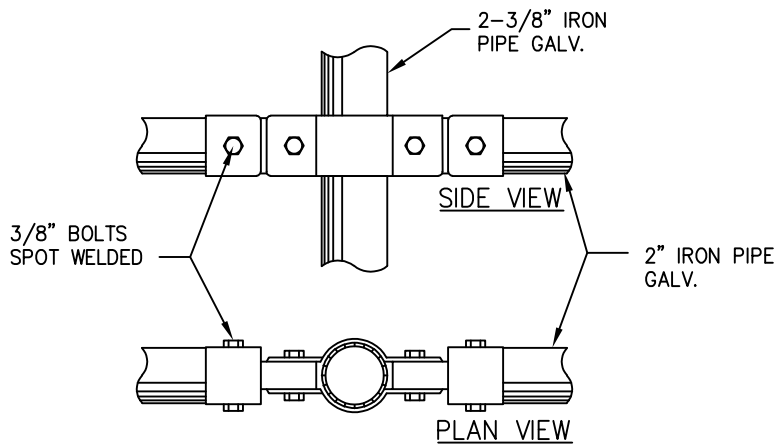
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PLATE NO.
 D-11



TRANSVERSE PROTECTION BAR



DETAIL "A"

NOTES:

1. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 505 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
2. SEE PLATE D-10 FOR ADDITIONAL FENCE DETAILS.
3. ALL EXPOSED METAL PARTS ARE TO BE GALVANIZED PRIOR TO INSTALLATION.
4. HARDWARE IS TO BE TACK WELDED AND GROUND SMOOTH AND GALVANIZED. SEE PLATE D-2 FOR RODENT BARRIER DETAILS.



FLOOD ZONE FENCING SPECIFICATIONS

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

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PLATE NO.
D-12