CITY OF GUSTINE

REVISED STORM DRAIN MASTER PLAN AMENDED AUGUST 19, 2008 RESOLUTION NO. 2008-2095

AND

IMPROVEMENT STANDARDS AND SPECIFICATIONS SECTION 5 – STORM DRAINAGE

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I. INTRODUCTION

The City of Gustine (City) is a small rural community located in the western portion of Merced County at the crossroads of State Highways 140 and 33. In February 2002, the City adopted the General Plan Update (City of Gustine, 2002) to guide its growth over the next 20 years. The focus of this Revised Storm Drainage Master Plan (Revised Drainage Plan) is the determination of a cost effective means of collecting, conveying and discharging storm water runoff from lands proposed to be developed pursuant to the General Plan (with the exception of the agricultural/commercial land use area surrounding the City).

The Revised Drainage Plan examines the use of detention basins to reduce the rates of runoff such that existing agricultural water conveyance systems can be used. These agricultural systems would be used to convey the runoff instead of constructing a dedicated urban storm water conveyance system that would carry the direct (un-detained) runoff from the service area to Los Banos Creek. Under City Council direction the previous study (Stoddard & Associates, 2003) (Original Drainage Plan) did not consider the use of detention basins.

Various storm water conveyance alternatives were examined in the Original Drainage Plan. Each of these alternatives directly discharged to Los Banos Creek. The discharge rates from the Service Area would exceed the capacity of the existing drainage ways. The City has since requested that the Drainage Plan be revised to incorporate detention basins. This Revised

Drainage Plan evaluates the use of detention basins in the City's storm drainage collection and conveyance system.

The recommended facilities plan developed in this report is based on the results of the hydrologic analyses presented in this report, established or recommended standards for storm drainage facilities, direction from City staff and the City Council, current topography and existing water conveyance systems. A project description and an opinion of the probable cost of facilities are presented for the recommended facilities plan.

II. DESCRIPTION OF PROJECT SERVICE AREA

The City's General Plan sets forth land use categories for the future growth areas within its sphere of influence. The total Service Area to be developed is 1,000 acres. At buildout, the City will be 280% the current size. The magnitude of storm runoff will therefore be approximately three times what it is today for a given storm event.

Figure 1 reflects the land use categories as reflected in the 2002 General Plan Land Use Map for Service Areas. For the purpose of storm water runoff calculations, land use has been divided into three categories: residential, representing land uses between very low density and medium density, commercial and industrial. The land use designations are important since the rate and volume of runoff which occur from a particular storm are related to how the land has been developed.

The City's existing storm drainage system conveys storm water runoff by two pipelines east of the City and three earth ditch systems northeast of the City as shown in Figure 2. The storm drain pipelines discharge to wetlands and Los Banos Creek in the vicinity of the Gustine Airport. Earthen ditch systems carry the storm water runoff to sloughs that discharge to Los Banos Creek north of Highway 140. Los Banos Creek is tributary to Mud Slough, which is tributary to the San Joaquin River.

The agricultural land that will be developed under this Revised Drainage Plan currently drains into the drainage routes as shown in Figure 3. Some of the subbasins currently drain to existing waterways; others do not currently discharge surface drainage off-site.

III. SOIL TYPES AND RUNOFF CHARACTERISTICS IN THE SERVICE AREA

The quantity of storm water runoff is related to native soil type. Small grained soils such as clay and silts have much lower infiltration rates than do coarse soil types. The methodology utilized to calculate the volume of storm water runoff, as later described in this report, takes into account the native soil characteristics as classified by the United States Department of Agriculture National Resource Conservation Service. Soil characteristics, including composition, permeability rating, water holding capacity, and hydrologic soil group, for the soils that exist in the Service Area are shown in Table III-1.

For the purpose of runoff calculations, the soils are divided into one of four (A, B, C, or D) soil groups pursuant to Urban Hydrology for Small Watersheds, TR55: (USDA SCS, 1986). The soil distribution in the Service Area is shown in Figure 4. The hydrologic soil group and the land use are used to specify curve numbers (CN) to quantify runoff pursuant to TR-55.

TABLE III-1
SOIL CHARACTERISTICS

Soil Type	Composition	Permeability Rating	Water Holding Capacity	Hydrologic Soil Group
167-Deldota Clay, Partially Drained	Mixed alluvium derived predominantly from sedimentary rock.	Slow	Moderate to High	D
168-Dos Amigos Clay Loam	Mixed alluvium derived predominantly from sedimentary rock.	Very Slow	Moderate to High	D
169-Dos Amigos Clay	Mixed alluvium derived predominantly from sedimentary rock.	Very Slow	Moderate to High	D
253-Stanislaus Clay Loam	Mixed alluvium derived predominantly from sedimentary rock.	Slow	High to Very High	C
254-Stanislaus Clay Loam, Wet	Mixed alluvium derived predominantly from sedimentary rock.	Slow	High to Very High	C
255-Stanislaus-Dos Amigos-Urban Land Complex	Mixed alluvium derived predominantly from sedimentary rock.	Slow	High to Very High	C
274-Woo Loam	Mixed alluvium derived predominantly from sedimentary rock.	Moderately Slow	High to Very High	B
276-Woo Sandy Clay Loam	Mixed alluvium derived predominantly from sedimentary rock.	Moderately Slow to Moderately Rapid	Moderate to High	B
277-Woo Clay Loam	Mixed alluvium derived predominantly from sedimentary rock.	Moderately Slow	High to Very High	B
279-Woo Clay Loam, Wet	Mixed alluvium derived predominantly from sedimentary rock.	Moderately Slow	High to Very High	C
282-Woo Urban Land Complex	Mixed alluvium derived predominantly from sedimentary rock.	Moderately Slow	High to Very High	C

Figure 5 designates hydrologic subbasins for all the subbasins within the Service Area. Each subbasin has a mix of soil groups and land uses. A weighted average is calculated to determine the CN value for each subbasin, as shown in Tables III-2 and III-3. Table III-2 presents the weighted CNs for the subbasins in their undeveloped furrow-irrigated state. Table III-3 presents the weighted CNs for each subbasin after the Service Area transforms to urban use. These data are carried forward for hydrologic modeling of the watershed.

TABLE III-2
EXISTING SUBBASIN RUNOFF CHARACTERISTICS

	AREA ACRES	AREA SQ. MILES	WEIGHTED CURVE NUMBER
N1	82.7	0.13	82.6
N2	107.2	0.17	82.9
N3	16.3	0.03	86.8
N4	90.6	0.14	86.8
NORTH	296.7	0.46	84.2
E1	42.4	0.07	87.0
E2	17.4	0.03	84.8
E3	23.4	0.04	80.0
E4	93.1	0.15	80.0
E5	79.4	0.12	80.8
EAST	255.7	0.40	81.7
S1	2.4	0.00	84.3
S2	1.8	0.00	80.0
S3	10.7	0.02	80.0
S4	11.5	0.02	85.3
S5	15.0	0.02	80.7
S6	38.8	0.06	84.0
S7	45.3	0.07	84.6
S8	81.9	0.13	85.6
S9	35.9	0.06	80.5
S10	130.9	0.20	80.1
S11	16.9	0.03	87.0
SOUTH	391.0	0.61	82.7
W1	45.0	0.07	80.0
W2	9.3	0.01	84.1
WEST	54.3	0.08	80.7

	FURROW CROPS		
	SOIL B ACRES	SOIL C ACRES	SOIL D ACRES
Curve No.	80	87	90
N1	52.4	30.3	
N2	67.3	28.9	10.9
N3	4.9	1.3	10.1
N4	5.4	77.5	7.7
NORTH	130.0	137.9	28.8
E1		42.4	
E2	5.4	12.0	
E3	23.4		
E4	93.1		
E5	70.8	8.6	
EAST	192.7	63.0	0.00
S1	0.9	1.5	
S2	1.8		
S3	10.7		
S4	2.8	8.7	
S5	13.4	1.6	
S6	16.8	22.0	
S7	15.8	29.5	
S8	16.3	65.6	
S9	33.3	2.6	
S10	128.1	2.8	
S11		16.9	
SOUTH	240.0	151.0	0.00
W1	45.0		
W2	5.5		3.8
WEST	50.5	0.0	3.8

TABLE III-3
DEVELOPED SUBBASIN RUNOFF CHARACTERISTICS

	AREA ACRES	AREA SQ.	WEIGHTED CURVE NUMBER
N1	82.7	0.13	89.1
N2	107.2	0.17	87.5
N3	16.3	0.03	89.8
N4	90.6	0.14	89.9
NORTH	296.7	0.46	88.8
E1	42.4	0.07	94.0
E2	17.4	0.03	93.4
E3	23.4	0.04	88.0
E4	93.1	0.15	88.0
E5	79.4	0.12	88.3
EAST	255.7	0.40	89.5
S1	2.4	0.00	88.1
S2	1.8	0.00	85.0
S3	10.7	0.02	85.0
S4	11.5	0.02	88.8
S5	15.0	0.02	85.5
S6	38.8	0.06	87.8
S7	45.3	0.07	88.3
S8	81.9	0.13	89.0
S9	35.9	0.06	85.4
S10	130.9	0.20	85.1
S11	16.9	0.03	90.0
SOUTH	391.0	0.61	86.9
W1	45.0	0.07	85.0
W2	9.3	0.01	93.8
WEST	54.3	0.08	86.5

	RESIDENTIAL			COMMERCIAL			INDUSTRIAL		
	SOIL B ACRE	SOIL C ACRE	SOIL D ACRE	SOIL B ACRE	SOIL C ACRE	SOIL D ACRE	SOIL B ACRE	SOIL C ACRE	SOIL D ACRE
Curve No.	85	90	92	92	94	95	88	91	93
N1							52.4	30.3	
N2	62.5	26.7	10.7	4.8	2.2	0.3			
N3	4.9	1.3	10.1						
N4	5.4	77.5	7.7						
NORTH	72.8	105.5	28.5	4.8	2.2	0.3	52.4	30.3	0.0
E1					42.4				
E2				5.4	12.0				
E3							23.4		
E4							93.1		
E5							70.8	8.6	
EAST	0.0	0.0	0.0	5.4	54.5	0.0	187.3	8.6	0.0
S1	0.9	1.5							
S2	1.8								
S3	10.7								
S4	2.8	8.7							
S5	13.4	1.6							
S6	16.8	22.0							
S7	15.8	29.5							
S8	16.3	65.6							
S9	33.3	2.6							
S10	128.1	2.8							
S11		16.9							
SOUTH	240.0	151.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
W1	45.0								
W2				3.8		5.5			
WEST	45.0	0.0	0.0	3.8	0.0	5.5	0.0	0.0	0.0

IV. DESIGN RAINFALL

Rainfall is simulated based on historic rainfall data. Statistical methods are utilized to develop relationships between the frequency of occurrence of rainfall events, the amount of rainfall, and the time over which the rainfall occurs. These data are generally set forth in intensity-duration-frequency curves. The current City Standards contain recommended rainfall intensity-frequency curves for storms having return periods of 2-years, 5-years, and 10-years. These data were compared with short-term intensity-duration curves developed by DWR from rainfall data at San Luis Dam, short-term rainfall data set forth in the Stanislaus County Storm Drainage Design Standards for the City of Modesto, long-term depth-duration-frequency data for the City of Los Banos, and long-term depth-duration-frequency data for San Luis Dam. The comparison indicated the short-term duration data set forth in the current standards, to be slightly greater than shown for the City of Modesto. The short-term duration data for San Luis Dam averaged 18-20% below that shown for Modesto.

Annual normal rainfall for the City of Newman, the closest gauging station to the City of Gustine, is 10.3 inches per year. The average annual rainfall measured at San Luis Dam is 9.72 inches per year, and the annual rainfall measured at Los Banos is 9.24 inches per year. These data show the trend of increased annual rainfall along the westerly side of the San Joaquin Valley and that an increase of 6% in the short-term rainfall data developed from the San Luis Dam rain gauge would be representative of rainfall characteristics in Gustine. On this basis, rainfall depth-duration-frequency curves for return periods of 2-years, 5-years, 10-years, 50-years, and 100-years, with durations between 5 minutes through 24 hours were developed. These data are presented in Table IV-1 below. This table of data is carried forward for modeling the Service Area runoff.

TABLE IV-1
DEPTH - DURATION - FREQUENCY DATA

City of Gustine

Return Period (Years)	Duration									
	5 min.	10 min.	15 min.	30 min.	1 hr.	2 hr.	3 hr.	6 hr.	12 hr.	24 hr.
	Depth (Inches)									
2	0.07	0.12	0.15	0.21	0.29	0.42	0.52	0.77	0.94	1.20
5	0.11	0.16	0.20	0.30	0.39	0.59	0.73	1.09	1.33	1.69
10	0.13	0.19	0.23	0.36	0.47	0.70	0.87	1.29	1.57	1.99
50	0.17	0.25	0.32	0.47	0.63	0.93	1.14	1.71	2.08	2.64
100	0.18	0.28	0.35	0.52	0.69	1.03	1.26	1.88	2.29	2.90

V. RUNOFF COMPUTATION METHODOLOGY

The City Standards allow use of the Rational Method or the USDA SCS TR-55 methodology for quantifying storm water runoff volumes and flowrates. This study uses the USDA SCS TR-55 methodology which is preferred for use with large watershed areas for the following reasons:

1. The TR-55 method provides more accurate results for drainage areas exceeding 20 acres.

2. The TR-55 method represents storm runoff by synthetic hydrographs that can be routed using computer methods.

The computer program developed by the Corps of Engineers Hydraulic Engineering Center for hydrologic and hydraulic modeling known as HEC-HMS is used to perform the modeling of the system.

The Service Area is divided into subbasins as shown in Figure 3. The subbasins were determined based on observations of the current drainage conditions. Hydrologic modeling was performed to determine the 50-year storm runoff rates and volumes for the existing and developed conditions, as well as to determine detention basin and pipeline sizes.

Drainage from subbasin W2 is expected to discharge directly into the Central California Irrigation District (CCID) Main Canal through use of on-site facilities and is therefore not addressed specifically in this plan. Subbasin W1 may also discharge into the Main Canal. Subbasin W1 may alternatively be connected to the storm water collection system in subbasin N4. In this Revised Drainage Plan it is assumed that subbasin W1 will be connected to subbasin N4.

VI. EXISTING STORM DRAINAGE WATER CONVEYANCE FACILITIES

Currently, all storm runoff is discharged from the City of Gustine through the use of agricultural water conveyance facilities, through joint use of a 42-inch pipeline and the use of a 24-inch storm drainage outfall line. These facilities discharge into natural sloughs which are tributary to Los Banos Creek. Runoff which enters Los Banos Creek enters Mud Slough which discharges to the San Joaquin River at a point about five miles northeast of the City. Los Banos Creek and the downstream tributaries currently handle all storm runoff from the City of Gustine. Figure 2 shows the approximate locations of the main conveyance facilities utilized to convey storm water from the City.

VII. EXISTING AGRICULTURAL WATER CONVEYANCE FACILITIES

A reconnaissance of the existing channels draining the agricultural land within the Service Area was performed to determine their suitability for conveying the storm drainage after development. A map of these facilities is given in Figure 3. The current drainage routes are as follows:

- Route 1: Part of the High School Ditch system. Drainage route for the Borrelli Ranch subdivision and subbasin N4.

- Route 2: Part of the High School Ditch system. Joins Route 1 downstream of Kniebes Road. Drainage route for subbasins N1 and N2.

- Route 3: Open ditch approximately 1,300 feet north of Carnation Road. Drainage route for subbasin E1, hereafter referred to as "Orchard Ditch".

- Route 4: The City's 24-inch storm drain pipeline along Carnation Road. Drainage route for subbasin E3.

- Route 5: The City's 42-inch storm drain pipeline following the extension of Meredith Avenue. Drainage route for subbasin E4.

- Route 6: Drainage route for subbasins S6 and S9. Channel is not connected to downstream drainage facilities and discharges to pasture land.

- Route 7: Drainage route for subbasins S7 and E5. Channel diminishes to the east.

- Route 8: CCID Gustine Farm Ditch. A combination water delivery and water drainage route. The major waterway south of the City. Drainage route for subbasin S8.

The reconnaissance revealed that subbasins N3, W1, S1, S2, S3, S4, S5, S10, S11, and E2 currently do not discharge drainage water off-site.

The High School Ditch system on the north side of the City, the ditch system serving subbasin E1, the existing City storm drain pipelines and the Gustine Farm Ditch system appear to be viable options for conveying storm water runoff after detention once the Service Area is developed. This conclusion is based on field observations of the facilities and choosing those appearing to have the larger conveying capacity.

Areas which continue to direct storm water runoff to their historic drainage routes after development may have the right to continue to drain as long as the rate of runoff is limited to less than the rate prior to development or does not cause damage downstream. Runoff rates are regulated by providing storm water detention prior to discharge. The right to use the existing waterways is a legal question that should be addressed by the City's legal counsel.

The CCID Main Canal may be the most appropriate point of disposal for storm water runoff from the highway commercial properties within the Service Area lying upslope and west of the canal.

Prior to construction of the Los Banos Creek Detention Dam, diversion of flows from the creek by the Grassland Water District, and severance of watershed due to construction of canals and highways, Los Banos Creek drained a considerable watershed. The modifications have substantially reduced creek flow. The capacity to convey water in the creek from the City of Gustine to the San Joaquin River is not known. However, with storm water detention being provided, runoff rates will be less than the historic rates.

VIII. DRAINAGE SYSTEM DESIGN CRITERIA AND CONSIDERATIONS

1. City of Gustine General Plan

The City General Plan contains guidance and policy regarding the requirements for storm drainage improvements in its Public Facilities section. It recognizes the need for a Storm Drainage Master Plan.

The General Plan recommends that storm water detention facilities be provided to detain peak storm water flows so that peak flows in the downstream conveyance facilities do not exceed the flows experienced currently during storm conditions. It also recognizes that "new discharge standards are expected to be implemented by the Environmental Protection Agency that will require municipalities to implement some sort of treatment program for stormwater before it is directly discharged into the surface water system."

Detention basins with interruptible discharge will be a necessary part of any future stormwater treatment system.

The General Plan does not contain any specific design requirements or discussion of best management practices (BMPs).

2. **Merced County Department of Public Works Storm Drainage Design Manual.**

Design of storm drainage facilities constructed under Merced County's jurisdiction include elements listed below. Some of the elements listed were not adopted by the City:

Transmission Facilities

a) Page III-1, 3.02A. Design Return Frequency: Storm drainage transmission facilities shall be designed to transport the runoff from a 5-year, 24-hour storm as presented in this manual.

b) Page III-1, 3.02C. Allowable Detention Basin Discharge Rate Constraints: The amount of discharge into an irrigation canal or lateral is subject to the approval of the appropriate irrigation district. However, since the Department of Public Works is usually the responsible agency for providing maintenance for the drainage maintenance zone of benefit, we reserve the right to reduce the discharge from an irrigation district's approved allowable in order to decrease pump sizes and reduce pump cycling.

c) Page III-3, 3.02F. Roadside Ditch Design Constraints: The minimum allowable flow line slope of a roadside ditch shall be 0.0025. The maximum allowable capacity of a roadside ditch shall be determined as follows:

1) Determine the hydraulic radius of the proposed ditch. The design engineer may either use a trial and error method to calculate the exact hydraulic radius for the maximum design flowrate or the design engineer may use the maximum allowable depth of an earth ditch to calculate the hydraulic radius. In residential developments, the maximum water depth in a roadside ditch should meet the following criteria:

   - The edge of the water should be a minimum of 2 feet from the edge of the gravel shoulder.

   - The maximum allowable depth shall be 1 foot.

Detention Basin Design Constraints and Procedures

a) Page II-1, 2.02A. General Design Constraints: All detention basins except those approved for non-interruptible discharge shall have the capacity to fully contain the entire runoff resulting from a 10-year, 24-hour storm with the highest design water surface elevation no higher than the lowest tributary inlet grate elevation.

b) Page II-1, 2.02B. The basin shall have a minimum of 0.2 feet of freeboard above the highest design water surface elevation.

c) Page II-1, 2.02C. The maximum design water surface elevation in a detention basin without a fence shall be 1 1/2 feet with side slopes not exceeding 8:1. Otherwise, a fence will be required around the entire basin perimeter. The maximum detention basin side slope when a fence is proposed shall be 3:1 in sandy soil and 2:1 in heavy soil.

d) Page II-1, 2.02E. The required basin size may be reduced by the volume of the transmission pipe that leads to the basin.

e) Page II-2, 2.03A. Detention Basin with Positive Discharge: A detention basin with a positive discharge will be defined in this manual as a detention basin utilizing a pumped discharge or an interruptible metered gravity flow into an irrigation lateral or natural creek. A detention basin with a positive discharge can be considered for approval only after the following criteria have been satisfied:

1) The minimum separation between the bottom of a detention basin with a positive discharge and any ground water or perched water shall be 5 feet in accordance with the Health Department requirements. In no case shall separation be less than 2 feet in the event that the Health Department waives its separation requirements.

2) The appropriate irrigation district shall first agree to accept the proposed storm drainage water.

3) Pumped or gravity discharge shall be designed to completely interrupt storm water flow into the discharge channel whenever the water level in the discharge channel is at or above a high water mark established by the appropriate agency.

f) Page II-3, 2.03B. Detention Basins with Non-Interruptible Discharge: The Department of Public Works will allow non-interruptible discharge to be utilized for newly constructed storm drainage systems within the

County of Merced only on a very limited basis. The following criteria must be satisfied in order for non-interruptible discharge to be approved:

1) The entire property being developed must currently drain directly into the channel being proposed as the discharge point.

2) The channel must have the existing capacity to contain the runoff from a 2-year storm for the entire drainage area upstream of the development. The Merced County Streams Report prepared by the Corps of Engineers may be used in determining capacity.

3) The proposed non-interruptible discharge must gravity flow from the detention basin to the discharge point in the channel.

4) The maximum allowable discharge rate shall be based upon the runoff from a 2-year storm for the undeveloped state of the land.

5) Required Detention Basin Volume shall be determined from Chapter 6 of TR-55.

6) Channels under the jurisdiction of an irrigation district must receive specific approval from them allowing non-interruptible gravity discharge into their facilities.

7) Pumped discharge cannot be assumed to be non-interruptible because of a historical problem with pump failures and power disruptions.

3. California Storm Water Regulations

The National Pollution Discharge Elimination System (NPDES) administrated by the United States Environmental Protection Agency (EPA) was introduced in 1972 to address pollution of surface waters in the United States. This program was first directed at reducing pollutants from industrial and municipal wastewater.

In 1973, EPA issued their first storm water regulations. Extensive revisions to NPDES regulations occurred during the 1970's and 1980's primarily as a result of several lawsuits. In 1990, EPA promulgated rules establishing Phase 1 of the NPDES Storm Water Program which applied to industrial sites, to construction sites of 5 acres or more, and to municipalities serving populations with 100,000 persons or greater. These large municipalities were required to implement a storm water management program to control pollutant discharge and obtain a permit through the Regional Water Quality Control Board (RWQCB).

On December 8, 1999, the EPA extended the NPDES Storm Water Program by promulgating regulations for small municipal storm sewer systems. Known as Phase II, the final rule automatically covers, on a nationwide basis, all small municipal storm water systems located in urbanized areas and some identified small municipal storm sewers located outside of urbanized areas if the California State Water Resources Control Board (SWRCB) determines that discharges from the storm sewer system causes or has the potential to cause an adverse impact on water quality. The Phase II final rule required the SWRCB develop a set of designation criteria. The criteria which may result in regulation outside of an urban area includes high population density, high growth, continuity to an urbanized area, discharge to sensitive water bodies, and significant contributors of pollutants.

The SWRCB has elected to adopt a statewide general permit to regulate the small municipal storm drainage systems, except that certain situations may necessitate individual permits or region-specific permits.

On April 30, 2003, the SWRCB issued the General Permit No. CAS000004 for small municipal separate storm sewer systems (Small MS4s). Small MS4 is defined as an MS4 that is not permitted under the Phase 1 regulations which pertain to municipal separate storm sewer systems serving a population of 100,000 or more. The permit states that:

"This General Permit regulates discharges of storm water from "regulated Small MS4s." A "regulated Small MS4" is defined as a Small MS4 that discharges to a water of the United States (U.S.) or to another MS4 regulated by NPDES permit, and which is designated in one of the following ways:

1. *Automatically designated by U.S. EPA pursuant to 40 CFR section 122.32(a)(1) because it is located within an urbanized area defined by the Bureau of the Census (see Attachment 1); or*

2. *Traditional Small MS4s that serve cities, counties, and unincorporated areas that are designated by SWRCB or RWQCB after consideration of the following factors:*

   a. *<u>High population density</u> – High population density means an area with greater than 1,000 residents per square mile. Also to be considered in this definition is a high density created by a non-residential population, such as tourists or commuters.*

   b. *<u>High growth or growth potential</u> – If an area grew by more than 25 percent between 1990 and 2000, it is a high growth area. If an area anticipates a growth rate of more than 25* *percent over a 10-year period ending prior to the end of the first permit term, it has high growth potential.*

c. *Significant contributor of pollutants to an interconnected permitted MS4* – *A Small MS4 is interconnected with a separately permitted MS4 if storm water that has entered the Small MS4 is allowed to flow directly into a permitted MS4. In general, if the Small MS4 discharges more than 10 percent of its storm water to the permitted MS4, or its discharge makes up more than 10 percent of the other permitted MS4's total storm water volume, it is a significant contributor of pollutants to the permitted MS4. In specific cases, the MS4s involved or third parties may show that the 10 percent threshold is inappropriate for the MS4 in question.*

d. *Discharge to sensitive water bodies* – *Sensitive water bodies are receiving waters, which are a priority to protect. They include the following:*

- *those listed as providing or known to provide habitat for threatened or endangered species;*

- *those used for recreation that are subject to beach closings or health warnings; or*

- *those listed as impaired pursuant to CWA section 303(d) due to constituents of concern in urban runoff (these include biochemical oxygen demand [BOD], sediment, pathogens, petroleum hydrocarbons, heavy* *metals, floatables, polycyclic aromatic hydrocarbons [PAHs], trash, and other constituents that are found in the MS4 discharge).*

Additional criteria to qualify as a sensitive water body may exist and may be determined by SWRCB or RWQCB on a case-by-case basis.

e. <u>Significant contributor of pollutants to waters of the U.S.</u> – Specific conditions presented by the MS4 may lead to significant pollutant loading to waters of the U.S. that are otherwise unregulated or inadequately regulated. An example of such a condition may be the presence of a large transportation industry.

These factors are to be considered when evaluating whether a Small MS4 should be regulated pursuant to this General Permit. An MS4 and the population that it serves need not meet all of the factors to be designated. SWRCB designates a number of Small MS4s according to these criteria through this General Permit."

The City has not been designated by the SWRCB as one to be regulated under the General Permit.

IX. STORM DRAINAGE DESIGN STANDARDS

With consideration given to the above criteria and standards of other communities, the following storm drainage design system standards are adopted for guidance and development of this plan as set forth in Table IX-1.

TABLE IX-1
HYDROLOGIC DESIGN CRITERIA FOR
STORM DRAINAGE SYSTEM DESIGN

Rainfall-Intensity–Duration	The data set forth in Table IV-1 is used for calculation of runoff storage volumes and flowrates.
Detention Basin Storage	Basins must hold runoff from the 10-year, 24-hour hypothetical rainfall event with the maximum water level no higher than six inches below the lowest tributary gutter elevation and must hold the runoff from the 50-year, 24-hour storm event with a water surface elevation below the lowest top of curb.
Detention Basin Control	Basin inlet and outlet works shall be designed and the basin configured to allow control of the flow diverted into the basin and control of the flow discharged from the basin such that water can be diverted for water quality control and treatment as needed.
Detention Basin Evacuation	To provide storage for subsequent storms, after the 50-year, 24-hour storm event detention basins must be fully evacuated within 48-hours after maximum storage occurs.
Retention Basins	Retention basins, also known as percolation basins, shall not be allowed due to low permeability soils and shallow groundwater conditions which restrict percolation.
Conveyance Facilities	All conveyance facilities including pipelines, ditches and culverts shall be designed to carry the peak discharge from a storm with a 5-year return. The slope of the hydraulic grade line shall be calculated assuming the depth of the receiving water or basin to be 50% of the maximum depth at the time the peak runoff rate occurs.

It is recommended that the City become familiar with the General Permit requirements, focusing upon the required 6 Minimum Control Measures and consider implementation of Best Management Practices which can be implemented at little cost to the City and result in improved water quality.

X. RUNOFF ANALYSES

Rainfall runoff simulations were performed to determine the runoff characteristics from the various subbasins within the Service Area into the identified drainage routes. Runoff was routed as characterized by the runoff curve numbers in Tables III-2 and III-3. The 50-year storm event was analyzed to quantify the runoff into the various drainage routes under undeveloped conditions. The runoff rates and volumes from the Service Area during the 50-year storm event under the undeveloped state were compared to those during the 50-year storm event in the developed state. Detention was provided in the developed state.

This comparison is given to demonstrate that, although the runoff volume increases substantially upon development (71.2 ac-ft to 126.9 ac-ft), the rate of discharge is only a fraction of the rate in the pre-development rate. This comparison is given in Table X-1. Note that even though the drainage routes of some of the subbasins will be changed in the developed state, increasing the rates of discharge into particular channels, the discharge rates are reduced to less than 12% compared to the pre-developed state because of the storm water detention.

Table X-1
RUNOFF IN EXISTING AND DEVELOPED STATES
DUE TO 50-YEAR STORM EVENT

		Existing		Developed	
Route	**Description**	**Flow** (cfs)	**Volume** (ac-ft)	**Flow** (cfs)	**Volume** (ac-ft)
R1	High School Ditch System	44.0	10.7	4.4	17.3
R2	High School Ditch System	64.2	18.1	6.6	26.2
R3	Orchard Ditch System	22.9	5.0	1.8	7.1
R4	24" Storm Drain	8.3	2.0	1.5	5.8
R5	42" Storm Drain	27.6	7.6	--	--
R6	Discontinuous Ditch	27.9	7.0	--	--
R7	Discontinuous Ditch	46.9	11.6	--	--
R8	Gustine Farm Ditch	36.5	9.1	17.8	70.5
Total		278.8	71.2	32.1	126.9

The Merced County Department of Public Works Storm Drainage Design Manual specifies the maximum permissible discharge rate for detention basins with non-interruptible discharge. The maximum allowable discharge rate is that from the 2-year storm for the undeveloped state of the land. Even though the detention basins recommended in this revised Drainage Plan are interruptible discharge, this comparison is still used. Table X-2 provides this comparison. As shown in this table, the proposed rates of discharge to agricultural waterways are at or below the 2-year undeveloped rates with the exception of the Gustine Farm Ditch. The 50-year post-development flow in the Gustine Farm Ditch will significantly exceed the 2-year pre-development flow. After development, this channel will be used to convey over half of the storm water from the Service Area. Currently, it only accepts storm water from a very small portion of the Service Area. The total rate of discharge for the 50-year storm event in the developed state with storm water detention is 32.1 cfs. The total rate of discharge for the 2-year storm event in the undeveloped state is 33.1 cfs.

Table X-2
COMPARISON OF FLOWS IN EXISTING AND DEVELOPED STATES

Route	Description	Existing 2-Year Flow (cfs)	Developed 50-Year Flow (cfs)
R1	High School Ditch	7.8	4.4
R2	High School Ditch	6.5	6.6
R3	Orchard Ditch	4.1	1.8
R4	24" Storm Drain	0.4	1.5
R5	42" Storm Drain	1.6	--
R6	Discontinuous Ditch	2.7	--
R7	Discontinuous Ditch	4.4	--
R8	Gustine Farm Ditch	5.6	17.8
Total		33.1	32.1

XI. DEVELOPMENT OF THE STORM DRAINAGE COLLECTION AND DISPOSAL PLAN

Drainage from the subbasins defined in Figure 5 was assigned to proposed detention basins as shown in Figure 6. The subbasin groupings and the locations of the detention basins are based on current topography. The conveyance of runoff from the subbasins is also shown in Figure 6. The recommended routing patterns were determined based on current topography as well as the suitability of the existing agricultural channels for storm water conveyance, as determined by field observation of the various water conveyance features in the near vicinity of the potential points of discharge. Due to limited access and the numerous downstream distributing routes, tracing the flow routes between the proposed points of discharge and Los Banos Creek was not accomplished. The CCID has indicated that they will review the proposed discharge routes, rates of discharge and the downstream conveyance capabilities of the agricultural water facilities. An agreement for shared maintenance of the downstream conveyance facilities may be appropriate.

Because of site topography it is unlikely that the detention basins will be able to discharge into the existing channels without pumping. Table XI-1 provides the pumping rate chosen for each of the basins. The rates were chosen so as to evacuate the 50-year design storm within 48 hours. The basin storage volume was chosen so as to contain the 10-year design storm within the basin per the recommended hydrologic design criteria.

Table XI-1
DETENTION BASIN VOLUMES AND PUMPING RATES

Detention Basin	**Subbasins Served**	**Average Pump Discharge** (cfs)	**Detention Basin Storage (10-year)** (acre-feet)	**Total Storage (50-year)** (acre-feet)
DB1	W1, N4	4.35	11.1	17.3
DB2	N2, N3	3.84	9.7	15.3
DB3	N1	2.75	7.1	11.0
DB4	E1	1.78	4.9	7.1
DB5	E2, E3	1.45	3.9	5.8
DB6	S1, E4, E5	5.55	14.1	22.1
DB7	S2, S3, S6, S7, S9	4.01	10.1	16.0
DB8	S10, S12	4.11	10.0	16.4
DB9	S4, S5, S8, S11	4.08	10.5	16.2
Total		32.1	81.4	126.9

Discharge from the detention basins into the various drainage routes is shown in Table XI-2.

Table XI-2
PEAK POST-DEVELOPMENT STORM WATER DISCHARGES

Route	Description	Detention Basins Served	Peak Flow (cfs)
R1	High School Ditch	DB1	4.4
R2	High School Ditch	DB2, DB3	6.6
R3	Orchard Ditch	DB4	1.8
R4	24" City Storm Drain	DB5	1.5
R8	Gustine Farm Ditch	DB6, DB7, DB8, DB9	17.8

XII. STORM DRAINAGE COLLECTION AND DISPOSAL PLAN AND PROJECT FACILITIES

The recommended storm drainage collection and disposal plan is shown in Figure 6. Nine detention basins are proposed. Each detention basin will be utilized for temporary storage of storm drainage runoff. Basins are to be designed as an integral system of new development. All storm water detention basins shall be improved with irrigation systems and grass mixture as approved by the Community Development Department and said storm drain basins shall be secured or fenced with materials as may be required by the City Council. Slopes shall not be less than 8:1. The depth to groundwater in the Service Area tends to be shallow so it will be necessary to carefully site the detention basins and configure the basins such that the bottom elevation of each detention basin is a minimum of 2 feet above the expected maximum groundwater elevation. The groundwater levels vary depending on the season with the minimum depth to groundwater (maximum groundwater elevation) occurring during the peak irrigation season. A hydrogeological study of the Service Area will be required to determine the historical maximum groundwater elevation and establish the basins' bottom elevation.

For the purposes of this Revised Drainage Plan, historic depths to groundwater in the Gustine vicinity were examined utilizing depth to groundwater data collected and maintained by CCID in the Gustine vicinity. Based on water table observations collected over the last ten years, the approximate minimum depth to groundwater at each detention basin site has been estimated as shown on Figure 6. The depth to groundwater decreases from west to east, with a minimum depth anticipated to be approximately 3.8 feet below ground surface. Table XII-1 presents the anticipated general configuration of each detention basin developed assuming that the bottom of the basin shall be 2 feet above the highest groundwater elevation and the maximum water level 1.5 feet below the adjacent natural ground elevation. Detention basins DB1 through DB4 and DB7 through DB9 will be gravity fed with pumped discharge. Because of the expected high groundwater level, DB5 and DB6 will be pump fed with gravity discharge, with the bottom elevation at approximate ground line. These configurations were developed for the purpose of developing the opinions of project cost. The final design of each basin must be based on specific site conditions. The design grades of the finished subdivision will be dependent upon the design elevations of the detention basins dictated by the local groundwater conditions. For cost estimating purposes, it has been assumed that one pumping station will be required for each basin. If additional pumping is required sufficient funding should be available in the construction contingency to provide for the additional pump stations.

TABLE XII-1
DETENTION BASIN CONFIGURATION

Detention Basin	Natural Ground Elevation (feet)	Expected Minimum Depth to Groundwater (feet)	Bottom Elevation (feet)	Maximum Water Surface Elevation (feet)	Maximum Water Depth (feet)	Storage Volume (acre-feet)	Detention Basin Area (acres)
1	102	5.8	98.2	100.5	2.3	17.3	7.5
2	95	5.5	91.5	93.5	2	15.3	7.7
3	91	5.3	87.7	89.5	1.8	11.0	6.1
4	93	6.0	89.0	91.5	2.5	7.1	2.8
5	89	3.8	89.0	91.5	2.5	5.8	2.3
6	90	3.8	90.0	92.5	2.5	22.1	8.8
7	98	4.5	95.5	96.5	1	16.0	16.0
8	97	6.0	93.0	95.5	2.5	16.4	6.6
9	102	4.8	99.2	100.5	1.3	16.2	12.5

The opinion of the probable cost of facilities is given in Table XII-2. The included costs are the land for storm drain detention basins, improvments to the detention basins that include irrigation systems, grass mixture, and fencing, pumping stations, and pipelines connecting the basins to the existing agricultural conveyance channels. The total costs do not include the collection pipelines constructed to convey runoff to the basins, which are part of the normal subdivision improvements. The cost for this system is greater than the storm drainage system recommended in the Original Drainage Plan. The cost estimates of the storm drain master plan system include the cost of land and developing 90 acres of storm drain detention basins and associated drainage facilities improvements.

TABLE XII-2
PRELIMINARY CONSTRUCTION COST ESTIMATE

DETENTION BASIN	ITEM NO.	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
1	1	BASIN EARTHWORK	46,113	CUBIC YARD	$ 3	$ 138,339		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	9.4	ACRE	$ 50,000	$ 470,000		
	5	LAND COST	9.4	ACRE	$ 85,000	$ 799,000	$ 1,507,339	
2	1	BASIN EARTHWORK	43,197	CUBIC YARD	$ 3	$ 129,591		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	9.6	ACRE	$ 50,000	$ 478,000		
	5	LAND COSTS	9.6	ACRE	$ 85,000	$ 816,000	$ 1,523,591	
3	1	BASIN EARTHWORK	32,536	CUBIC YARD	$ 3	$ 97,608		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	7.6	ACRE	$ 50,000	$ 382,000		
	5	LAND COST	7.6	ACRE	$ 85,000	$ 646,000	$ 1,225,608	
4	1	BASIN EARTHWORK	18,327	CUBIC YARD	$ 3	$ 54,981		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	3.6	ACRE	$ 50,000	$ 177,500		
	5	LAND COST	3.6	ACRE	$ 85,000	$ 306,000	$ 638,481	
5	1	BASIN EARTHWORK	9,378	CUBIC YARD	$ 10	$ 93,780		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 80,000	$ 80,000		
	4	BASIN IMPROVEMENTS	4.1	ACRE	$ 50,000	$ 202,500		
	5	LAND COST	4.1	ACRE	$ 85,000	$ 348,500	$ 764,780	
6	1	BASIN EARTHWORK	17,072	CUBIC YARD	$ 10	$ 170,720		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 80,000	$ 80,000		
	4	BASIN IMPROVEMENTS	12.0	ACRE	$ 50,000	$ 599,000		
	5	24" RCP	1500	L.F.	$ 60	$ 90,000		
	6	LAND COSTS	12.0	ACRE	$ 85,000	$ 1,020,000	$ 1,999,720	

TABLE XII-2
PRELIMINARY CONSTRUCTION COST ESTIMATE
(continued)

DETENTION BASIN	ITEM NO.	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
7	1	BASIN EARTHWORK	64,533	CUBIC YARD	$ 3	$ 193,599		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	20.0	ACRE	$ 50,000	$ 1,000,000		
	5	18" RCP	3000	L.F.	$ 50	$ 150,000		
	6	LAND COST	20.0	ACRE	$ 85,000	$ 1,700,000	$ 3,143,599	
8	1	BASIN EARTHWORK	42,334	CUBIC YARD	$ 3	$ 127,002		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	8.2	ACRE	$ 50,000	$ 410,000		
	5	18" RCP	4000	L.F.	$ 50	$ 200,000		
	6	LAND COST	8.2	ACRE	$ 85,000	$ 697,000	$ 1,534,002	
9	1	BASIN EARTHWORK	56,293	CUBIC YARD	$ 3	$ 168,879		
	2	INLET STRUCTURES	1	EACH	$ 40,000	$ 40,000		
	3	OUTLET PUMP STRUCTURES	1	EACH	$ 60,000	$ 60,000		
	4	BASIN IMPROVEMENTS	15.6	ACRE	$ 50,000	$ 779,000		
	5	LAND COST	15.6	ACRE	$ 85,000	$ 1,326,000	$ 2,373,879	
								$ 14,710,999
		Construction Contingency @ 30%						$ 4,413,300
		Engineering, Legal and Admin. @ 15%						$ 2,206,650
		ESTIMATED TOTAL PROJECT COST						***$ 21,330,94***

The City of Gustine has prepared a Public Facility Fee Study and has distributed to cost of storm drain facilities to new development. The Storm Drain Impact Fee shall be adjusted annually by the City.

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FIGURES

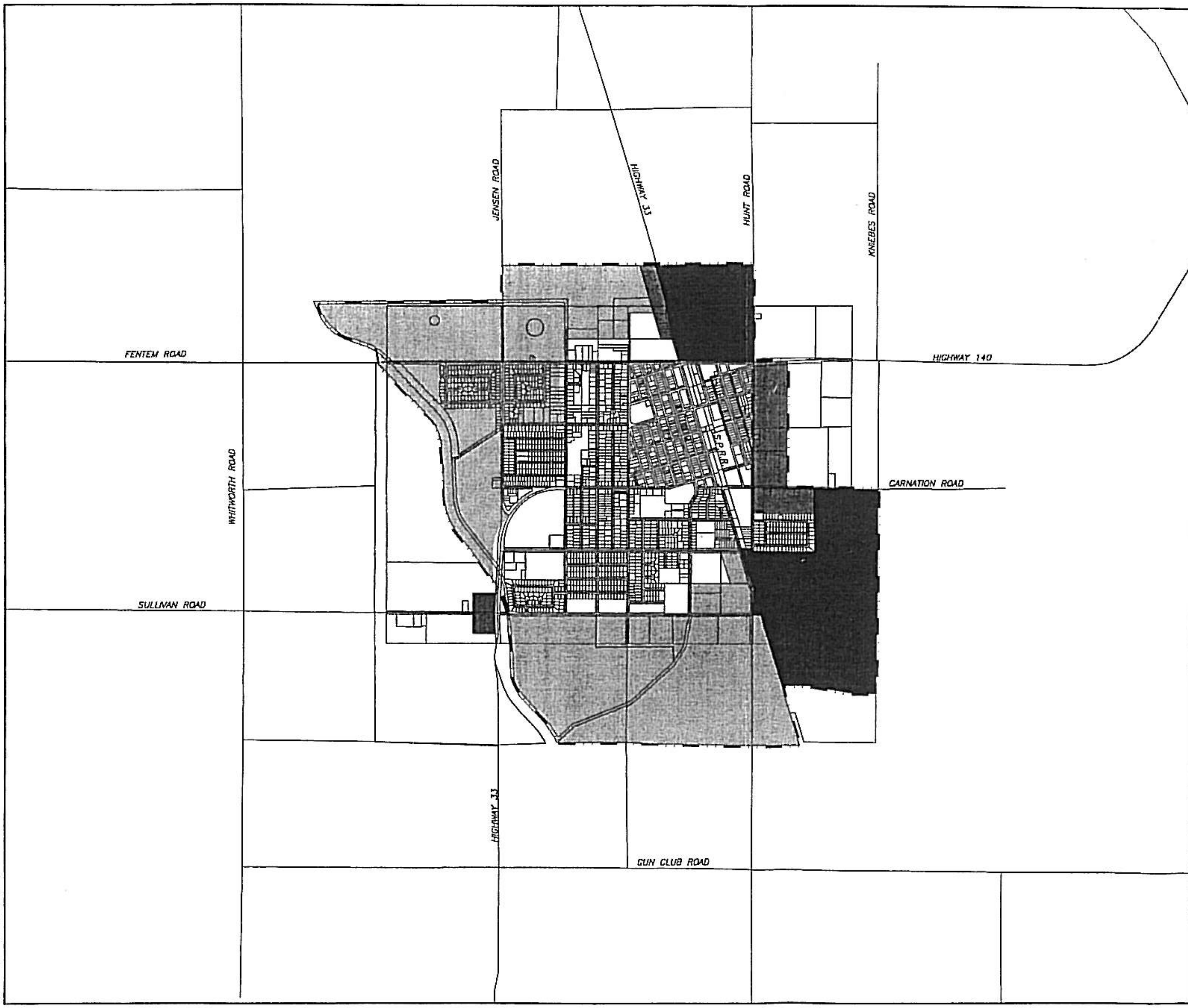

FIGURE 1

CITY OF GUSTINE
MASTER DRAINAGE PLAN
PHASE 1

SERVICE AREA
AND
LAND USE

N

0 2000 4000
SCALE IN FEET

LEGEND

GENERAL PLAN BOUNDARY

RESIDENTIAL

COMMERCIAL

INDUSTRIAL

STODDARD & ASSOCIATES
CONSULTING CIVIL ENGINEERS
AND LAND SURVEYORS
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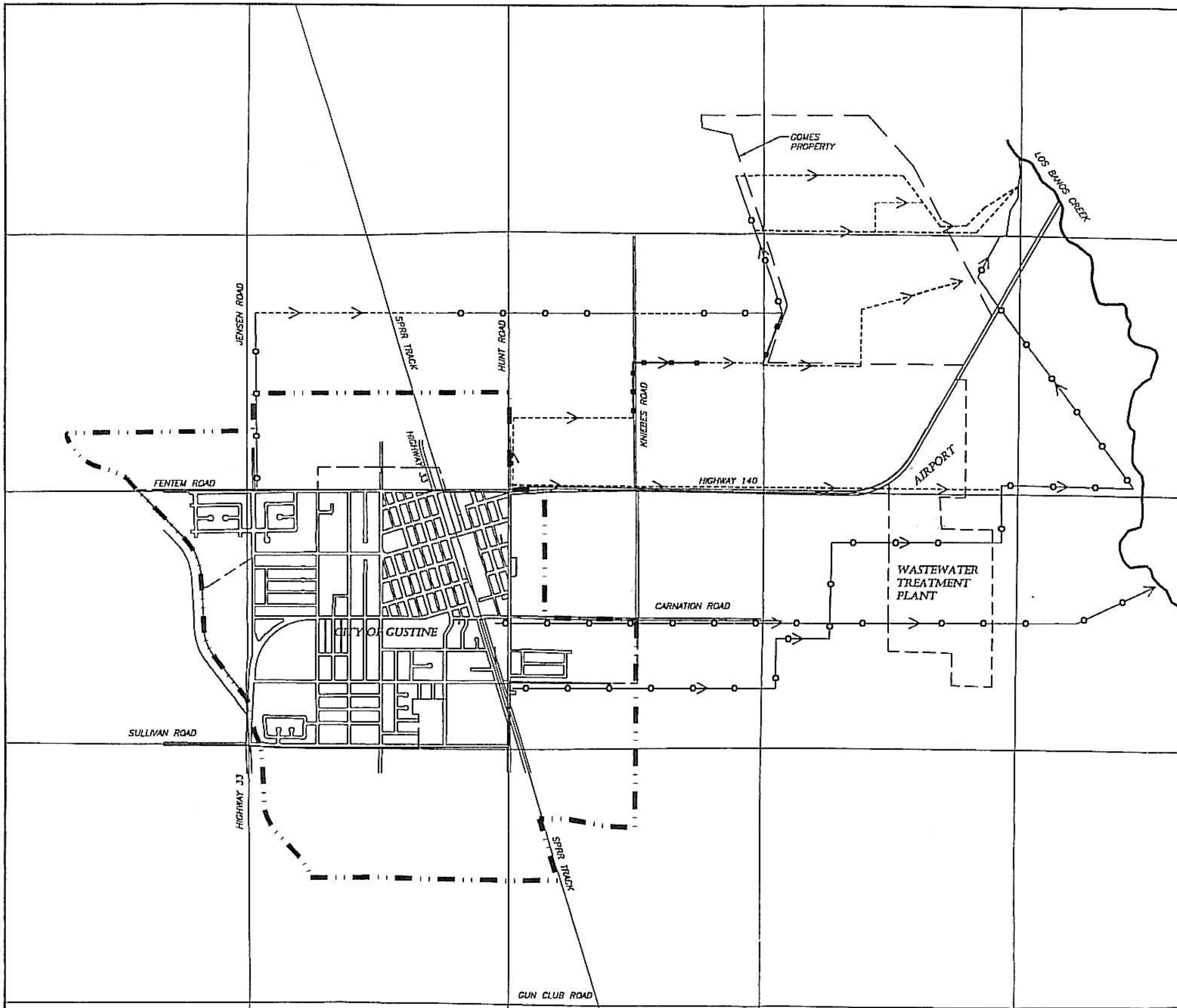
TELEPHONE (209) 826-5155 • FAX (209) 826-3307

Mar 14, 2005 - 9:52am
\\Cadd4\DWG\CDG\950\05\FIGURE-1.DWG

FIGURE 2

CITY OF GUSTINE
STORM DRAINAGE
MASTER PLAN

EXISTING
STORM DRAINAGE CONVEYANCE
FACILITIES MAP



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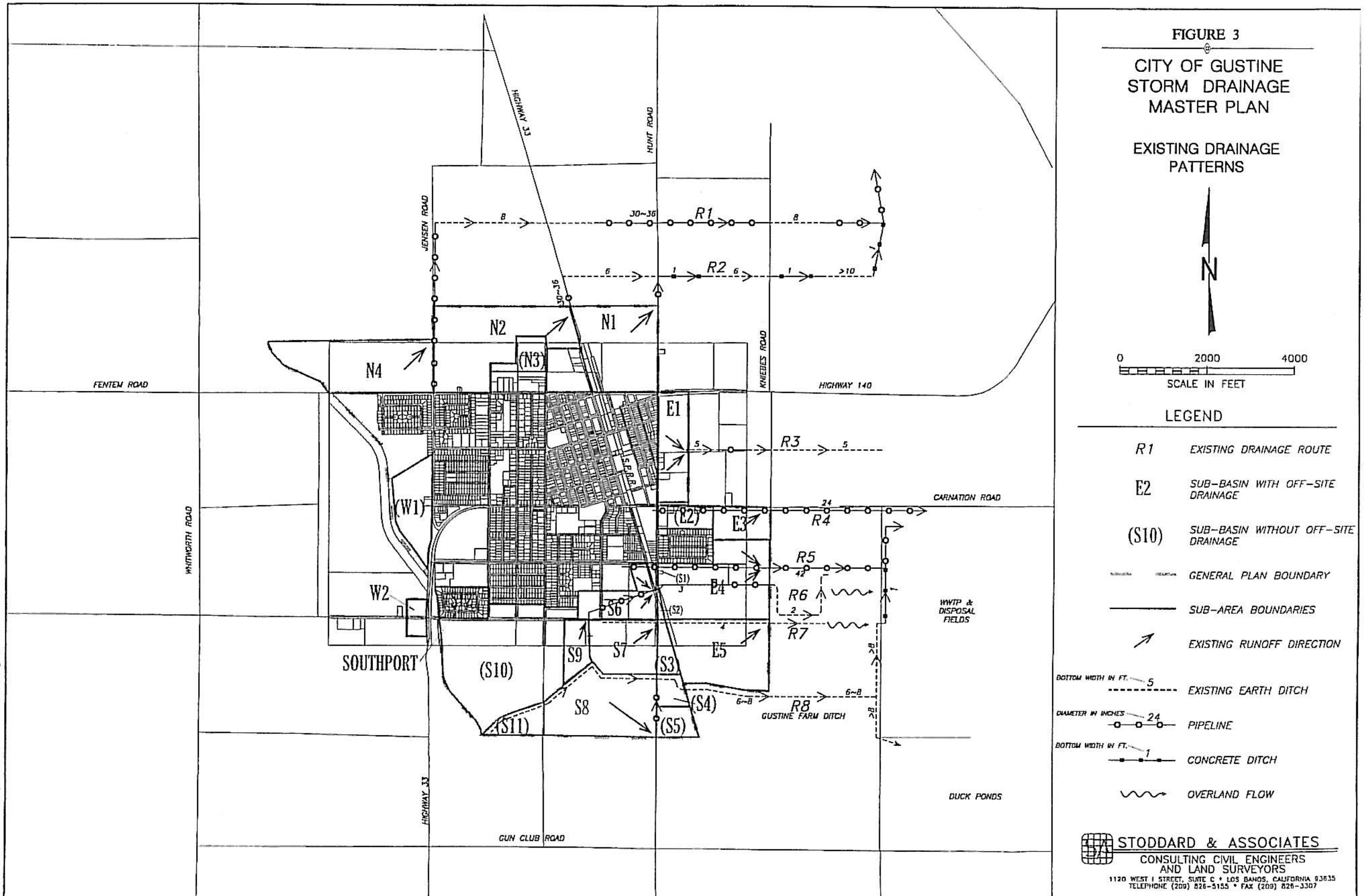
Mar 10, 2005 - 11:21am
\\Cadd4\DWG\CDG\950\05\FIGURE2.dwg



Mar 10, 2005 - 11:22am
\\Cadd4\DWG\COG\950\05\MASTER STORM 12-27-04.dwg FIGURE 3

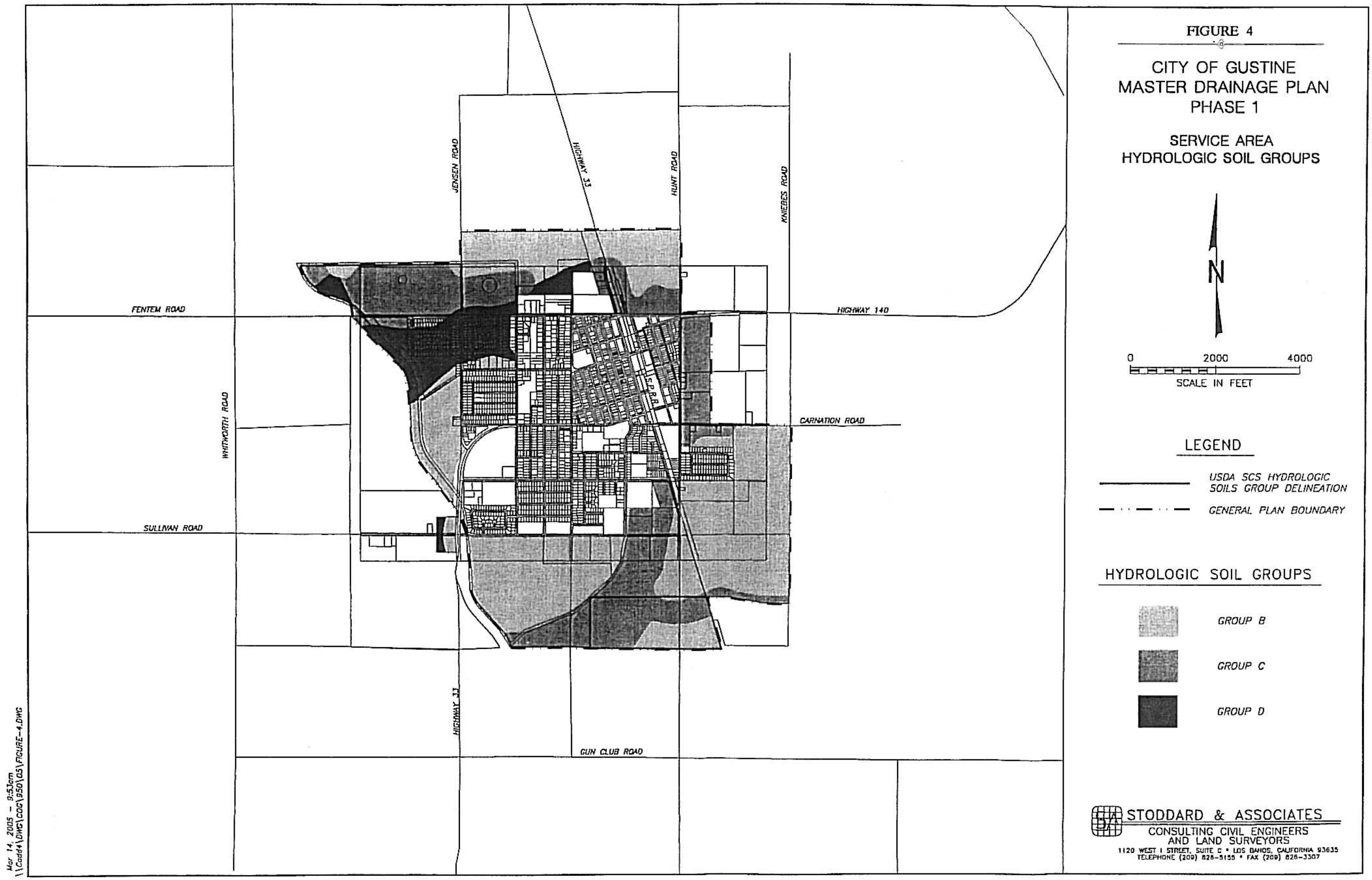


FIGURE 4
CITY OF GUSTINE
MASTER DRAINAGE PLAN
PHASE 1
SERVICE AREA
HYDROLOGIC SOIL GROUPS
N
0
2000
4000
SCALE IN FEET
LEGEND
USDA SCS HYDROLOGIC SOILS GROUP DELINEATION
GENERAL PLAN BOUNDARY
HYDROLOGIC SOIL GROUPS
GROUP B
GROUP C
GROUP D
STODDARD & ASSOCIATES
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
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FENTEM ROAD
WHITWORTH ROAD
SULLIVAN ROAD
JENSEN ROAD
HIGHWAY 33
HUNT ROAD
KNIEBES ROAD
HIGHWAY 140
CARNATION ROAD
S.P.R.R.
GUN CLUB ROAD
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\\Cadd4\DWG\CDG\950\05\FIGURE-4.DWG

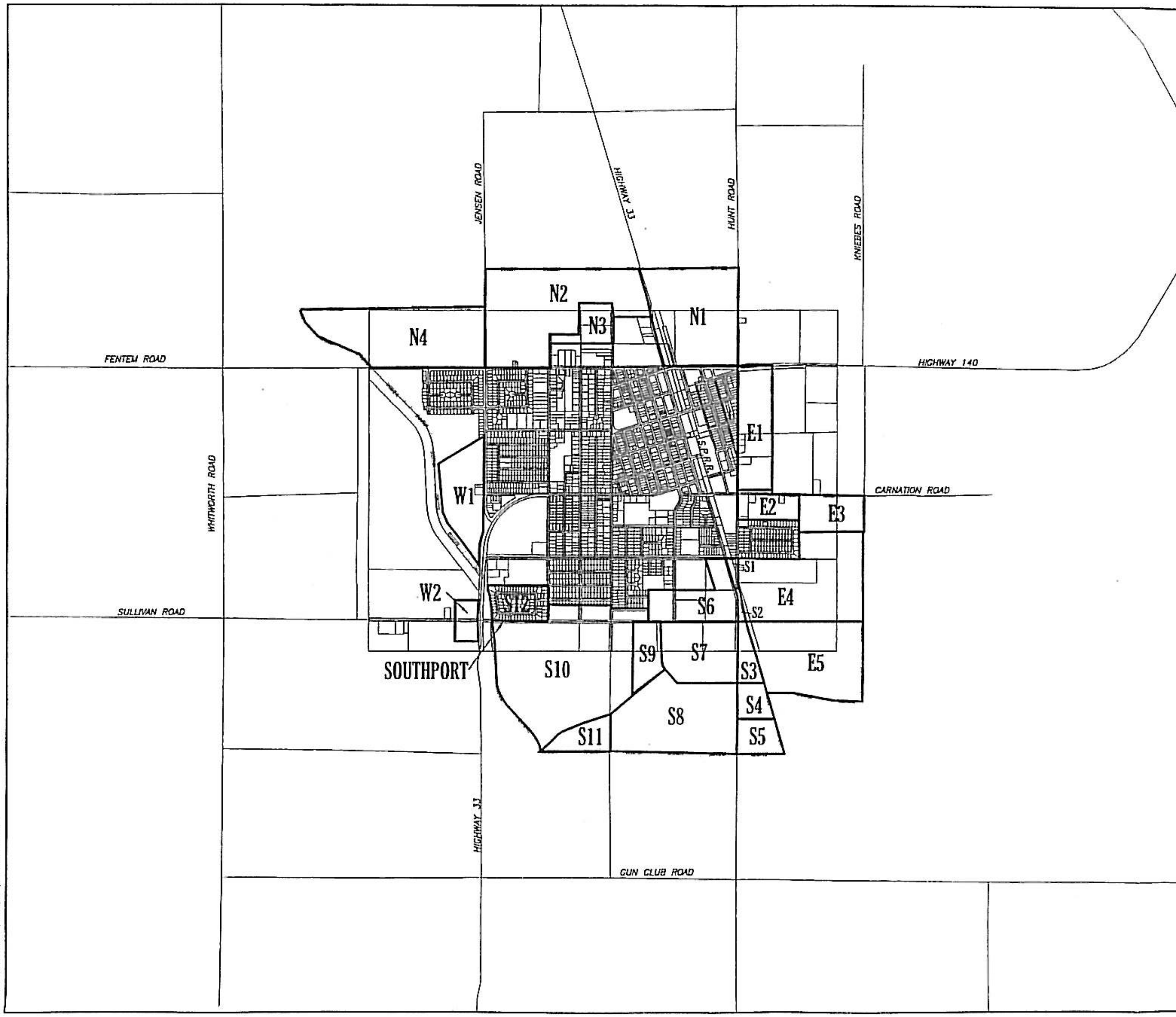

FIGURE 5

CITY OF GUSTINE
STORM DRAINAGE
MASTER PLAN

SERVICE AREA
HYDROLOGIC SUBBASINS

N

0 2000 4000
SCALE IN FEET

LEGEND

E2 SUB-AREA IDENTIFIERS
GENERAL PLAN BOUNDARY
SUB-AREA BOUNDARIES

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\\Cadd4\DWG\COG\950\05\FIGURE-5.DWG

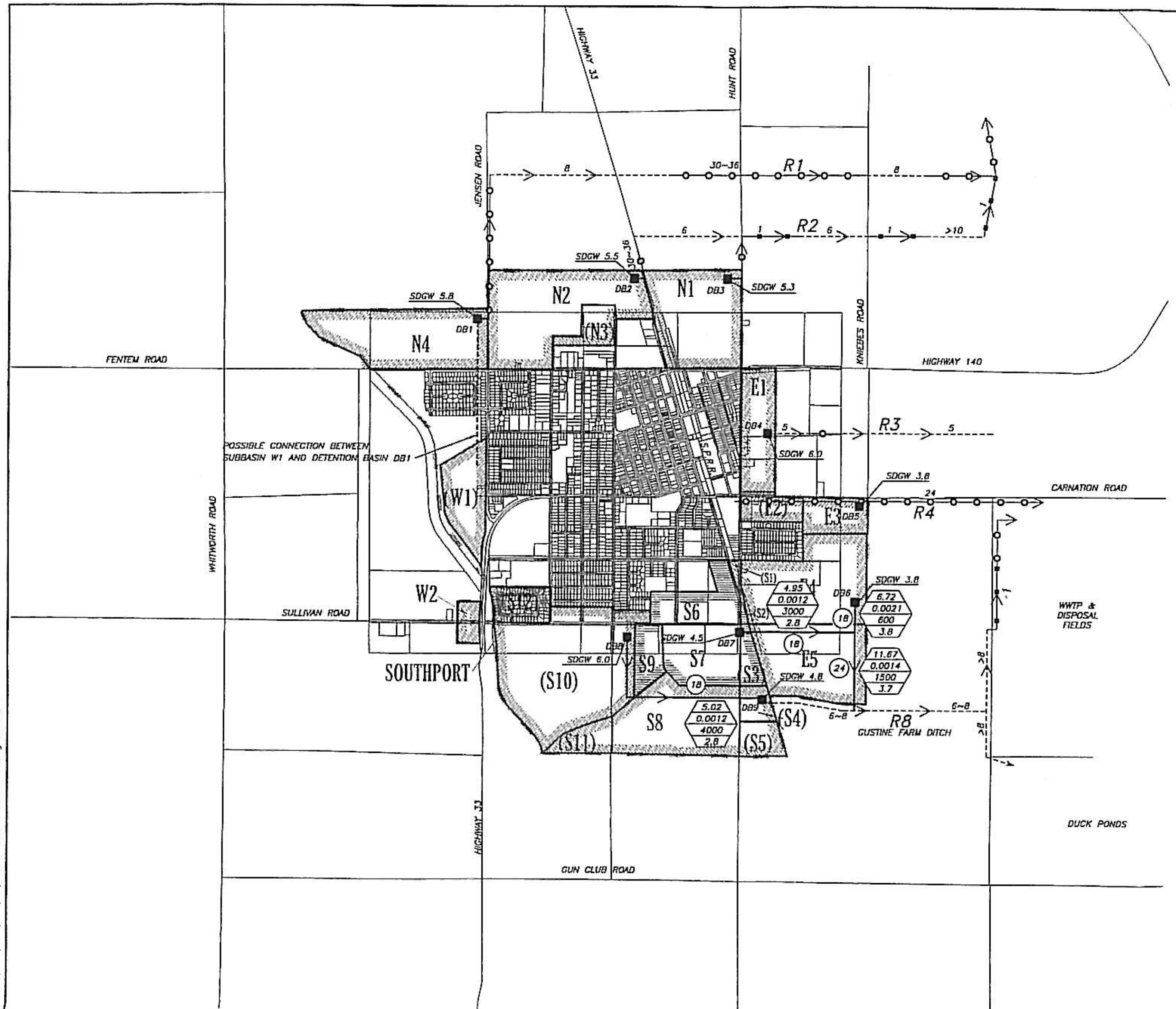

FIGURE 6

CITY OF GUSTINE STORM DRAINAGE MASTER PLAN

RECOMMENDED STORM DRAINAGE FACILITIES PLAN

N

0 2000 4000
SCALE IN FEET

LEGEND

Symbol	Description
R1	EXISTING DRAINAGE ROUTE
E2	SUB-BASIN WITH OFF-SITE DRAINAGE
(S10)	SUB-BASIN WITHOUT OFF-SITE DRAINAGE
	GENERAL PLAN BOUNDARY
	SUB-AREA BOUNDARIES
BOTTOM WIDTH IN FT. 5	EXISTING EARTH DITCH
DIAMETER IN INCHES 24	EXISTING PIPELINE
BOTTOM WIDTH IN FT. 1	EXISTING CONCRETE DITCH
DB1	DETENTION BASIN
SDGW 5.8	SURFACE DEPTH TO GROUNDWATER IN FEET
FLOWRATE IN CFS 6.00; HYD. SLOPE IN FT./FT. 0.0015; LENGTH IN FT. 1300; VELOCITY IN FT./SEC. 4.0	PIPELINE DATA
DIAMETER IN INCHES (24)	PIPELINE SIZE

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Mar 10, 2005 - 11:26am
\\Cadd4\DWG\COG\950\05\MASTER STORM 12-27-04.dwg FIGURE 6

CITY OF GUSTINE

IMPROVEMENT STANDARDS AND SPECIFICATIONS

SECTION 5 – STORM DRAINAGE

CITY OF GUSTINE
682 THIRD AVENUE
GUSTINE, CA 95322

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ADOPTED
DECEMBER 15. 2003

AMENDED:
JANUARY 2007
AUGUST 19, 2008 – RESOLUTON NO. 2008-2095
SECTION 5 - STORM DRAINAGE

CC Reso No. 2008-2095
August 19, 2008

SECTION 5

STORM DRAINAGE

5.1 GENERAL

All drainage design shall be in accordance with the following requirements and shall provide a positive means of drainage to the discharge point designated by the City. . All drainage calculations shall be submitted to the City Engineer for review. Drainage calculations shall cover all drainage facilities required to deliver run-off to a certain location and hydraulic grade line elevation as approved by the City Engineer. Drainage flow calculations shall be submitted on Drawing No. 5-A. Output of computerized calculations will not be accepted unless all of the data required on Drawing No. 5-A is provided in the same format as Drawing No. 5-A.

5.2 SUBMITTALS

Prior to submittal of Improvement Plans for the first phase of construction, a storm drainage master plan for the entire development shall be submitted to the City Engineer for review and approval. The plan shall include the following:

- A plan with a scale of 1" to 100' showing the proposed system, preliminary pipe sizes, tributary sub-areas and existing and future tributary areas outside the project area.
- Hydraulic calculations.
- Detention basin design calculations and conceptual drawings of the basin and access road. The drawings shall include approximate groundwater elevation, basin inverts, maximum water surface elevations and hydraulic grade line control elevations.
- A description and preliminary sketch of any pump stations or gravity outlet facilities. This information shall include number and size of pumps, sump volumes and pump operating levels.

5.3 STORM RUNOFF

Flow rates may be determined by using the Rational Formula, Q=CIA, where Q represents the quantity of run-off in cubic feet per second; A, the total run-off area in acres; I, the intensity of the rainfall in inches per hour as determined from the intensity duration curves shown on Drawing No. 5-B; and C, the coefficient of run-off also shown on Drawing No. 5-B.

Alternatively, the Urban Hydrology for Small Watersheds, TR-55 method may be used, and in some cases required depending upon the size of the watershed.

Roof to gutter time shall be assumed to be 20 minutes.

5.4 PIPE DESIGN

1. GENERAL

Storm drainage piping shall be designed to handle a storm with a minimum return period of five years. The minimum size of any storm drainage pipe shall be 15 inches in diameter except for pipes terminated in cul-de-sacs and catch basin laterals which shall be a minimum of 12 inches in diameter.

Manning's formula shall be used to calculate design flow, velocity, slope and pipe diameter. Manning's roughness coefficient "**n**" varies with the type of pipe used according to the following table:

Pipe Material	n
Plastic	0.012
Reinforced Concrete	0.013
Cast-In-Place Concrete	0.015

Plastic pipe up to and including 15-inch diameter shall conform to ASTM Designation D3034. Pipe dimension ratio shall be SDR35. Plastic pipe 18-inch to 27-inch in diameter shall conform to ASTM Designation F679. Rubber gasket joints shall be factory installed and conform to ASTM F477.

Reinforced concrete pipe shall be the minimum class required to serve the purpose intended but in no case shall be less than Class III conforming to the specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, ASTM Designation C76. The pipe shall be manufactured using the packer head method or shall be centrifugally spun. The pipe shall utilize a Bureau of Reclamation Type R-4 bell and spigot. Use of elliptical reinforcement is not allowed.

Cast-in-place concrete pipe shall only be used if approved by the City Engineer. Cast-in-place concrete pipe shall conform to Section 63 of the State Standards and these Improvement Standards.

2. SLOPE

Minimum slopes are as follows:

Diameter (inches)	Minimum Slope (ft/ft)
12	0.0019
15	0.0014
18	0.0011
21	0.0009
24	0.0008
30	0.0006
36	0.0006
42	0.0005
48	0.0004

The above slopes are intended to provide velocities of not less than 2.0 feet per second when flowing half full regardless of the slope of the hydraulic grade line. (Where the City's system is surcharged, velocities based on the design hydraulic grade line are well below 2 feet per second except in trunk lines.)

If it is impractical to meet these velocity standards, the minimum slopes can be waived by the City Engineer.

The slope of storm drains between manholes shall be constant.

Catch basin laterals shall have a minimum fall of 0.10 feet between the catch basin and the manhole. Desired fall is 0.30 feet or more.

Siphons are not permitted.

3. VERTICAL ALIGNMENT

The minimum cover for storm drains shall be 2 feet 6-inches. When crossing a water main, the storm drain line should be installed below the water main with a minimum clearance of 12-inches. At points of convergence of pipes, the invert of the inflowing pipe shall be a minimum of 0.1 foot higher than the invert of the outflowing pipe. (This 0.1 foot of elevation difference does not apply for laying of pipe through a manhole.)

4. HORIZONTAL ALIGNMENT

Drainage pipes shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer. Alignment shall be parallel to the street centerline whenever possible.

Permanent easements shall be provided for all mains not located in public rights-of-way. The minimum easement width shall be 15 feet. Wider easements may be required by the Director for any lines over 18-inches in width or with an invert elevation 5 feet or greater below ground line. The line shall be located in the center of the easement unless otherwise required by the Director.

A minimum horizontal clearance of 10 feet shall be maintained between drain lines and water mains, unless otherwise approved by the City Engineer. If the 10-foot separation is waived, the requirements of the California State Department of Health Services for separation between water mains and sanitary sewers shall be adhered to.

5.5 DRAIN INLETS

Drain inlets shall be as shown on Standard Drawing 5-K. The structural channel iron shall be galvanized to conform to the requirements Section 75-1.05 of the State Standards.

Spacing of drain inlets shall be such that the surface flow to the drain inlet does not encroach into vehicular travel ways.

5.6 MANHOLES

Manholes shall be located on storm trunk and lateral pipelines. Manholes shall be placed at all storm drain intersections, at sections where changes in slope, pipe size and alignment occur, and at the upstream ends of all storm drains.

Manholes shall have a maximum spacing of 500 feet.

Invert elevation drop across each manhole shall equal the difference in pipe diameter where there is a change in pipe size and a minimum of 0.1 foot at all bends.

5.7 TRENCH EXCAVATION

The Contractor shall, prior to beginning construction, obtain from the Division of Industrial Safety the permit required by California Labor Code, Section 6500, and pay any fee charged for such permit. In addition thereto, whenever the work under the Contract involves trench excavation 5-feet or more in depth, the Contractor shall submit for approval to a registered civil or structural engineer representing the City, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the plan shall be prepared by a registered civil or structural engineer. Nothing in this section shall be deemed to allow the use of shoring, sloping or other protective system less effective than that required by the Construction Safety Orders. Nothing in this section shall be construed to impose tort liability on the City, City Engineer, or any of their officers, agents or employees.

The pipe trench shall be dug with side walls sloped or otherwise supported in a safe manner in accordance with the Department of Industrial Relations, Division of Occupational Safety and Health Administration regulations pertaining to trenching.

Excavated material shall be placed on only one side of the trench unless otherwise directed. Separation distance between piles of excavated material and trench shall be consistent with the Construction Safety Orders.

The alignment and grade for the bottom of the trench shall be properly established before the trench is excavated and shall be approved by the City before the pipe is laid. Trenches shall be true to line and grade, and the bottom shall be even and free from all objectionable material.

5.8 WATER IN TRENCH

When water is encountered in the trench, it shall be removed by draining or by pumping. Should water get into the trench before the pipe is laid, the laying of pipe shall be postponed until the trench has dried sufficiently to provide a firm foundation for the pipe or else, the mud or softer material shall be removed and grade re-established by backfilling and compacting with suitable material as determined by the City.

5.9 LAYING AND JOINTING OF PIPE

Laying and jointing of pipe shall be in accordance with the manufacturer's recommendations and as approved by the City. Joint deflections shall not exceed 80% of the maximum recommendations of the manufacturer.

Where rubber gaskets are used for jointing pipe, a feeler gauge shall be used to check the position of the rubber gasket upon each closure. The interior of the pipe shall be cleared of all debris, and exposed pipe ends shall be closed by a suitable pipe plug when pipe laying is not in progress.

The pipe shall be laid on a trench bottom shaped to provide adequate support of the pipe except at coupling or bell holes. The use of prepared mounds to facilitate laying of the pipe is not approved.

Where pipe is to be encased or have concrete bedding, suitable concrete blocks shall be used to support the pipe in the proper location while placing concrete.

5.10 BACKFILL

After the storm drains have been properly constructed and inspected, the trench shall be backfilled and compacted as shown on Drawing No. 5-C for flexible walled pipe, Drawing No. 5-D for rigid walled pipe and Drawing No. 5-E for cast-in-place pipe.

Compaction tests shall be performed by a testing laboratory approved by the City. The laboratory shall be retained by the Developer and all testing expenses shall be paid by the Developer.

Jetting of backfill will not be allowed except in special cases as approved by the City Engineer.

During the compaction operation, the contractor must exercise extreme caution so as not to damage or disturb the pipe.

5.11 DEFLECTION TESTING

PVC storm drain pipe shall be tested using a mandrel or other approved testing device. Maximum deflection shall not exceed 5% of the average inside diameter of the pipe.

For all pipes less than 24-inch (I.D.), a mandrel shall be pulled through the pipe by hand. Prior to use, the mandrel shall be approved by the Director. If the mandrel fails to pass, the pipe will be deemed to be over-deflected.

Mandrels shall be rigid, nonadjustable, odd-numbering-leg (9 legs minimum), having an effective length not less than its nominal diameter. The minimum diameter of the mandrel at any point along its full length shall be as follows:

Pipe Material	Nominal Size (Inches)	Minimum Mandrel Diameter (Inches)
PVC-ASTM D3034	12	10.793
(SDR35)	15	13.203
PVC-ASTM F679	18	16.748
(T-1 Wall)	21	19.744
	24	22.212
	27	25.033

Mandrels shall be fabricated from steel, fitted with pulling rings at each end, and stamped or engraved on some segment, other than the runner, with the pipe material, specifications, nominal size and mandrel O.D.

For pipes with a nominal diameter of 24-inches or larger, deflections shall be determined by a method submitted to and approved by the Director. If a mandrel is selected, the minimum diameter, length and other requirements shall conform to the dimensions and requirements previously stated.

5.12 CLOSED CIRCUIT TV INSPECTION

Prior to placing the final street surfacing, the Contractor will inspect all new storm drain piping with a closed circuit television system. This will be done after the pipe has been installed true to the prescribed lines and grades, the trench backfilled and compacted, the manhole and cleanout covers set to proper grade, the roadway subgrade compacted, aggregate subbases and bases placed and compacted, and the sewer system cleaned of all debris.

At the start of each storm drain section, the Contractor shall record the manhole location by street intersections the inspection is beginning and ending at. This information shall appear in typewritten letters on the videotape. A gauge shall be attached to and dragged behind the camera to indicate the depth of any standing water within the line. The gauge shall have a diameter of 10% of the pipe diameter being televised.

Pulling of the camera shall be stopped and locations recorded in typewritten letters on the videotape at the following locations:

- The beginning and ending locations of all areas where the depth of standing water exceeds 10% of the pipe diameter.
- Any problem areas.

Camera pulling speed shall not exceed 100 ft. per minute.

Videotapes shall be delivered to the Director for his review. The Contractor shall make all necessary repairs and corrections to the pipeline as required by the Director prior to paving.

5.13 DETENTION BASINS

1. GENERAL

Detention basins shall be designed with a capacity to hold the total run-off from a 10-year frequency, 24-hour event with the maximum water level no higher than six inches below the lowest tributary gutter elevation.

Additionally, storm basins shall hold the total run-off from a 50-year frequency, 24-hour event with a water surface elevation below the lowest top of curb.

Hydraulic grade line control elevation, if not established, shall be the elevation at which 50 percent of the design containment occurs.

Basin bottoms shall be provided with a minimum slope of 0.008 toward approved drainage facilities. The minimum separation between the basin bottom and any groundwater shall be 2 feet.

Maximum sideslopes of detention basins shall be 8 horiz.:1 vert. unless otherwise approved by the City.

Basin inlet/outlet piping shall enter the basin through a reinforced concrete inlet/outlet structure installed in the sideslope of the basin.

Storm drainage piping shall be designed such that nuisance water flows less than the discharge capacity of the basin shall be evacuated without first entering the basin. Detention basins shall be provided with outlet facilities capable of draining a full basin within 48 hours.

2. MISCELLANEOUS IMPROVEMENTS

Detention basins shall include a landscape irrigation system and shall be planted with a grass mixture as approved by the City.

Fencing/gates will be required around the entire basin perimeter. Fencing shall be a minimum of 42 inches high. Materials and styling shall be as required by the City.

5.14 PUMP STATIONS

1. GENERAL

Pumping stations shall be designed to pump 100% of the calculated run-off from a storm with a ten-year return period unless utilized in conjunction with a detention basin. Pumps designed in conjunction with basins shall be capable of draining 100 percent of the basins storage capacity within 48 hours.

Pump stations shall be designed with a separator to remove settling and floating debris from the water entering the pump sump. They will also be designed with the following criteria:

- Pump stations shall have a minimum of two low RPM (1,170 RPM maximum) non-clog vertical turbine or mixed flow pumps. Capacities shall be selected so that with the largest pump out of service, the others can handle the design flow.

  If the design flow of the station exceeds 1,000 gpm, a 500 gpm nuisance flow pump shall also be installed. The nuisance flow pump shall be a non-clog submersible FLYGT sewer pump with a slide rail system. (Slide rails shall be 2-inch schedule 40 steel pipe with stainless steel hardware.)

- Reinforced concrete pump sump of a hydraulic design that meets the recommendations of the pump manufacturer and the City.

- Adequate storage in the pump sump, to provide a minimum pump cycle time of 15 minutes for the nuisance pump or lead pump, whichever is less.

2. CONTROLS

Controls shall be mounted in a deadfront free standing self-contained NEMA 3R metal enclosure with a padlockable door. The control center and all electrical components shall bear the Underwriters Laboratory (UL) label.

For each pump, there shall be included, a NEMA combination circuit breaker/overload protector with adjustable protection, short circuit protection, reset and disconnect for all phases; across the line magnetic contactor; hand/off/automatic pump operation selector switch; overload relay to be pre-calibrated to match motor characteristics and factory sealed to ensure trip setting is tamper proof and 120 volt control circuitry.

The control center shall also have a pump alternator, pump run lights, condensation heater with thermostat and a 120 volt, 15 amp, GFI duplex receptacle mounted on the inner door.

A manual power transfer switch and a receptacle with closing plug, as specified by the Director, shall be provided to allow connection of an emergency power generator.

The water level sensor for pump control shall be as specified by the Director.

3. DISCHARGE PIPING

Discharge piping shall be ductile iron or steel. Plastic piping may be allowed below ground where approved by the City Engineer.

The design velocity in the discharge piping shall not exceed 8 foot per second. All internal piping in the pumping station shall be properly anchored and restrained. Expansion joints and flanged connections shall be provided to facilitate dismantling and maintenance of the equipment.

Valves, couplings and additional flanges as required for proper maintenance of the pumping facilities shall be readily accessible.

5.15 TRASHRACKS

Trashracks shall be installed on all basin pump stations utilizing vertical turbine or mixed flow pumps.

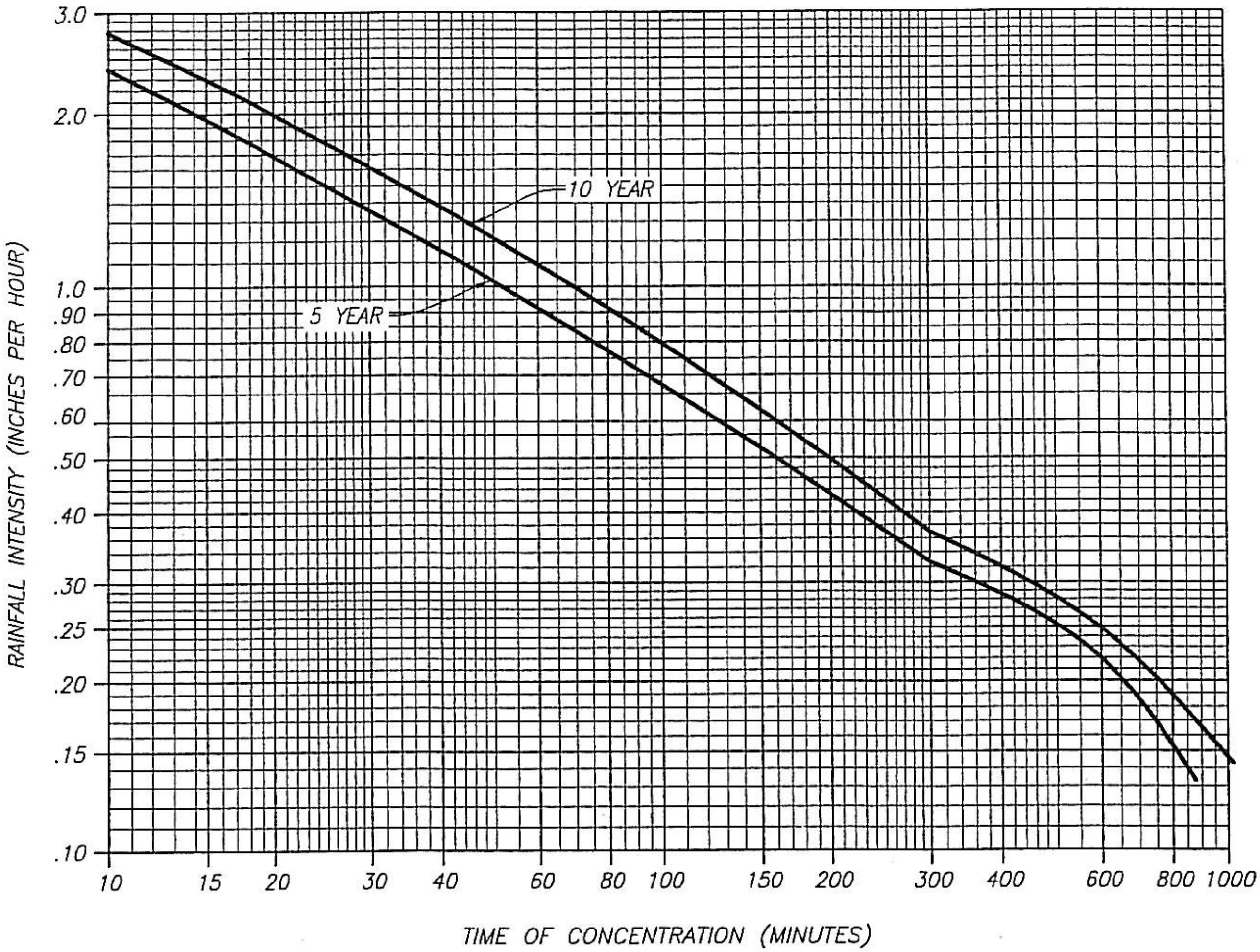
Trashracks shall be constructed of flat steel bars a minimum of 2 inches deep and 0.25 inches wide. Centerline to centerline spacing of bars shall be 2 inches maximum.

Bars shall be held in a parallel, equally spaced position by a flat toe plate welded across their lower ends and by horizontal spacing bars welded to the rack's downstream side. These horizontal bars shall not interface with raking the racks.

Trashracks shall be inclined 30 to 45 degrees from the horizontal and shall extend from the floor to the top of the structure. A walkway, platform or other suitable level surface shall be provided at the top of all structures to allow for proper maintenance operations. Guardrails meeting the Industrial Safety Orders shall be provided. Sufficient clearance shall be provided between trashracks and surrounding fences or other obstacles to permit handling of cleaning rakes.

5.16 ACCESS

Pump station layout shall allow for proper access of maintenance vehicles. Vehicular access route from the adjacent public travelway, throughout the site, and back onto the public travelway shall be shown on the site plan. Access roads to pump stations shall be asphalt concrete paved as required by the Director. Minimum outer and maximum inner turning radii of 42 feet and 24 feet, respectively, are required. Minimum access road pavement width shall be 12 feet.



NOTES:

1. ALL STORM DRAINAGE PIPING SHALL BE DESIGNED TO HANDLE A STORM WITH A MINIMUM RETURN INTERVAL OF 5 YEARS.
2. ROOF TO GUTTER TIME SHALL BE ASSUMED TO BE 20 MINUTES.
3. THE 10 YEAR–24 HOUR RAINFALL IS 1.99 INCHES.
4. THE 50 YEAR–24 HOUR RAINFALL IS 2.64 INCHES.

RUNOFF COEFFICIENTS

ZONING	"C"
R1, R2	0.50
R3	0.60
COMMERCIAL	0.80
INDUSTRIAL	0.70

GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

RAIN INTENSITY FREQUENCY CURVES

APPROVED BY: [signature] DATE: 2-23-04

DRAWING NO. 5 - B

Feb 05, 2004 – 5:00pm
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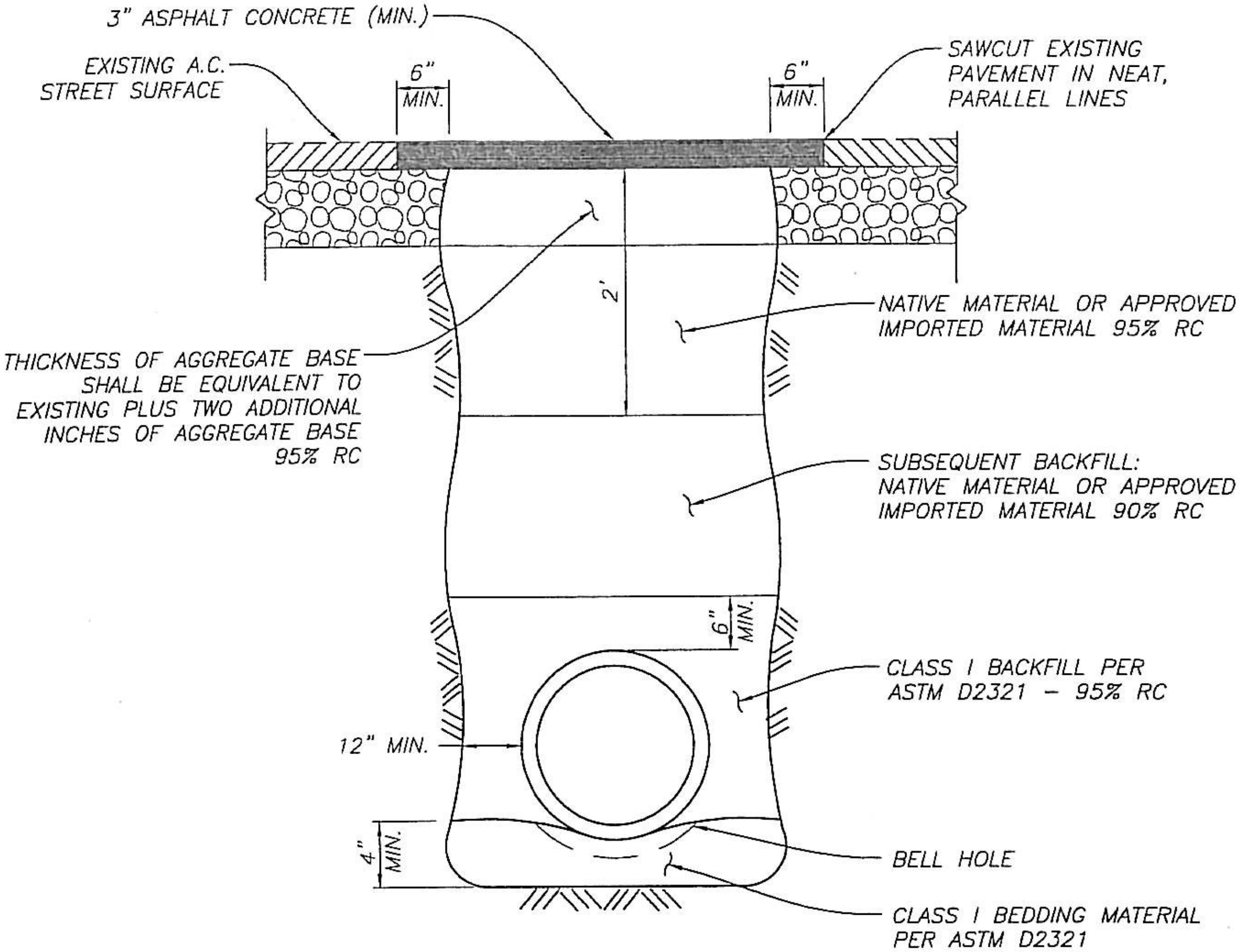


NOTES

1. IF THE BOTTOM OF TRENCH IS SOFT AND UNSTABLE, IT SHALL BE OVER EXCAVATED 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.

2. TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.

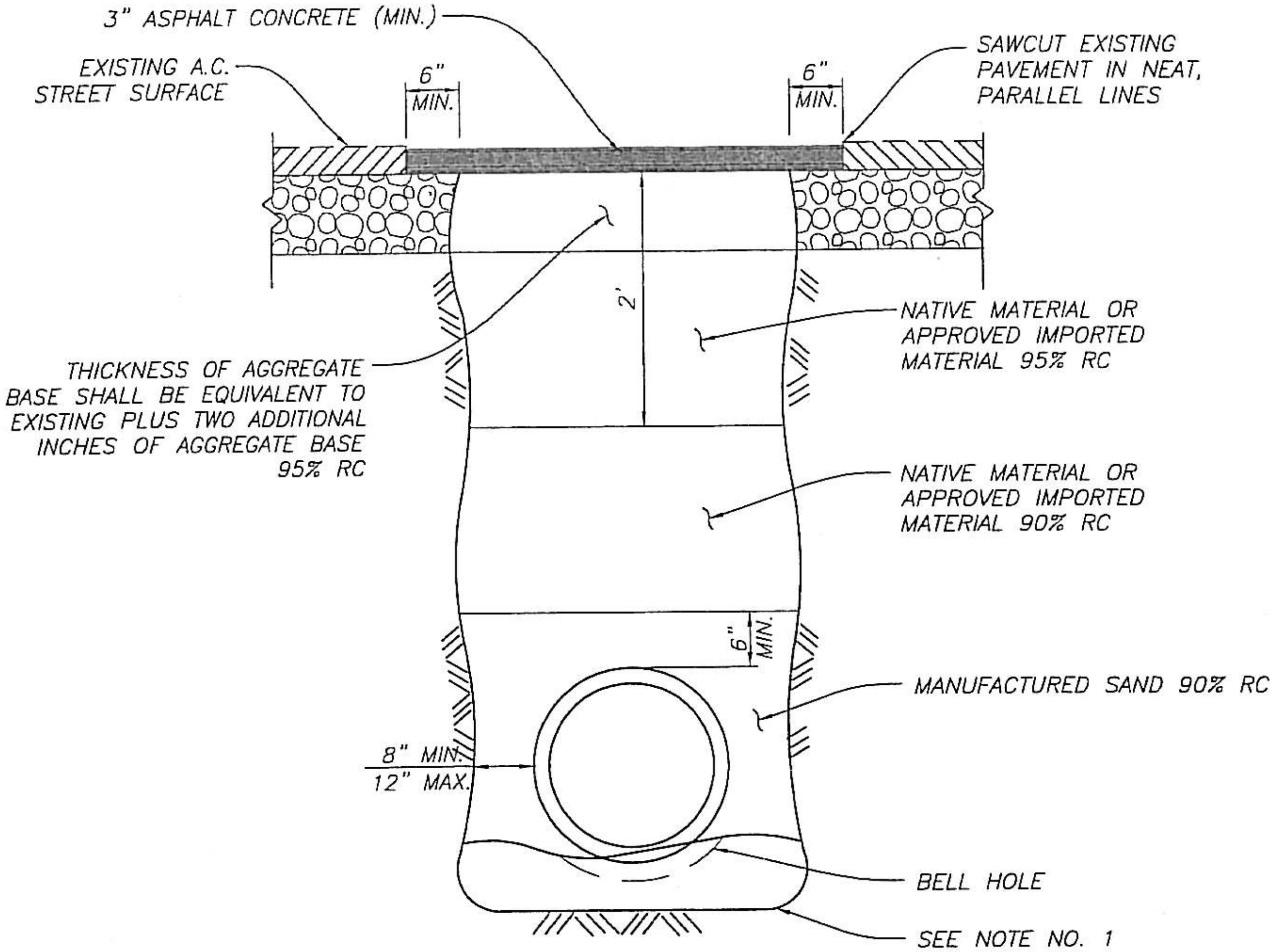
GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

FLEXIBLE WALL PIPE BACKFILL

APPROVED BY: [signature] DATE: 2-23-04

DRAWING NO. 5 - C



NOTES:

1. IF THE BOTTOM OF TRENCH IS SOFT OR UNSTABLE, IT SHALL BE OVER–EXCAVATED A MINIMUM OF 1 FOOT BELOW GRADE AND BACKFILLED WITH APPROVED IMPORTED MATERIAL.
2. NATURAL SAND MAY BE SUBSTITUTED FOR MANUFACTURED SAND AS APPROVED BY THE DIRECTOR. SUBSTITUTIONS SHALL BE REVIEWED ON A CASE BY CASE BASIS. REQUESTS FOR USAGE OF WHAT IS COMMONLY REFERRED TO AS "BLOW SAND" OR "HILMAR SAND" WILL NOT BE APPROVED.
3. TRENCHES NOT IN PAVED AREAS SHALL BE RESTORED TO MATCH EXISTING SURFACE CONDITIONS.

Feb 05, 2004 – 5:00pm
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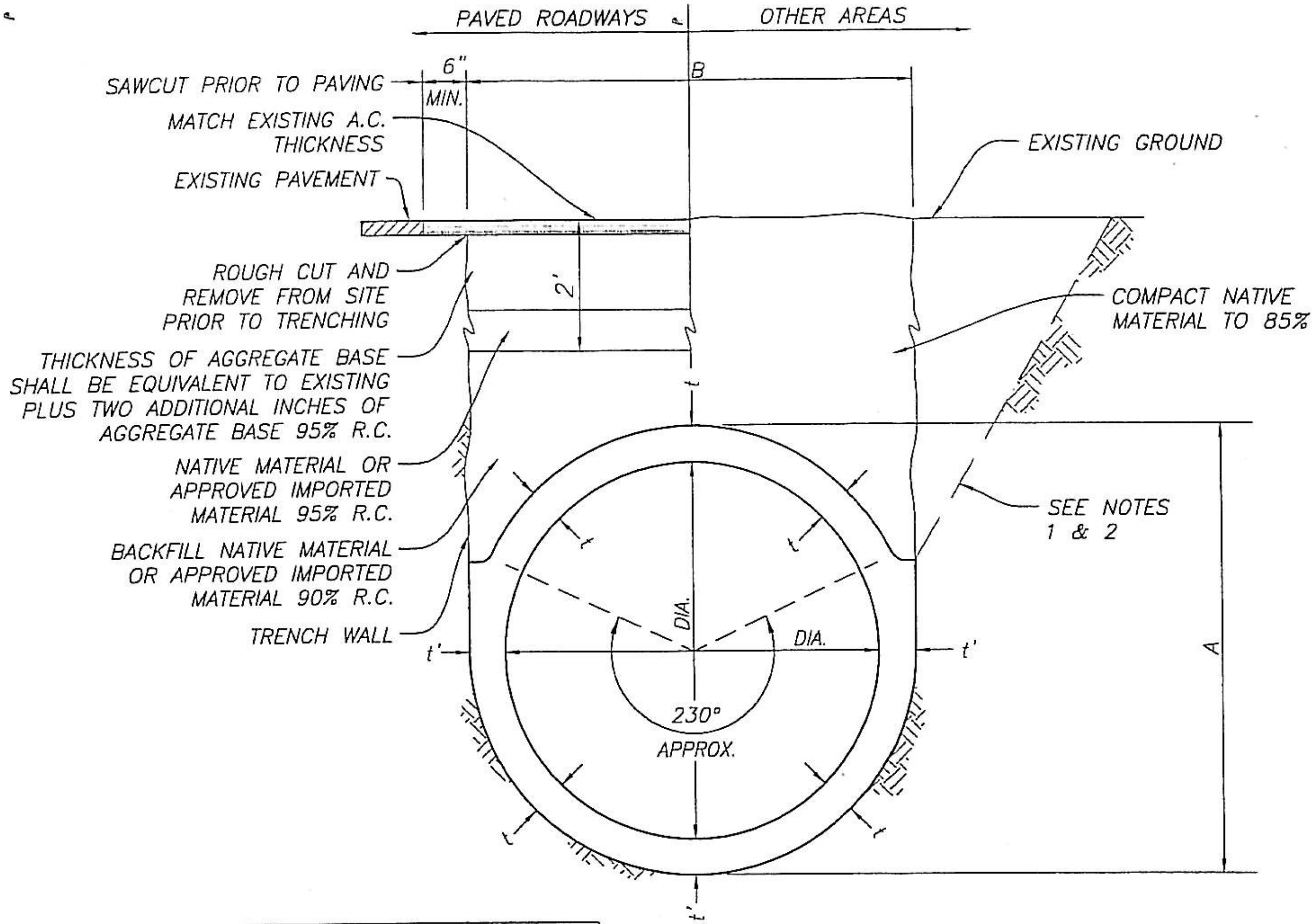
GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

RIGID WALL PIPE BACKFILL

APPROVED BY: [signature] DATE: 2-23-04

DRAWING NO. 5 - D



DIA.	A	MIN. B	t	t'
30"	36"	37"	3"	3"
36"	43"	44"	3 ½"	3 ½"
42"	50"	51"	4"	4"
48"	58"	59"	5"	5"
54"	65"	66"	5 ½"	5 ½"
60"	72"	73"	6"	6"
66"	79"	80"	6 ½"	6 ½"
72"	86"	87"	7"	7"
84"	100"	101"	8"	8"
96"	114"	115"	9"	9"

TYPICAL PIPE SECTION
30" THRU 96"

NOTES:

1. THE CONTRACTOR SHALL SUBMIT A DETAILED PLAN TO THE CITY ENGINEER PRIOR TO EXCAVATION, SHOWING DESIGN OF SHORING, BRACING, SLOPING OR OTHER PROVISIONS TO BE MADE FOR WORKER PROTECTION, IN ACCORDANCE WITH SECTION 6422 OF THE LABOR CODE OF CALIFORNIA.

2. THE MINIMUM REQUIRED WORKER PROTECTION SHALL BE AS DESCRIBED IN THE CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY. VARIANCES THEREFROM SHALL BE PREPARED AND SIGNED BY A REGISTERED CIVIL ENGINEER OF THE STATE OF CALIFORNIA.

3. TRENCHES IN EXISTING PAVED AREAS SHALL BE EXCAVATED VERTICALLY, OR TO THE MOST NARROW PRACTICAL WIDTH AS SOIL CONDITIONS WILL PERMIT.

GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

C.I.P.P. STORM DRAIN AND TRENCH

APPROVED BY: [signature] DATE: 2-27-01

DRAWING NO. 5 - E

Feb 05, 2004 – 5:00pm
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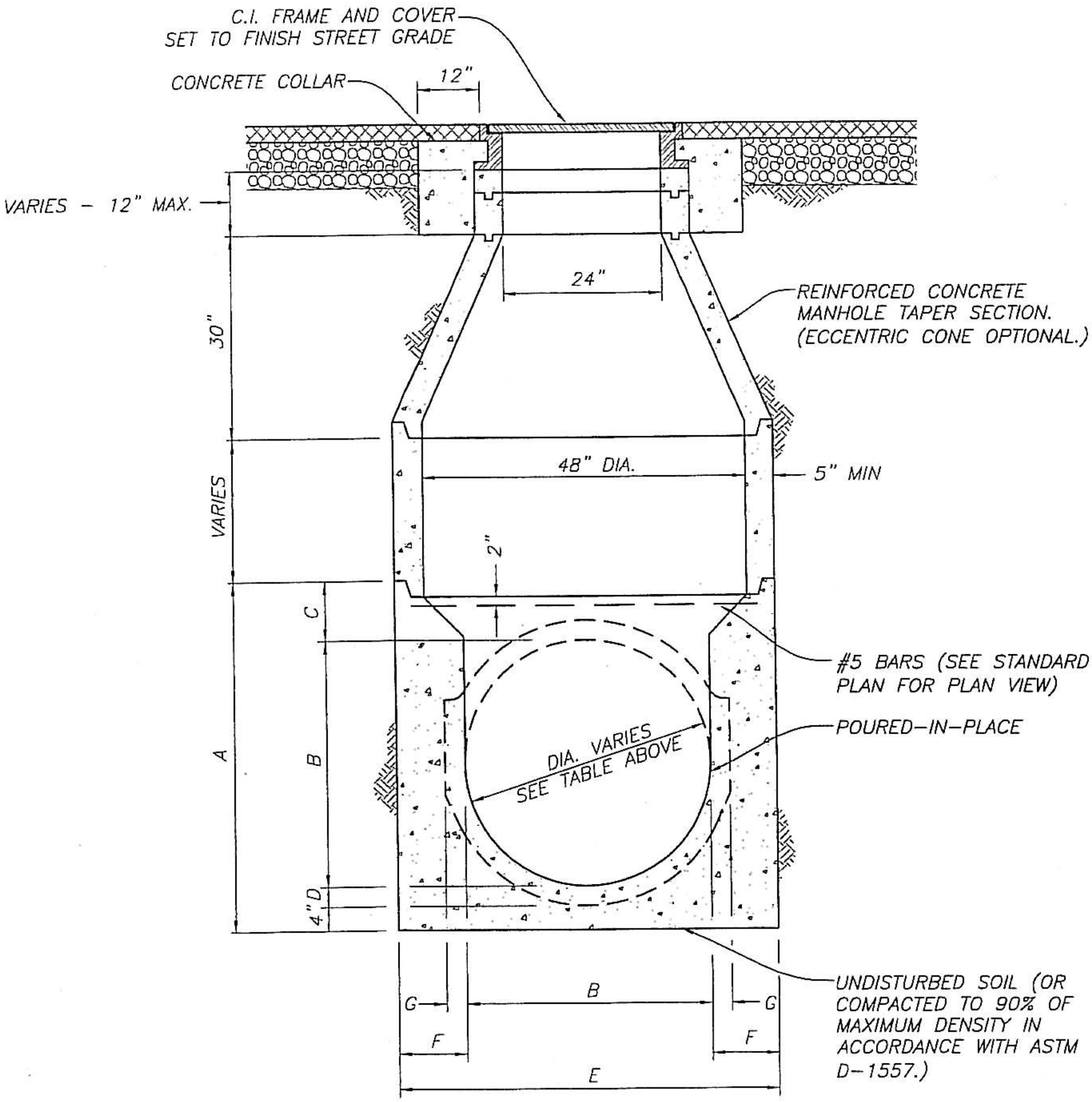
DIA.	A	B	C	D	E	F	MIN. G
30"	46"	30"	9"	3"	56"	13"	3"
36"	53"	36"	9 ½"	3 ½"	56"	10"	3 ½"
42"	60"	42"	10"	4"	60"	9"	4"
48"	68"	48"	11"	5"	66"	9"	5"



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GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

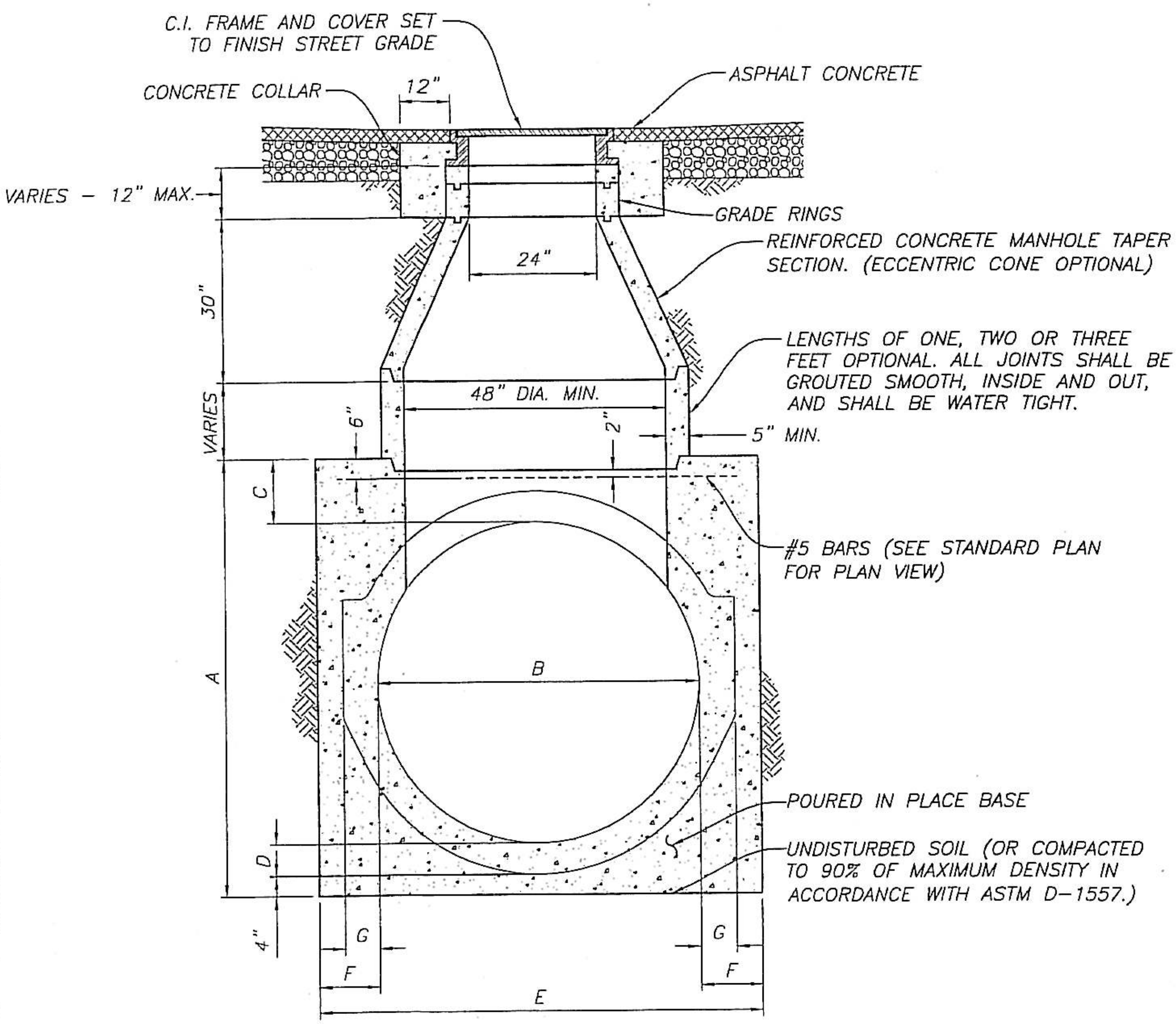
CITY OF GUSTINE IMPROVEMENT STANDARDS

STORM DRAIN MANHOLE FOR 30" - 48" C.I.P.P.

APPROVED BY: [signature] DATE: 2-27-04

DRAWING NO. 5 - F

DIA.	A	B	C	D	E	F	MIN. G
54"	75"	54"	11 ½"	5 ½"	75"	10 ½"	5 ½"
60"	82"	60"	12"	6"	82"	11"	6"
66"	89"	66"	12 ½"	6 ½"	89"	11 ½"	6 ½"
72"	96"	72"	13"	7"	96"	12"	7"
84"	110"	84"	14"	8"	110"	13"	8"
96"	124"	96"	15"	9"	124"	14"	9"



Feb 05, 2004 – 5:00pm
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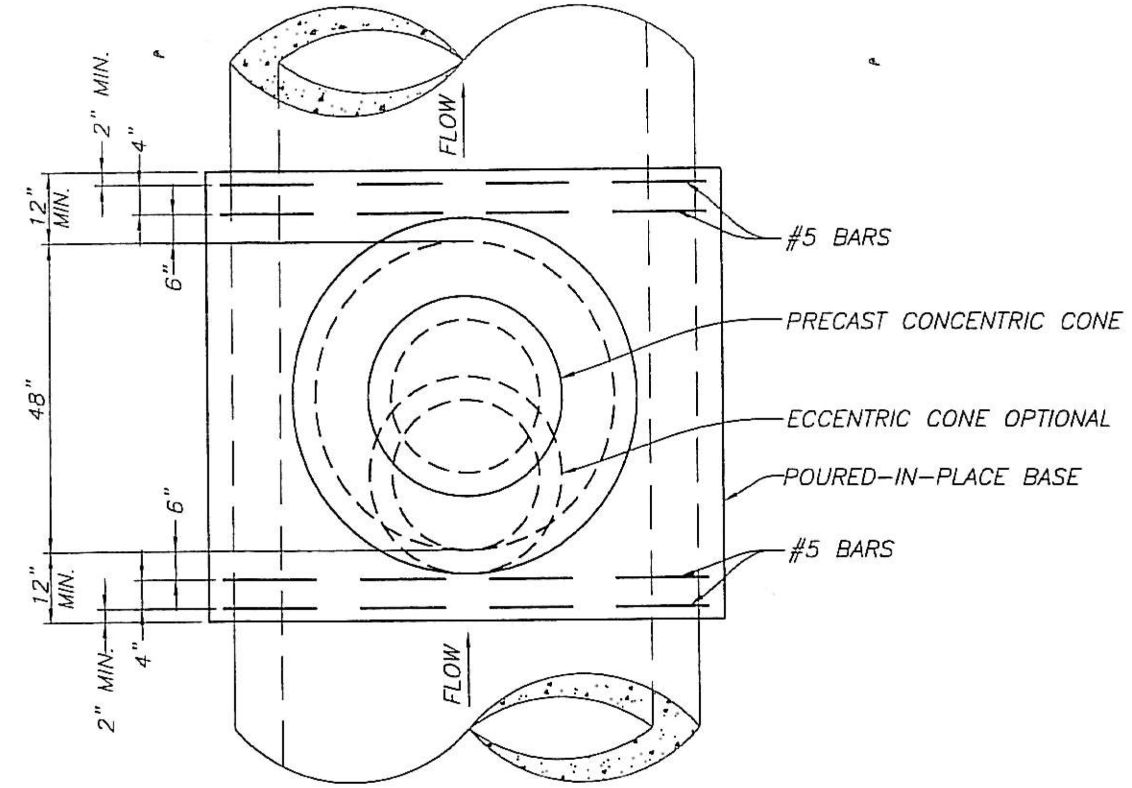
GUSTINE CITY CALIFORNIA
INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

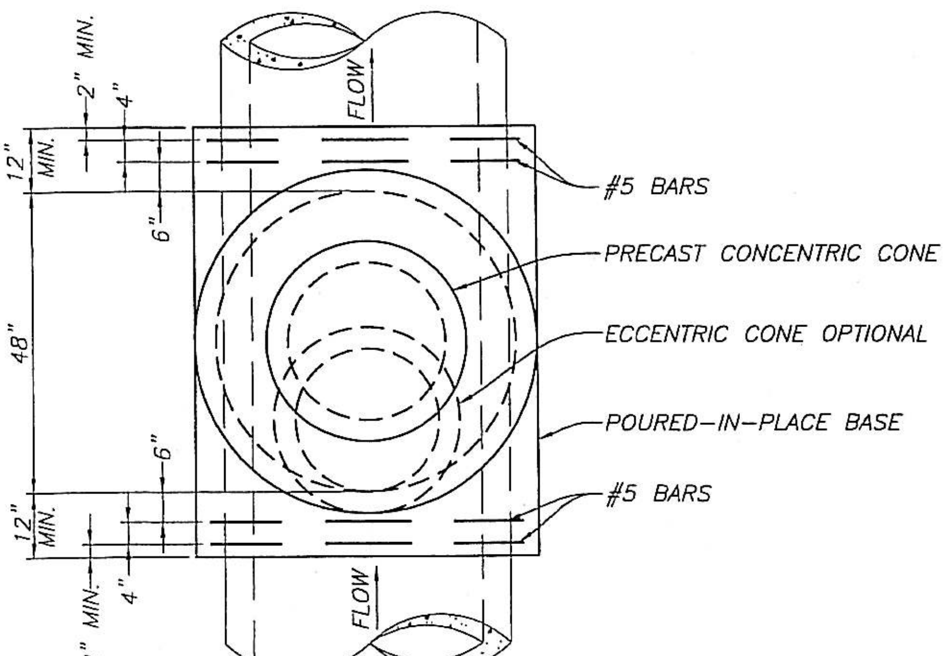
STORM DRAIN MANHOLE FOR 54" - 96" C.I.P.P.

APPROVED BY: DATE:

DRAWING NO. 5 - G



MANHOLE FOR 54" - 96" C.I.P.P.



MANHOLE FOR 30" - 48" C.I.P.P.

GUSTINE CITY CALIFORNIA — INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

STORM DRAIN MANHOLE PLAN VIEW (C.I.P.P.)

APPROVED BY: [signature] DATE: 2-27-04

DRAWING NO. 5 - H

Feb 05, 2004 - 5:00pm
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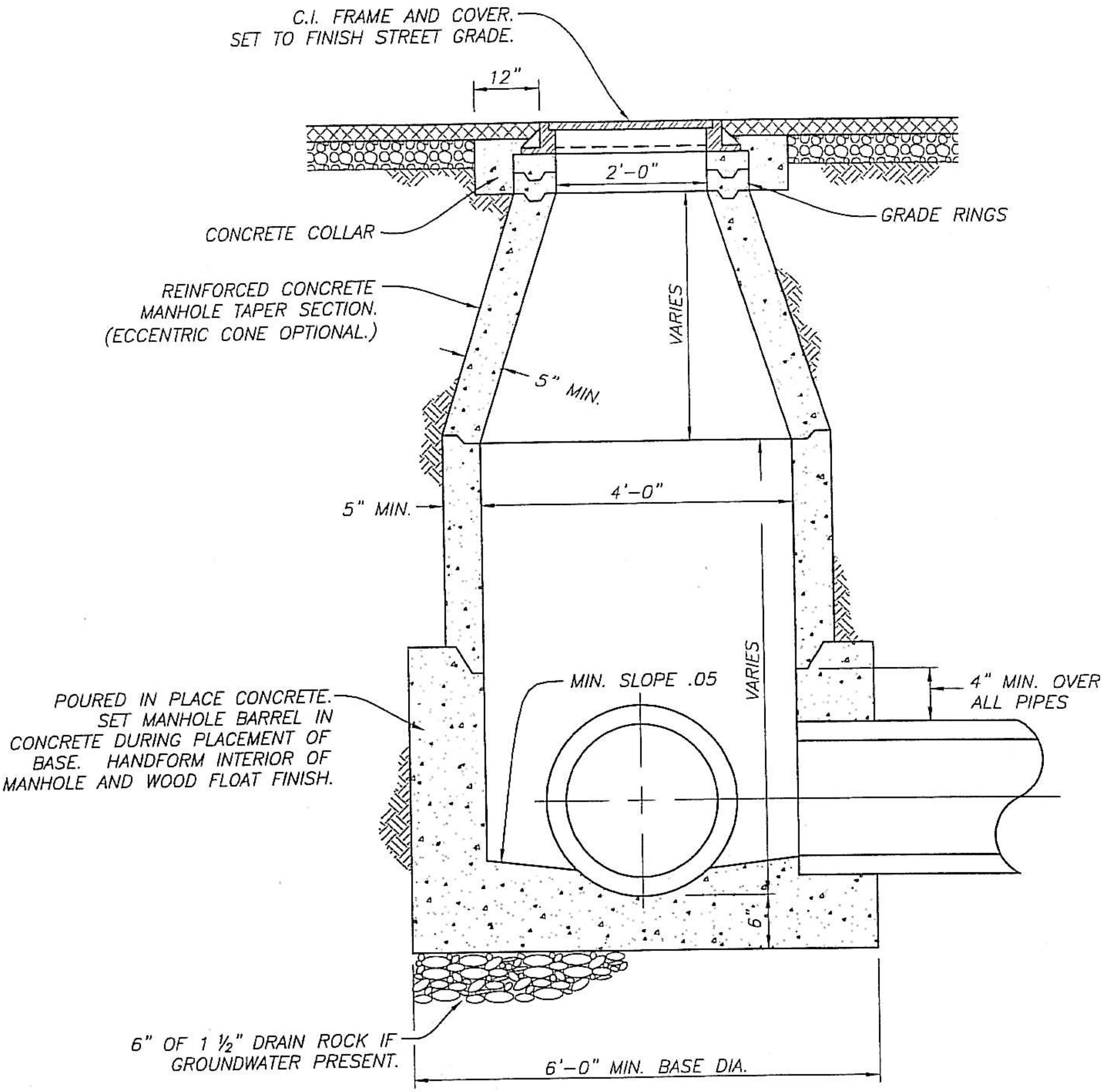

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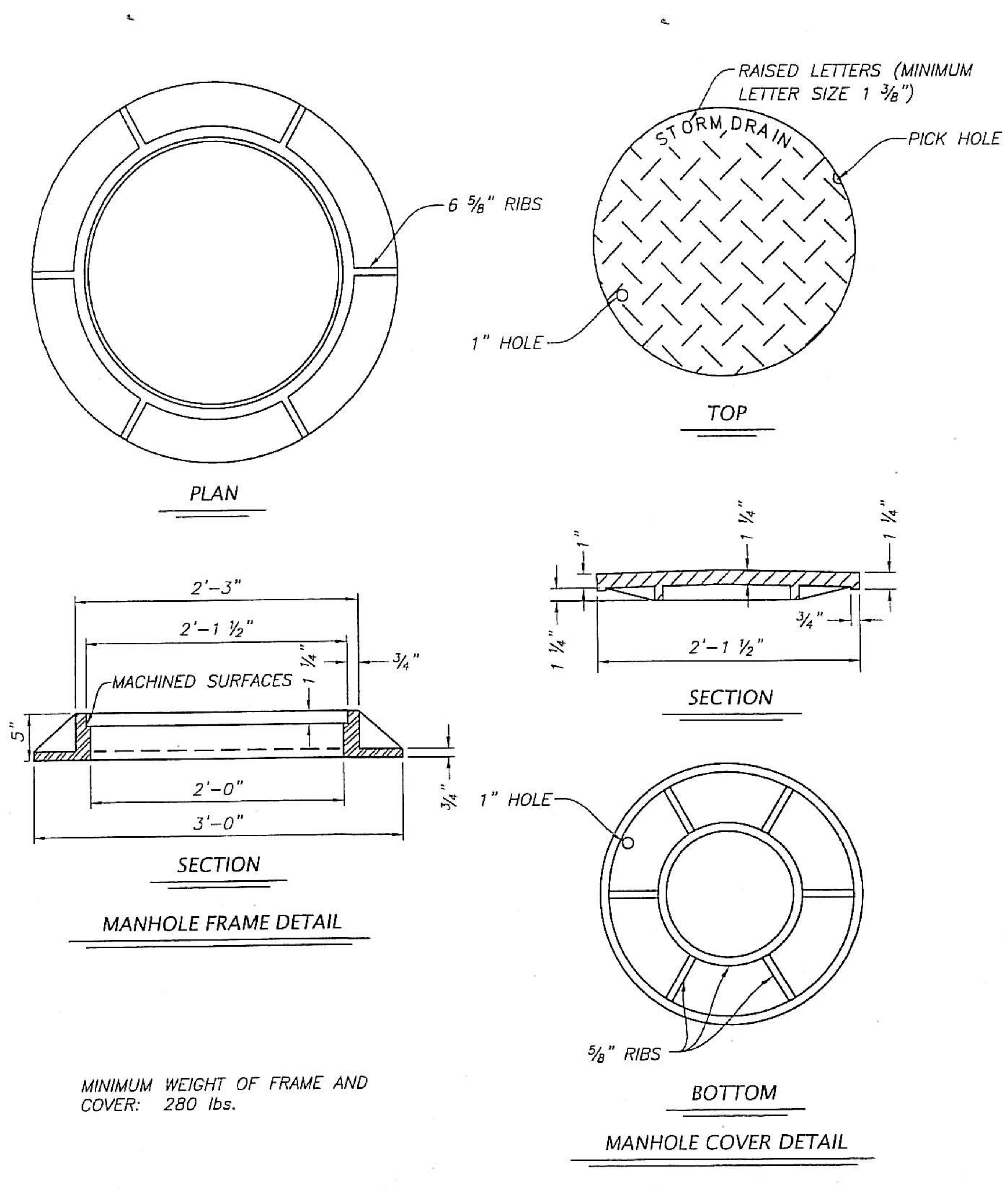
GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

STORM DRAIN MANHOLE

APPROVED BY: [signature] DATE: 2-23-04

DRAWING NO. 5 - 1

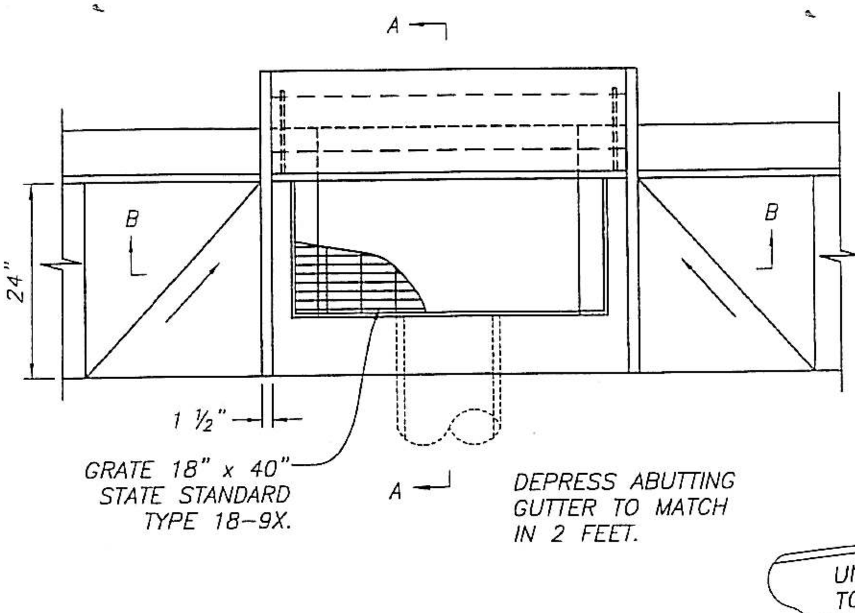


CITY OF GUSTINE IMPROVEMENT STANDARDS

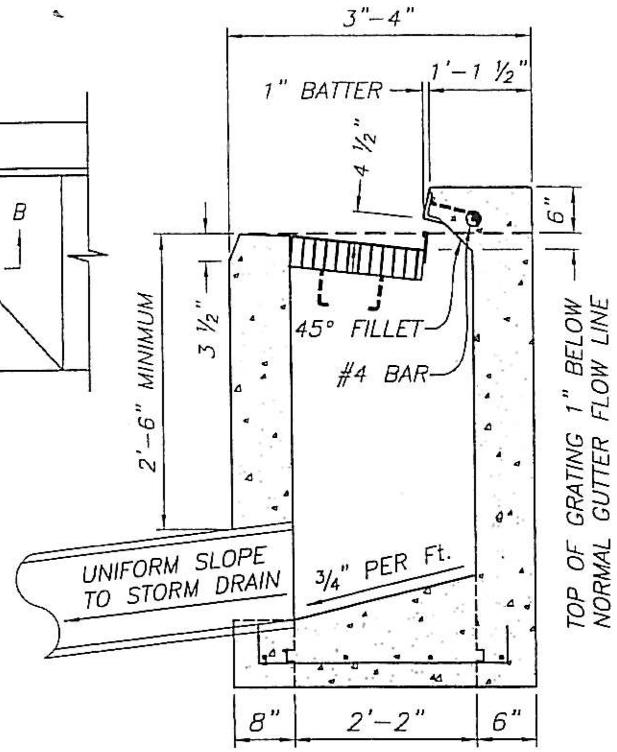
CAST IRON MANHOLE FRAME AND COVER

APPROVED BY: DATE: 2-23-04

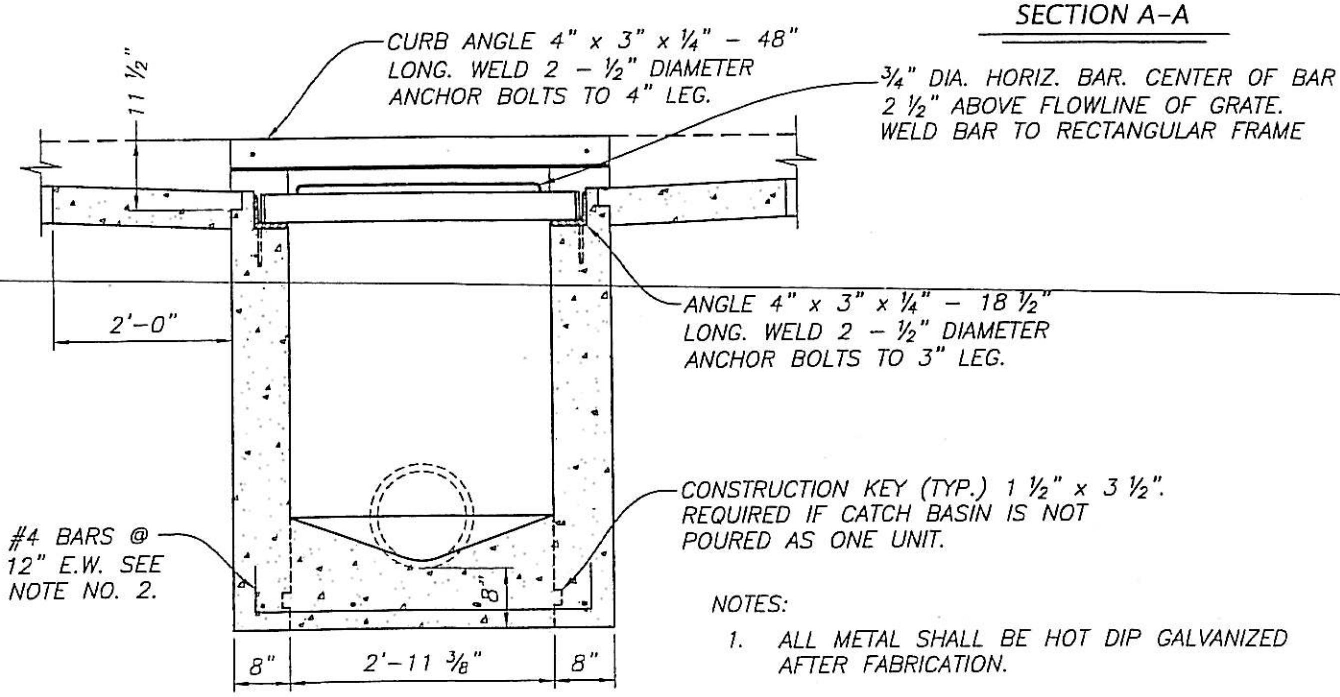
DRAWING NO. 5 - J



PLAN



SECTION A-A



SECTION B-B

NOTES:

1. ALL METAL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
2. WALL AND FLOOR REINFORCING NOT REQUIRED IF INVERT LESS THAN 8' DEEP, OTHERWISE USE No. 4 BARS AT 12" EACH WAY, CENTER IN WALLS.

Feb 06, 2004 - 8:03am
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GUSTINE CITY CALIFORNIA INCORPORATED NOV. 11, A.D. 1915

CITY OF GUSTINE IMPROVEMENT STANDARDS

DRAIN INLET

APPROVED BY: [signature] DATE: 2-27-04

DRAWING NO. 5 - K

RESOLUTION NO.2008-2095

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF GUSTINE, CALIFORNIA, AMENDING THE CITY OF GUSTINE STORM DRAINAGE MASTER PLAN – EXHIBIT A AND CITY OF GUSTINE DEVELOPMENT STANDARDS FOR SECTION 5 STORM DRAINAGE EXHIBIT B

WHEREAS, the City of Gustine City Council on March 15, 2005 adopted the Revised Storm Drain Master Plan; and

WHEREAS, the City is dedicated to the enhancement of the quality of life for the future and existing residents of the community; and

WHEREAS, the City Council of the City of Gustine is establishing its expectations and criteria to insure that storm drain basins as a public facility are provided to accommodate and serve new development as defined in the City of Gustine's Public Facility Impact Fee ordinance; and

WHEREAS, the blending of the storm drain facilities and park facilities are to be separated and storm drain basins are to be stand alone facilities and are to be funded by new development through the Public Facility Impact Fee currently under preparation; and

WHEREAS, storm drain facilities shall be designed to blend into the neighborhoods and to be developed with the minimum improvements of irrigation systems, grass, and fencing for protection of the new facilities from vehicle vandalism; and

WHEREAS, Table XII-2 shall be updated reflecting the cost of land anticipated to be $85,000.00 per acre and from time to time the cost estimates shall be updated to insure that the Preliminary Construction Cost Estimates remain current and upon updating the cost estimates, the City Manager shall present said adjustments to the City Council for adjustment to the Public Facility Fee; and

WHEREAS, Table XII-3 Cost of Storm Drainage Facilities by Land Use Type is deleted and said impact fee for storm drain facilities shall be incorporated in the Public Facility Impact Fee Study that will establish costs to be placed on new development to offset the cost of the storm drain facility program; and

WHEREAS, the City Engineer has incorporated various amendments to Section 5, Storm Drainage development standards to reflect the new design concepts and the desire of the City to have storm drain facilities to be aesthetically pleasing and be an assist to the community both functionally and aesthetically.

WHEREAS, on August 19, 2008, the City of Gustine City Council reviewed the proposed amendments to the Master Storm Drain Master Plan and Development Criteria of Section 5, Storm Drainage and has approved the proposed changes.

NOW THEREFORE BE IT RESOLVED, that the City of Gustine City Council hereby:

1. Approves the proposed amendments to the Storm Drain Master Plan and various amendments to Section 5, Storm Drainage development standards to reflect the new design concepts.
2. Storm Drain Facility Impact Fees are to be incorporated in the Public Facility Fee Study.
3. The City Manager shall cause the Preliminary Engineering Estimates to be update yearly and to present any proposed amendments of the Storm Drain Master Plan to the City Council for action.
4. The City Manager shall present all proposed amendments to the storm drain public facility impact fee to the City Council for action.

I hereby certify that the foregoing is a full, true and correct copy of the resolution duly and regularly adopted and passed by the City Council of the City of Gustine, CA at a regular meeting held on the 19th of August, 2008 by the following vote:

AYES: Mayor Ford, Council members Bonta, Garcia
NOES:
ABSENT: Council members Amaral, Oliveira
ABSTAIN:

Mayor Rich Ford

Attest:

Kelly Buendia, Deputy City Clerk