City of Newman Storm Drain Master Plan

City of Newman

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Section 1
Introduction

The City of Newman (the City) is experiencing relatively rapid urban growth similar to other parts of the Western San Joaquin Valley. In response to this growth, the City prepared a new General Plan, adopted on April 4, 2007, to guide the growth of the City through the year 2030. The area that is the focus of this study (Project Area) is a portion of the defined growth area set forth in the General Plan slated for future residential, commercial and industrial development. The Project Area, depicted in Figure 1, does not include the existing drainage system.

This Master Plan was developed by defining the proposed land use, soils, and water table depths within the Project Area; establishing the rainfall characteristics; and identifying the existing drainage patterns. The recommended design criteria were then applied to configure the viable drainage system improvement alternatives. Computer modeling of the alternatives was performed to evaluate the drainage characteristics of each alternative to estimate the cost of improvements for comparison purposes. The cost of improvements and characteristics of operation and maintenance were compared to determine the apparent best alternative for providing storm drainage service to the Project Area. A detailed description of the preferred project and an itemized cost estimate was then prepared. The preferred project will then guide the design and implementation of the storm drainage improvements to service the Project Area at the defined level of performance.

Under the previously established Storm Drainage Master Plan, the runoff from the Project Area was to be conveyed by additional parallel pipes or open channels (Tettermer & Associates, 2001). The plan recommended new pipelines of 18-inch to 90-inch in diameter, and open channels with depths of 5 feet and bottom widths of 10 feet. Two small detention basins to service the western portion of the Project Area, and several separate points of discharge were included in the recommended plan. Except for the recently constructed Sherman Parkway Storm Drainage Channel proposed in that study, no other recommended storm system upgrades were put in place.

The City has allowed variance from the recommended plan by allowing the use of storm drainage detention to attenuate the peak discharge from all the development that has since occurred, to avoid the necessity of constructing large capacity storm water conveyance systems. This allows the use of existing agricultural water conveyance facilities, with the approval of the Central California Irrigation District (CCID), to convey the storm runoff to the points of discharge to the Newman Wasteway or the San Joaquin River. The City and CCID have been in discussions regarding joint use of facilities, but have yet to come to an agreement.

Section 2
Description of Project Area

The Project Area is generally bounded by the CCID Main Canal on the west, Stuhr Road to the north, the county line to the southeast, and Hallowell Road to the south, excluding the urbanized zone serviced by the existing drainage system. The Project Area includes approximately 2,500 acres of various planned land uses.

The Project Area shown on Figure 1 differs from the "subareas" defined in the General Plan. The planning area for the purposes of this plan encompasses an updated area that has been expanded to the southeast. The Project Area not only includes the future developed areas, but also those areas already developed that need storm drainage service.

The General Plan specifies that each subarea be master planned before annexation to the City and that the master plan must include: "Distribution and location of, and specifications for, sewer, water and drainage facilities needed to serve the new development consistent with the Citywide Services Master Plan".

Currently, the Project Area drains through and around the City. In the northern part of the Project Area, Subareas 3, 2, 1 and 10 drain via an open drainage ditch that runs west to east and is centrally located in the subareas. The ditch then parallels Hills Ferry Road and the northeastern boundary of the Wastewater Treatment Plant (WWTP) to a pump station that lifts the drain water for disposal into the San Joaquin River at high river stage; otherwise, the water is discharged by gravity into the river.

In the western part of the Project Area, part of Subareas 4 and 5 generally drain into the City's storm drainage system, which has insufficient capacity to handle the runoff from the subareas in addition to the urban runoff. This causes surcharge of the drainage facilities and localized flooding south of the High School.

Most of the drainage from Subareas 6, 7, 8 and 9 currently enters the Miller Ditch for ultimate discharge into the Newman Wasteway. A minor amount of drainage from Subarea 6 enters the City's storm drainage system.

The Fig Lane Ditch provides a small amount of drainage service to Subarea 3 and the existing drainage zone, in addition to providing irrigation water delivery, but drainage is restricted crossing Highway 33. The Clary Ditch provides irrigation water delivery and drainage from a small portion of the existing drainage zone. Both the Clary Ditch and the Miller Ditch have limited capacity crossing Highway 33.

The Sherman Parkway Storm Drain Channel, which currently provides drainage service to the Hearthstone Ranch and Sherman Ranch developments, is also designed to service Subareas 2, 3 and part of Subarea 4.

2.1 Historic Groundwater Levels

The City is located within the Delta-Mendota Subbasin of the San Joaquin River Hydrologic Region, as defined by the California Department of Water Resources (DWR, 2003). The groundwater gradient is generally from the southwest to the northeast, and water levels tend to be higher to the east of the City as

compared to the west. Shallow groundwater can limit the depth to which detention basins can be excavated, since design standards typically require a minimum amount of separation between the bottom of the basin and the water table. Very shallow groundwater conditions can render installation of detention basins in the area non-viable. CCID and DWR monitor groundwater levels in both monitoring wells and deep wells in the vicinity of the City. Figure 2 shows the location and minimum depth to groundwater indicated for each monitored well. Hydrographs for each of the wells are shown in Appendix A. These data are an important consideration in the evaluation of storm drainage system alternatives that include the use of detention basins.

A few measurements appeared to differ substantially from the typical seasonal water levels for the well data reviewed. In the cases where the readings were questionable, they were not considered in this analysis. Because site-specific conditions may differ from the regional data, the site-specific groundwater conditions should be studied before any detention basin would be sited in this area.

2.2 Land Use

The land use designations are important since the rate and volume of runoff that result from a particular storm event are related to how the land has been developed. The primary factor affecting runoff, and therefore volume, peak flow, and time of concentration of storm water entering the system, is the permeability of the surface. Surface permeability is a function of land use. Dense land use development will exhibit a greater abundance of impervious surfaces and therefore a higher percentage of the rainfall will flow into the storm drain system. In addition, the time of concentration of the flow will be reduced. Less dense land use areas will have a greater proportion of permeable surfaces to restrict and absorb flow across the surface, resulting in a reduction of runoff into the storm drain system.

For the purpose of storm water runoff calculations, the proposed various land uses within the Project Area specified in the General Plan have been divided into several categories: 1) Mixed Density Residential, 2) Medium Density Residential, 3) Commercial, 4) Industrial, 5) Public/Quasi-Public, and 6) Park, Recreation and Open Space.

The proposed "Mixed Density Residential" category includes the categories described in the General Plan as Planned Mixed Residential and Very Low Density Residential. Based upon the General Plan land use characteristics, the average density is assumed to be seven units per acre for the "Mixed Density Residential" and ten units per acre for the "Medium Density Residential". The "Commercial" designation includes the Business Park and Community Commercial land use categories. "Industrial" land use accounts for Light and Heavy Industrial designations. "Public/Quasi-Public" land uses consist of existing or planned schools and other public facilities with maximum designated lot coverage of fifty percent pursuant to the General Plan. The "Park, Recreation and Open Space" designation cover such land uses in the Project Area. The proposed land use categories are presented in Figure 3.

2.3 Soil Types and Runoff Characteristics

The volume of storm water runoff is related to native soil type. Finer grained soils will typically have significantly lower infiltration rates than coarser soils. The methodology utilized to calculate the rates and volumes 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 (USDA-NRCS).

Soil characteristics, including composition, permeability ranking, water holding capacity, and hydrologic soil group, for the soils that exist in the Project Area are shown in Table 2.1. As native soils are mainly loams having moderate infiltration, the runoff potential is medium.

TABLE 2.1
Soil Characteristics

Soil Type	Composition	Permeability Ranking	Water Holding Capacity	Hydrologic Soil Group
110-El Solyo silty clay loam	Alluvium from sedimentary and metamorphic rock sources	Slow	Very high	C
116- El Solyo silty clay loam, 0 to 2 percent slopes, rarely flooded	Alluvium from sedimentary and metamorphic rock sources	Slow	Very high	C
120-Vernalis-Zacharias complex	Alluvium from mixed rock sources	Moderate slow surface over moderate subsoil	High	B
122-Vernalis loam	Alluvium from mixed rock sources	Moderate	High	B
125-Vernalis clay loam	Alluvium from mixed rock sources	Moderate slow surface over moderate subsoil	High	B
127-Vernalis loam	Alluvium from mixed rock sources	Moderate	High	B
140-Zacharias clay loam	Alluvium from mixed rock sources	Moderately low	High	B
170-Dospalos-Bolfar complex	Alluvium dominantly from granitic rock sources	Slow	Moderate	D
270-Elsalado fine sandy loam, rarely flooded	Alluvium from sandstone and shale	Moderate rapid surface over moderate subsoil	High	B
271-Elsalado loam	Alluvium from sandstone and shale	Moderate	High	B
310-Deldota clay	Alluvium from sedimentary rock sources	Slow	High	D
320-Dosamigos clay loam	Alluvium from sedimentary rock sources	Very low	High	D
330-Pedcat clay loam	Alluvium from sedimentary rock sources	Very low	Moderate	D
331-Pedcat clay loam	Alluvium from sedimentary rock sources	Very low	Moderate	D

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, TR-55 (USDA-NRCS, 1986). The hydrologic soil groups distribution in the Project Area is shown in Figure 4.

The hydrologic soil groups and the land uses are utilized to determine curve numbers (CN's) to quantify runoff pursuant to TR-55. The CN's selected for use in this study, based upon land use and soil types, are shown in Table 2.2.

TABLE 2.2
Runoff Curve Numbers Associated with Land Use and Soil Types

Land Use Designation	Soil Type		
	B	C	D
Mixed Density Residential (56% impervious)	81.8	87.7	90.4
Medium Density Residential (65% impervious)	85	90	92
Industrial	88	91	93
Commercial	92	94	95
Park, Recreation and Open Space (Good condition)	61	74	80
Public/Quasi-Public	79.5	86	89

Hydrographs generated by this method from the hydrologic modeling of each subcatchment of the watershed are routed through the conveyance and storage systems to analyze capacity and performance under various scenarios.

2.4 Weather Conditions

The weather conditions in Newman consist of mild winters and warm, dry summers. According to the Western Regional Climate Center (WRCC, 2007), the monthly low temperatures occur typically between December and February. The average winter temperature between December and February was approximately 37.2° F, with a monthly average low of 36° F in December during the 58-year period of record between 1948 and 2007. The average summer temperature between June and August was approximately 94.5° F, with a monthly average high of 96.8° F in July during the period of record. The hottest day on record was 116° F on July 23, 2006. The coolest day on record was 15° F on December 23, 1990.

Rainfall typically occurs between the months of November and March, with some infrequent events as late as May and early as September. Over the 58-year period of record, the average annual rainfall measured at the Newman gaging station (046168) was about 10.96 inches per year. The maximum annual rainfall was approximately 22.56 inches in 1998, and the low was approximately 3.34 inches in 1953. The maximum 24-hour rainfall was measured at 4.10 inches and occurred on January 17, 1988. During the period of record, six 24-hour rainfall events have been recorded that exceeded 2-inches of total rainfall. All six events occurred between late November and early March. No snowfall has ever been recorded in Newman.

2.5 Existing Drainage Facilities

The description of the existing storm drainage system within the City is based on information provided by the City. Figure 5 shows the main conveyance lines, the existing detention facilities and the pump stations.

The existing drainage system consists of a main drainage line that runs west to east down Inyo Avenue. It collects storm water runoff from the west and central portions of the City. This water is discharged directly into Miller Ditch, at the intersection of Inyo Avenue and Canal School Road. There is a 2 ac-ft detention basin located at the west end of Inyo Avenue that collects runoff from the Silva Ranch development. The associated discharge pump station consists of two 240-gpm pumps.

The storm runoff draining from the subdivision located northwest of the intersection of Inyo Avenue and Canal School Road, from the development located north of Hills Ferry Road, from the area north of Driskell Avenue west to the railroad, and from the Sherman Parkway Storm Drainage Channel is collected into a 54-inch pipeline and then pumped into the Miller Ditch from a pump station, with three 12,500-gpm pumps, located at Inyo Avenue and Canal School Road. The new developments, Hearthstone Ranch and Sherman Ranch, drain towards the Sherman Parkway Storm Drainage Channel, constructed between Highway 33 and Hills Ferry Road, which conveys storm water runoff from these developments and the undeveloped areas north of the City. The storm water is then conducted by a pipeline to the east side of the City, to a detention basin with a storage capacity of 12.8 ac-ft. A pump station, with two 1,400-gpm pumps, discharges the detained water into a pipeline that is finally tied into the 54-inch pipeline previously mentioned.

Because there was not enough capacity in the existing system to receive runoff from the new developments located in the south portion of the City, those developments drain towards Miller Ditch. As part of the drainage system, the City has installed several small detention basins in the southwest and southeast portion of the City, primarily to reduce the rate of storm water discharge to levels that could be accommodated by the existing waterways. There is a 2 ac-ft detention basin located in the Creek Canyon subdivision (Canyon Creek Drive and Creek Park Drive). The discharge pump station consists of two 400-gpm pumps with a discharge pipe that drains into the Miller Ditch. The detention basin located at the west end of Canyon Creek Drive has a storage capacity of approximately 20 ac-ft, and it gravity drains either towards the detention basin mentioned above or to a pump station placed at Upper Road, which has one 50-gpm pump and a discharge pipe that drains into Miller Ditch.

The current industrial park located in the southeast has two small detention basins. The one located at the end of L Street has approximately 3 ac-ft of storage capacity. An associated pump station with two 300-gpm pumps discharges the water into the Miller Ditch. The other basin, with 0.6 ac-ft of capacity, has an associated pump station, with two 110-gpm pumps. It is located at the end of Industrial Way and the water is discharged into the Clary Ditch.

Currently, there are three main drainage routes for runoff occurring in the Project Area. These routes typically provide the drainage from west to east for most of the Project Area.

The northern route conveys storm water runoff collected from the northern and northwestern undeveloped portions of the Project Area along the northern perimeter of the existing municipal development through the Sherman Parkway Storm Drainage Channel. It is anticipated that, in addition to new facilities, these existing facilities will be utilized to convey storm water runoff from the Project Area north and west of the channel.

The southern route conveys runoff collected from the southwestern and southern undeveloped portions of the Project Area and the southern portion of the City along the southern perimeter of the existing municipal development. Currently, the Miller Ditch, a CCID facility, is being utilized to convey the storm water runoff from the mentioned areas along the Shiells Road alignment, south of the City, east to Canal School Road near Brazo Road in Merced County. The ditch is then channeled north to Inyo Avenue, where it receives flows from the central portions of the City, the flows captured in the storm drain system from west of the City, and the flows from the Sherman Parkway Storm Drainage Channel. These conjoined flows are then channeled to the receiving waters at the Newman Wasteway.

The central route conveys runoff collected from the undeveloped portions of the Project Area west of the City through the existing drainage infrastructure. It is anticipated that drainage conveyed through the existing municipal system from the Project Area west of the City will be redirected into either the northern or southern drainage routes.

Additional runoff from the northeast corner of the Project Area is conveyed by an existing ditch that flows towards the WWTP. Then, it is discharged directly to a slough that is tributary to the San Joaquin River. At high river stage, a pump is utilized to discharge the storm water into the mentioned slough.

Section 3
Drainage System Analysis

The following sections discuss various applicable design standards and considerations, and the methodologies utilized in the hydrologic and hydraulic modeling of the Project Area.

3.1 Design Standards and Considerations

3.1.1 City of Newman Improvement Standards and Specifications

The City of Newman Improvement Standards and Specifications include the hydrologic design criteria and the construction standards for storm drainage conveyance pipelines. The City has adopted the Rational Method for quantifying runoff rates and volumes.

3.1.2 Stanislaus County Department of Public Works Standards and Specifications

Design standards for storm drainage improvements constructed under Stanislaus County's jurisdiction are quite comprehensive, containing sections covering the hydrologic design criteria and design standards for water conveyance and storage facilities. The applicable standards for planning of storm water systems set forth the following elements:

3.1.2.1 Transmission Facilities

1. Page 4.1, 4.2. Standard of Design: All conveyance drainage facilities shall be designated for a 10 year storm or greater.

2. Page 4.2, 4.2. Standard of Design: Design storm methods shall be according to the Rational Method for design areas less than or equal to 400 acres. Calculations for areas larger than 400 acres shall be computed using more advanced storm drain design methods (i.e. Unit Hydrograph Method as defined by the US Army Corps of Engineers, Technical Release 55 (TR-55), etc). The Manning equation shall be used to determine the capacity and friction losses of open channel and enclosed gravity conduits.

3. Page 4.2, 4.3. Peak Flow Rate: The peak flow rate shall be used to size pipe and culverts.

4. Page 4.7, 4.7. Pipe:

    - Size: All storm drain mains, trunk lines, cross culverts, catch basin laterals, or any other type of gravity flow storm drainage pipe shall be no less than eighteen inches (18") in diameter.

    - Minimum Cover: Pipe alignments shall be designed to allow for a minimum cover of 30 inches as measured from the natural ground or bottom portion of the structural pavement section to the outside top of the pipe.

- Velocities: Pipes (for calculation purposes) shall be considered to be flowing full. Minimum velocity shall be a velocity sufficient to maintain a clean pipe, generally no less than 2 feet per second. For pump discharge lines, the velocity shall not exceed the manufacturer's design specifications.

3.1.2.2 Detention Basins Design Constraints and Procedures

1. Page 4.1, 4.1. Standard of Design: All storm drainage storage facilities within Stanislaus County shall be designed using a 50 year storm or greater.

2. Page 4.3, 4.4. Drainage retention: A minimum separation of five (5) feet measured from the bottom of the drainage facility, rock well, or on-site drainage facility to the water table surface elevation shall be provided. If design restrictions do not provide a 5 foot minimum separation from the basin bottom to the water table elevation, the Developer shall obtain prior written approval and authorization. All drainage retention facilities shall have a measuring device (tad-a-tail) to indicate water level as measured from the bottom of the basin.

   Elevation: Drainage facilities shall be designed so that a hydraulic grade line (HGL) extended from the drainage retention facility's highest water surface elevation shall be at least 6 inches bellow all tributary drainage inlets at their respective locations.

   Dewatering: A drainage facility must be emptied of a 10-year event storm within 48-hours by outlet facilities providing positive drainage or through percolation

3. Page 4.14, 4.15. Open Space/Detention Basin: The City of Modesto's Design Standards for Dual Use Flood Control/Recreation Facilities, adopted on December 2000 – Resolution No. 2000-632 shall be used to design dual use open-space/storm drain detention basin facilities in the County areas. Among the minimum design criteria are the following:

   - The basins shall be able to fully contain the 100-year, 24-hour storm runoff.
   - All outlet design shall incorporate preventative measures for trash accumulation and erosion at the outfall structure.
   - Maximum side slopes for a basin area shall be 4:1 or flatter. Side slopes of basins adjacent to public streets may require 6:1 or flatter.
   - Minimum vertical separation between the bottom elevation of the basin and the local water table shall be five (5) feet.
   - Fencing will be avoided in open-space detention basin facilities.

3.1.3 California Storm Water Regulations

There are additional water quality regulations discussed in the following paragraphs, that may need to be considered.

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 pollution from industrial and municipal wastewater.

In 1973, EPA issued its 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. *High growth or growth potential – 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 MS4's 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. *Significant contributor of pollutants to waters of the U.S. – 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 classified as a Small MS4 regulated entity under the Phase II NDPES Program, but due to population density, growth in population and the fact that discharge is to the San Joaquin River, a designated sensitive water body, it is expected that the City will become regulated in the near future. A regulated Small MS4 is required to complete a Storm Water Management Program (SWMP), obtain the Small MS4 General Permit, and implement storm water pollution prevention plans (SWPPP) to reduce or eliminate pollutants from entering adjacent receiving waters via City discharges. The

SWMP must be made available for public review and provided to the RWQCB for their approval. The SWMP shall describe best management practices (BMPs), pollutant discharge related goals, and schedules of implementation of the plan. Once the City became a Small MS4, additional regulations may affect the Storm Drainage Master Plan.

3.2 Storm Drainage Analysis Criteria

With consideration given to the above standards and standards of other communities, the following storm drainage analysis criteria, set forth in Table 3.1, have been selected for guidance and development of this plan.

TABLE 3.1
Hydrologic Design Criteria for Storm Drainage System Analysis

Rainfall-Intensity–Duration	The data set forth in "Department of Public Works Stanislaus County Standards and Specifications, 2007 Edition" was used for calculation of runoff volumes and flowrates.
Detention Basin Storage	Design calculations were computed using the USDA-NRCS, Technical Release 55 (TR-55) using SWMM. Detention basins would be dual-use. Basins would retain runoff from the 100-year, 24-hour hypothetical rainfall event. The minimum separation between the bottom of the basin and the water table would be 5 feet, unless otherwise approved by the City.
Detention Basin Control	Basin inlet and outlet works would be designed, and the basin configured, to control 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, detention basins would be emptied of a 10-year storm event within 48-hours.
Detention Basin Depth	Detention basins would not exceed a depth of 20 feet.
Retention Basins	Retention basins, also known as percolation basins, would not be allowed due to low permeability soils and shallow groundwater conditions that inhibit percolation.
Conveyance Facilities	All direct discharge conveyance facilities were designed to carry the peak discharge from a 24-hour storm with a 10-year return period without flooding. All conveyance systems downstream of a detention facility were designed to convey the peak discharge flows designed for contributing detention facilities. Minimum flow velocities during peak flows exceed 2 fps, and did not exceed 10 fps. Minimum pipe size was eighteen inches (18"), and the minimum cover was thirty six inches (36").

3.3 Runoff and Hydrology

The Storm Water Management Model (SWMM), version 5.0, was used to perform the hydrologic computer modeling of the subcatchments. This program was developed by the EPA's National Risk Management Research Laboratory - Water Supply and Water Resources Division for rainfall-runoff simulation model.

The rainfall frequency-depth-duration curves set forth in the Stanislaus County's Standards and Specifications (County Standards) have been adopted for use in this study. These curves were based on DWR data from the Modesto rainfall gaging station. To obtain intensities for City of Newman, the intensity on the chart must be corrected for the difference in the mean annual precipitation at Newman, and at the Modesto gaging station.

The model was supplied data, in 15-minute intervals that formed a cumulative hyetograph of simulated 24-hour rainfall events with return period of 10-years, 50-years, and 100-years, respectively. The data was generated by using an SCS Type I synthetic 24-hour rainfall distribution curve. The simulated rainfall events were utilized by the model to develop storm runoff hydrographs for sizing of storage and conveyance facilities, and computing the discharges into the receiving waters.

The model used the TR-55 methodology to analyze storm water runoff from the various subareas within the Project Area. This is the method adopted by Stanislaus County for areas larger than 400 acres. This method is preferred for use with large watershed areas for the following reasons:

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

2. The TR-55 method generates synthetic hydrographs of subcatchment runoff that then can be routed through conveyance and storage.

The runoff from each subcatchment was directed into the drainage system at the locations shown in Figure 6. The runoff hydrographs were then routed through the drainage system for hydraulic analysis of the system under various scenarios.

3.4 Drainage System and Hydraulics

Various drainage system scenarios were analyzed using the SWMM model. These scenarios consisted of the comparison of underground pipe and surface conveyance systems, and detention reservoirs relative to direct discharge at various locations along the drainage system. The use of improved concrete lined channels is the only option considered for storm water surface conveyance within the Project Area and east of the Project Area. A detailed summary of the SWMM model output for the selected facilities plan is presented in Appendix B.

The location and capacity of existing waterways, and the topography provide the opportunities and constraints for configuring the storm drainage collection and disposal scheme for the Project Area. In all scenarios, the alignment and configuration of the existing facilities were utilized in the analysis. These routes are proposed to convey most of the storm water runoff from the Project Area. The drainage facilities providing service to portions of the Project Area north of Hoyer Road, and following the alignment along the northern side of the existing municipal development, were designated as the Northside Drain herein. Those drainage facilities providing service to the Project Area south of Hoyer

Road, and following the alignment along the southern side of the existing municipal development, were designated the Southside Drain herein. Storm water runoff from the portions of the Project Area west of the City, currently serviced by the City's storm drainage system, were divided between the Northside Drain and the Southside Drain based on topography and existing drainage features at Hoyer Road. Consistent with the alignment of existing facilities, the Northside Drain and the Southside Drain were joined together east of the City and flows conveyed along a common open channel to the point of discharge to the Newman Wasteway. The northeast corner of the Project Area will continue to drain towards the WWTP, and will ultimately end in the San Joaquin River.

As requested, an analysis of the existing conveyance system within the City was performed. This was performed utilizing ground surface information obtained from available public data. Because there was no available data on pipe invert elevations, they were estimated keeping at least 3 feet of coverage and the minimum slope needed to maintain a flow velocity of about 2 fps (feet per second) at full flow.

In addition to the design standards discussed above, other guiding principles used in development of the various project alternatives include the following:

- Storm runoff may be detained to attenuate runoff flowrates such that they can be discharged to the CCID or United States Bureau of Reclamation (USBR) open channels without downstream impact. Detainment also provides water quality benefits.
- Points of discharge should be minimized in anticipation that water quality monitoring will likely be required in the future, and the cost of this monitoring is a linear function of the number of discharge points.
- The number of pump stations should be kept at a minimum to reduce capital and annual operation and maintenance costs.
- Detention basins should be multi-purpose, as determined by the City, and should have a minimum area of 5 acres, unless otherwise approved by the City.
- A green belt, consisting in a 19-foot wide landscape area that includes a 9-foot meandering concrete sidewalk/bike path should be running along the open channels.
- Open channels have concrete lining up to 1 foot above the depth of the flow and the remaining wall is landscaped.

The conveyance system configuration alternatives reviewed are described below and presented in Figure 7, which shows the location of the conveyance reaches selected for the Northside Drain and the Southside Drain. The locations shown are to be considered as generalized alignment, with the understanding that the specific alignments will be determined as part of the infrastructure planning for each subarea.

3.4.1 Northside Drain Project Options

The following describes the various storm water conveyance components along the Northside Drain system analyzed in the alternative analysis:

1. For conveyance reaches 12, 13, 14, 16, 18, 20, and 22, conveyance through concrete pipelines discharging directly into the main line or into detention basins was evaluated.

2. For conveyance reaches 15 and 17, conveyance through concrete pipelines was evaluated.

3. For conveyance reaches 19 and 21, the storm water main drain west of Highway 33, extending west adjacent to Jensen Road to just past the Hardin Road intersection, concrete lined open channel and concrete pipe conveyance alternatives were evaluated.

4. For conveyance reaches 23, 25, 27 and 29, the existing Sherman Parkway Storm Drainage Channel between Highway 33 and Hills Ferry Road was evaluated based on the design drawings, with grades adjusted to correlate with United States Geological Survey (USGS) mapped elevations. Estimated flows from the Sherman Ranch Development and Hearthstone Ranch Development were included in the analysis.

5. For conveyance reaches 24, 26 and 28, north of the Sherman Parkway Storm Drainage Channel, conveyance through concrete pipelines to the Channel or into detention basins were evaluated.

6. For conveyance reaches 30 and 130, between the east end of the Sherman Parkway Storm Drainage Channel and the confluence with reach 31, conveyance through a concrete lined open channel was evaluated.

The following describes the various storm sewer detention scenarios along the Northside Drain that were evaluated in the alternative analysis:

1. Detention in those subareas west of Highway 33, and direct discharge east of Highway 33.

2. Detention in all subareas.

3. Direct discharge from all subareas.

There are six combinations of the various conveyance and detention options that were evaluated for the Northside Drain.

3.4.2 Southside Drain Project Options

The following describes the various storm water conveyance components along the Southside Drain system evaluated in the alternative analysis:

1. For conveyance reaches 1, 2, 4, 4a, 5 and 7, conveyance through concrete pipelines discharging directly into the main drains or into detention basins were evaluated.

2. For conveyance reaches 3, 6 and 8, the portions of the storm water conveyance system adjacent to the existing Miller Ditch alignment between Harvey Road and Highway 33, both conveyance through concrete lined open channels and concrete pipelines were evaluated.

3. For conveyance reaches 9, 109, 10, 11 and 31, east of Highway 33 to the Newman Wasteway, a concrete lined open channel was evaluated.

The following describes the various storm sewer detention components along the Southside Drain that were evaluated in the alternative analysis:

1. Detention in those subareas west of Upper Road and direct discharge east of Upper Road.
2. Detention in all subareas.
3. Direct discharge from all subareas.

There are six combinations of the various conveyance and detention options that were evaluated for the Southside Drain.

3.4.3 Northeast Subarea Project Options

For conveyance reach 32, the collector system within the Subarea 10, a concrete pipeline was evaluated.

For conveyance reach 33, between the corner of Stuhr Road at Hills Ferry Road and the WWTP pump station, surface conveyance through the existing drainage ditch was used to model the proposed collection.

In the Subarea 10, both direct discharge and detained discharge were evaluated.

Then two drainage options were evaluated and sized appropriately to convey discharges.

3.5 Alternatives Analysis

Computer models were developed for each alternative based on a concept plan of the facilities, and used to estimate the size of the various project components. The costs for the various facilities proposed were then estimated to compare the project options. Additionally, the advantages and disadvantages to the City associated with each option were reviewed and a summary of those advantages and disadvantages was developed for comparison. Based on the comparison of costs and the benefit to the City associated with each project alternative, the Recommended Project, consisting of the preferred option for each project component, evolved.

Section 4
Proposed Expanded Drainage System Improvements

4.1 Advantages and Disadvantages

A summary of some of the advantages and disadvantages identified in this evaluation that are associated with surface conveyance of storm water discharges by open channels relative to pipeline conveyance for the projected future storm water expansions are presented below in Table 4.1

TABLE 4.1
A Comparison of the Surface Storm Water Conveyance Relative to Underground Conveyance

Advantages	Disadvantage
Underground Pipe	
• Traffic routes and other surface facilities can be constructed above underground pipes. • Generally pose less risk to public safety than more open surface conveyances, open channels. • Are readily designed to flow in direction opposite of the general ground surface relief. • When properly screened, they are less likely to collect large trash and other debris than open channels, including public dumping. • Do not need security fencing, and associated installation and maintenance costs, to secure against general public access. • Undergrounding keeps most of the storm water collection and conveyance inconspicuous, eliminating the need to address aesthetic issues. • The service life of properly constructed underground systems typically exceeds a 30-year planning window, can exceed 100 years.	• Costly to construct. • Generally harder to inspect, maintain, and repair than open channels. Obstructions and damage may go unobserved prior to rainfall events, leading to localized flooding.
Concrete Lined Open Channels	
• Generally, more economical than underground pipe to construct. • Generally easier to conduct routine inspections, maintenance and repairs. • Conspicuous, so problems that have developed in the system can be observed incidental to other activities during routine passage by facilities. • Aesthetic appeal of an artificial riparian "Green Belt" along the sides of the channels, if properly landscaped and maintained.	• Operation and Maintenance are generally slightly higher than for underground conveyance. • Potential for public safety issues developing through public access. • Conspicuous and visible to the public requiring a greater maintenance effort. • Large trash and other debris may be dumped, blown or collect in channels. • Can obstruct future development of various traffic and other facilities, or substantially increase cost of associated development.

A summary of some of the advantages and disadvantages identified in this evaluation that are associated with detention relative to direct discharge of storm drainage are presented below in Table 4.2.

TABLE 4.2
A Comparison of Storm Water Detention Basins Relative to Direct Discharge

Advantages	Disadvantages
Direct Discharge	
• Cost savings in land acquisitions, construction, maintenance and repair of detention basins. • Pumping of storm water may be avoided if sufficient elevation difference exists. Flows can be maintained through gravity flow alone.	• Higher costs associated with construction of the larger/deeper conveyance systems. • No capability to mitigate degraded storm water quality occurring during the initial flush of runoff or during high runoff flows • High potential for adverse impacts to receiving waters. • Larger systems are more expensive to maintain and repair. • Large pumping facilities required to pump peak flows in areas where discharge by gravity is not feasible.
Detention Basins	
• Substantially reduces the size of the conveyance systems downstream of the detention storage thereby reducing associated conveyance costs. • Detention basins can provide dual use opportunities, such as parks and play grounds, when not detaining storm runoff. • Avoids exceeding downstream flow capacities. • Provides for operation at cleansing velocities a larger percentage of the flow time • Capability to mitigate degraded storm water quality prior to discharge to receiving waters.	• Additional costs associated with land acquisitions, construction, and maintenance and repair of detention basins

4.2 Cost Comparison of Alternatives

Table 4.3 presents a summary of the estimated capital cost for comparison of the various alternatives evaluated. Itemized cost estimates were prepared for the 14 project alternatives and are presented in Appendix C.

These preliminary estimated costs are based on engineering opinion, and presented only for comparison of the alternatives. The difference in the present value of the annual operations and maintenance cost are small relative to the capital costs; therefore, the capital costs with the appropriate contingency can be considered representative of the present life cycle cost of each project alternative. Cost estimates for the construction of detention basins considered in this plan do include neither transportation cost for removal of excavated materials substantially beyond the immediate area of the excavation site, nor any landscape costs associated with dual-use detention basins. Landscape costs associated with green belts along the open channels are included. Land acquisition costs were estimated based on the assumption that 100 percent of the acquisition costs would be assigned to the storm drainage.

TABLE 4.3
Preliminary Estimated Costs for Various Conveyance and Discharge Alternatives

Alternatives		Route		
		Northside Drain	Southside Drain	Northeast Industrial
Underground Conveyance along the Main	Direct Discharge	$ 6,730,000	$ 11,290,000	
	Detention Basins	$ 8,990,000	$ 9,790,000	
	Detention West - Direct Discharge East	$ 7,740,000	$ 9,820,000	
Surface Conveyance along the Main	Direct Discharge	$ 7,190,000	$ 12,070,000	$1,710,000
	Detention Basins	$ 9,280,000	$ 10,230,000	$1,980,000
	Detention West- Direct Discharge East	$ 7,940,000	$ 10,680,000	

The analysis of the different alternatives demonstrated that, when direct discharge is considered, the cost of the various project options is significantly sensitive to whether pipeline or concrete lined open channel is used for the main storm water conveyance inside the Project Area. The use of channels is more expensive because of the cost of the green belt and the cost of the land acquisition for the right-of way for the channels. Nevertheless, the use of surface conveyance has an aesthetic value, a very important consideration for the City.

Typically, when the detention alternative is a component, smaller conveyance facilities are required below the detention basins. These conveyance facilities are less expensive than conveyance facilities for the direct discharge option, but there is an extra cost due to land acquisition for the basins. Since this Plan proposes that the detention basins be dual-use facilities, the detained discharge alternatives have the extra value, which is not considered in the cost estimates, as additional parks and recreational areas are incorporated into the Project Area.

In the case of the Northside Drain, the existing Sherman Parkway Storm Drainage Channel provides sufficient capacity for direct discharge. When surface conveyance is considered, direct discharge and the alternative that combines direct discharge and detained discharge appear to be the most cost effective project options. However, direct discharge into the existing facilities from areas adjacent to the channel, and detention in the western service area is the preferred alternative because the use of detention basins has aesthetic and recreational benefits, provides a greater degree of protection against flooding downstream of the detention facilities, and favors water quality objectives.

Where existing facilities do not have capacity to convey direct discharge, use of detention becomes more favorable. This is the case along the Southside Drain, where the use of detention storage appears to be cost effective for all subareas if their use is not precluded by shallow groundwater or other subsurface conditions.

In the case of the northeastern industrial area, where the conveyance distances are relatively short, it is assumed that detention basin inflow must be pumped due to shallow groundwater beneath the site.

4.3 Recommended Project Plan

In general, the following criteria guided development and evaluation of the various project options:

- Project topography,
- Groundwater conditions,
- Existing storm water conveyance facilities,
- Life cycle costs,
- Detention basin benefits,
- Aesthetic value of green belt along open channels.

The following storm water drainage alternatives were selected for the subareas discussed below. Figure 8 shows the approximate location and size for each of the proposed conveyance systems in the Project Area. This storm water conveyance will have sufficient capacity to convey the expected peak flows. The final sizes are dependant upon final design grades.

4.3.1 Northside Drain

4.3.1.1 Western Service Area

Detention basins discharging into the main conveyance are recommended for Subareas 3, 4 and 5. The minimum storage capacity requirements to retain a 100-year, 24-hour event for Subareas 3, 4 and 5 are estimated to be approximately 40, 26, and 32 ac-ft, respectively. Dual-use detention facilities should occupy at least 5 acres of land, with 10 acres being more suitable. The facilities are not anticipated to be deeper than 6 to 8 feet below the existing ground surface elevation, with an average depth of approximately 4 feet below ground surface across most of the basin area. Therefore, the estimated land devoted to dual-use facilities would be approximately 10 to 13 acres, 7 to 9 acres, and 8 to 11 acres in each Subarea, respectively.

Concrete pipelines within the subareas and an open channel along Jensen Road, from Hardin Road to Highway 33 is the recommended conveyance system for this area.

4.3.1.2 Eastern Service Area

It is likely that seasonal high groundwater levels will preclude the use of economic and aesthetically pleasing detention basins. Additionally, Sherman Parkway Storm Drain Channel appears to have sufficient capacity to accept direct discharge from this eastern service area. Therefore, direct discharge from this area is recommended for Subareas 1 and 2.

4.3.2 Southside Drain

4.3.2.1 Western Service Area

Detention basins discharging into a main concrete lined open channel, are recommended for Subareas 6 and 7. The minimum storage capacity requirements to retain a 100-year, 24-hour event for Subareas 6 and 7 are estimated to be approximately 29 and 35 ac-ft, respectively. The facilities are not anticipated to be deeper than 8 feet below the existing ground surface elevation, with an average depth of approximately 4 feet across most of the basin area. Therefore, the estimated land devoted to dual-use facilities would be approximately 7 to 10 acres and 9 to 12 acres in each subarea, respectively.

4.3.2.2 Eastern Service Area

It is likely that shallow seasonal high groundwater levels will preclude use of detention basins. Therefore, it is recommended that direct discharge to a concrete lined open channel be utilized east of Upper Road, Subareas 8, 9, and 11.

4.3.2.3 Discharge to Wasteway

For conveyance between the confluence of the existing storm drainage facilities, the Southside Drain facilities, and the Northside Drain facilities to the Newman Wasteway, a discharge open channel having a capacity of 390 cubic feet per second (cfs) is required.

At the outflow into the Newman Wasteway, an energy dissipation/discharge structure would need to be constructed. The structure would need to be designed for the anticipated peak discharge flows allowed by USBR, and in accordance with USBR requirements. If USBR will not allow a peak discharge into the Newman Wasteway of 390 cfs, then measures would need to be implemented either at the point of discharge, or upstream, to attenuate the flows to an acceptable level. This is a small portion of the 4,300 cfs design capacity of the Newman Wasteway, and it is anticipated that a license to discharge 390 cfs to the wasteway will be issued.

4.3.3 Northeast Industrial Service Area

The cost of the detention basin option is shown to be more expensive than the direct discharge option, even though the direct discharge option includes a new crossing of Hills Ferry Road, expansion of the earth channel along the perimeter of the wastewater facilities to the pump station at the slough, and a new 90 cfs pump station constructed parallel to the existing station. However, because of the industrial zoning of this area, the detention option is recommended due to the detention benefits to the receiving waters. It is anticipated that seasonal high groundwater levels will require detention storage be constructed with the basin invert near the existing ground surface grade, and that the 100-year peak discharge will be pumped into the basin. The required storage volume is approximately 27 ac-ft, which will occupy approximately 7 to 9 acres with an average basin depth of 4 feet.

4.3.4 Existing Facilities

While it is not anticipated that the existing detention basin located on Hills Ferry Road would provide much benefit for flood protection during storm events with a recurrence of less than 10 years, it could provide added protection against flooding at the grade transition near the end of Sherman Parkway Storm Drainage Channel for events with recurrence greater than 10 years. This basin would be filled when the water level is high in the channel, and the water would drain back to the channel once its peak flow decreases. Since these facilities already exist, there would be no significant cost to retain them. Therefore, it is recommended that these facilities and the existing connection to the Sherman Parkway Storm Drainage Channel be maintained. However, since the Sherman Parkway Storm Drainage Channel will now discharge directly through to the Newman Wasteway, the existing pump station would be unnecessary.

The water coming from the small detention basin located at the end of Industrial Way would be redirected so it discharges into the Miller Ditch. The Clary Ditch would not be used any more to convey storm water from the industrial park.

Section 5
Capital Cost of Program

The estimated costs for the recommended project improvements described above in Section 4 are presented in Tables 5.1 to 5.3. The capital improvements costs presented are preliminary budgetary estimates based on engineering opinion. The unit cost of materials is based on current market value as of August 2007. The total estimated project cost is approximately $20,580,000, and the average estimated cost per acre to construct the facilities is approximately $8,200.

The drainage system proposed in this Plan contains improvements to the main storm drainage system and do not include any collection facilities upstream to serve a particular development. The determination of additional collection facilities should be made at the time the master plans are developed for each subarea to provide the most appropriate drainage services integrated with the improvements and requirements set forth in this Plan. The costs associated with collector facilities within each development are the responsibility of the developer, and are not considered as part of the capital improvements costs presented herein.

Depending on the final project alignment, development schedules, and the conditions at the time of improvement, it is expected that the improvement recommended in this Plan will be refined or modified to meet specific site conditions. Refined analysis of the drainage facilities will be required at that time. This Master Plan should periodically be updated and refined to reflect these changes.

TABLE 5.1
Estimated Capital Cost For Recommended Storm Drainage Improvements
NORTHSIDE DRAIN

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	18" CIPP	991	L.F.	$50	$49,600		
		48" CCIP	3,045	L.F.	$140	$426,000		
		48" CULVERT	1	EACH	$16,700	$16,700		
		MANHOLES	11	EACH	$4,160	$45,800		
							$538,000	
	DETENTION BASIN	BASIN EARTHWORK	51,523	C.Y.	$3.0	$155,000		
		INLET STRUCTURE	1	EACH	$30,000	$30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$100,000	$100,000		
							$285,000	
4	PIPELINE	24" CIPP	4,199	L.F.	$61	$256,000		
		30" CIPP	1,918	L.F.	$85	$163,000		
		36" CIPP	676	L.F.	$105	$71,000		
		48" CIPP	2,652	L.F.	$140	$371,000		
		24" CULVERT	1	EACH	$13,500	$13,500		
		MANHOLES	23	EACH	$4,160	$95,700		
							$970,000	
	DETENTION BASIN	BASIN EARTHWORK	42,659	C.Y.	$3.0	$128,000		
		INLET STRUCTURE	1	EACH	$30,000	$30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$100,000	$100,000		
							$258,000	
3	PIPELINE	48" CIPP	1,360	L.F.	$140	$190,000		
		60" CIPP	997	L.F.	$180	$179,000		
		MANHOLES	7	EACH	$4,160	$29,100		
							$399,000	
	OPEN CHANNEL	EARTHWORK	4,168	C.Y.	$3.5	$14,600		
		LINING	24,104	SQ.FT	$3.0	$72,300		
		LANDSCAPE	2,878	SQ.FT	$2.3	$6,710		
		24" CULVERT	1	EACH	$53,500	$53,500		
							$147,000	
	GREEN BELT	LANDSCAPE	6,435	SQ.FT	$2.3	$15,000		
		CONCRETE SIDEWALK / BIKE PATH	3,861	SQ.FT	$3.5	$13,500		
							$28,500	
	DETENTION BASIN	BASIN EARTHWORK	64,415	C.Y.	$3.0	$193,000		
		INLET STRUCTURE	1	EACH	$30,000	$30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$100,000	$100,000		
							$323,000	

TABLE 5.1
Estimated Capital Cost For Recommended Storm Drainage Improvements
NORTHSIDE DRAIN (continued)

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
HY 33 AND RAILROAD		30" CROSSING	1	EACH	$175,000	$175,000		
							$175,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$105	$240,000		
		MANHOLES	6	EACH	$4,160	$25,000		
		36" CULVERT	2	EACH	$15,000	$30,000		
		INLET STRUCTURE	2	EACH	$20,000	$40,000		
							$335,000	
1	PIPELINE	48" CIPP	1,784	L.F.	$140	$250,000		
		MANHOLES	4	EACH	$4,160	$16,700		
		48" CULVERT	1	EACH	$16,700	$16,700		
		INLET STRUCTURE	1	EACH	$20,000	$20,000		
							$303,000	
OFFSITE	OPEN CHANNEL	EARTHWORK	28,437	C.Y.	$3.50	$99,500		
		LANDSCAPE	46,720	SQ.FT	$2.33	$109,000		
		LINING	113,208	SQ.FT	$3.00	$340,000		
							$548,000	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$2.33	$122,000		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$3.50	$110,000		
							$231,000	
	ROAD CROSSING	72" CULVERTS	2	EACH	$120,000	$240,000		
							$240,000	
								$4,780,000
		Construction Contingency @ 30 %				$1,430,000		
		Subtotal					$6,220,000	
		Engineering, Legal and Admin. @ 15 %				$932,000		
		Subtotal					$7,150,000	
		BASIN RIGHT-OF-WAY	32.7	ACRE	$20,000	$654,000		
		CANAL RIGHT-OF-WAY	7.0	ACRE	$20,000	$141,000		
		ESTIMATED TOTAL PROJECT COST						**$7,940,000**

TABLE 5.2
Estimated Capital Cost For Recommended Storm Drainage Improvements
SOUTHSIDE DRAIN

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
6	PIPELINE	18" CIPP (UPPER ROAD)	1,455	L.F.	$338	$491,000		
		30" CIPP	1,397	L.F.	$85	$119,000		
		36" CCIP	1,370	L.F.	$105	$144,000		
		MANHOLES	12	EACH	$4,160	$50,000		
							$804,000	
	DETENTION BASINS	BASIN EARTHWORK	47,157	C.Y.	$3.0	$141,000		
		INLET STRUCTURES	2	EACH	$30,000	$60,000		
		DISCHARGE STRUCTURES WITH PUMPS	2	EACH	$100,000	$200,000		
							$401,000	
7	PIPELINE	36" CIPP	2,552	L.F.	$105	$268,000		
		MANHOLES	6	EACH	$4,160	$25,000		
							$293,000	
	OPEN CHANNEL	EARTHWORK	1,798	C.Y.	$3.5	$6,290		
		LINING	25,686	SQ.FT	$3.0	$77,100		
		LANDSCAPE	9,237	SQ.FT	$2.3	$21,500		
		18" CULVERTS	1	EACH	$52,500	$52,500		
							$157,000	
	GREEN BELT	LANDSCAPE	38,745	SQ.FT	$2.3	$90,300		
		CONCRETE SIDEWALK / BIKE PATH	23,247	SQ.FT	$3.5	$81,400		
							$172,000	
	DETENTION BASINS	BASIN EARTHWORK	56,008	C.Y.	$3.0	$168,000		
		INLET STRUCTURES	2	EACH	$30,000	$60,000		
		DISCHARGE STRUCTURES WITH PUMPS	2	EACH	$100,000	$200,000		
							$428,000	
	PIPELINE	42" CIPP	1,291	L.F.	$130	$168,000		
		MANHOLES	3	EACH	$4,160	$12,500		
		INLET STRUCTURE	1	EACH	$20,000	$20,000		
							$200,000	
	OPEN CHANNEL	EARTHWORK	10,837	C.Y.	$3.5	$37,900		
		LINING	66,207	SQ.FT	$3.0	$199,000		
		LANDSCAPE	36,434	SQ.FT	$2.3	$84,900		
		60" CULVERTS	1	EACH	$118,000	$118,000		
							$440,000	

TABLE 5.2
Estimated Capital Cost For Recommended Storm Drainage Improvements
SOUTHSIDE DRAIN (continued)

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
7	GREEN BELT	LANDSCAPE	60,375	SQ.FT	$2.3	$141,000		
		CONCRETE SIDEWALK / BIKE PATH	36,225	SQ.FT	$3.5	$127,000		
							$267,000	
HY 33 AND RAILROAD		TWIN 48" CROSSING	1	EACH	$390,000	$390,000		
							$390,000	
	OPEN CHANNEL	EARTHWORK	52,900	C.Y.	$5.0	$264,000		
		LANDSCAPE	13,817	SQ.FT	$2.3	$32,200		
		LINING	299.988	SQ.FT	$3.0	$900,000		
							$1,200,000	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$2.3	$317,000		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$3.5	$286,000		
							$603,000	
	ROAD CROSSING	72" CULVERTS	1	EACH	$120,000	$120,000		
		TWIN 72" CULVERTS	1	EACH	$240,000	$240,000		
		THREE 72" CULVERTS	1	EACH	$360,000	$360,000		
							$720,000	
	DISCHARGE STRUCTURE		1	EACH	$500,000	$500,000		
							$500,000	
		Total Estimated Construction Cost						$6,570,000
		Construction Contingency @ 30 %				$1,970,000		
		Subtotal					$8,540,000	
		Engineering, Legal and Admin. @ 15 %				$1,280,000		
		Subtotal					$9,830,000	
		BASIN RIGHT-OF-WAY	21	ACRE	$20,000	$428,000		
		CANALS RIGHT-OF-WAY	21	ACRE	$20,000	$427,000		
		ESTIMATED TOTAL PROJECT COST						**$10,700,000**

TABLE 5.3
Estimated Capital Cost For Recommended Storm Drainage Improvements
NORTHEAST INDUSTRIAL

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
10	PIPELINE	66" CIPP	3,190	L.F.	$ 200	$ 638,000		
		MANHOLES	8	EACH	$ 4,160	$ 33,300		
		24" CULVERTS	1	EACH	$ 33,500	$ 33,500		
							$ 705,000	
	DETENTION BASIN	BASIN EARTHWORK	43,690	C.Y.	$ 5.0	$ 218,000		
		INLET STRUCTURE WITH PUMPS	1	EACH	$ 250,000	$ 250,000		
		DISCHARGE STRUCTURE	1	EACH	$ 30,000	$ 30,000		
							$ 498,000	
		Total estimated Construction Cost						$ 1,200,000
		Construction Contingency @ 30 %			$ 361,000			
		Subtotal					$ 1,560,000	
		Engineering, Legal and Admin. @ 15 %			$ 235,000			
		Subtotal					$ 1,800,000	
		BASIN RIGHT-OF-WAY	9	ACRES	$ 20,000	$ 180,000		
		ESTIMATED TOTAL PROJECT COST						$ 1,980,000

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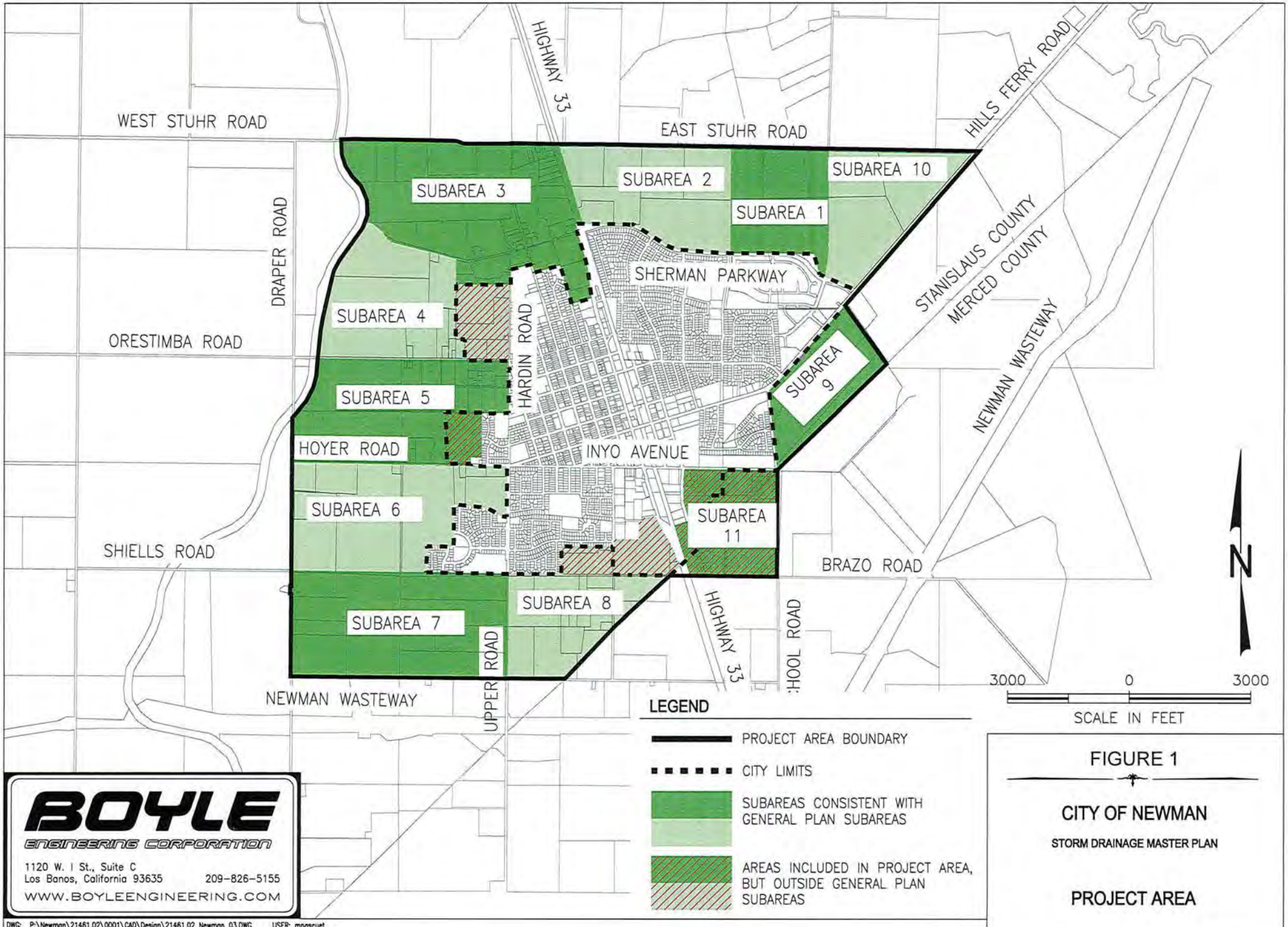
Figures



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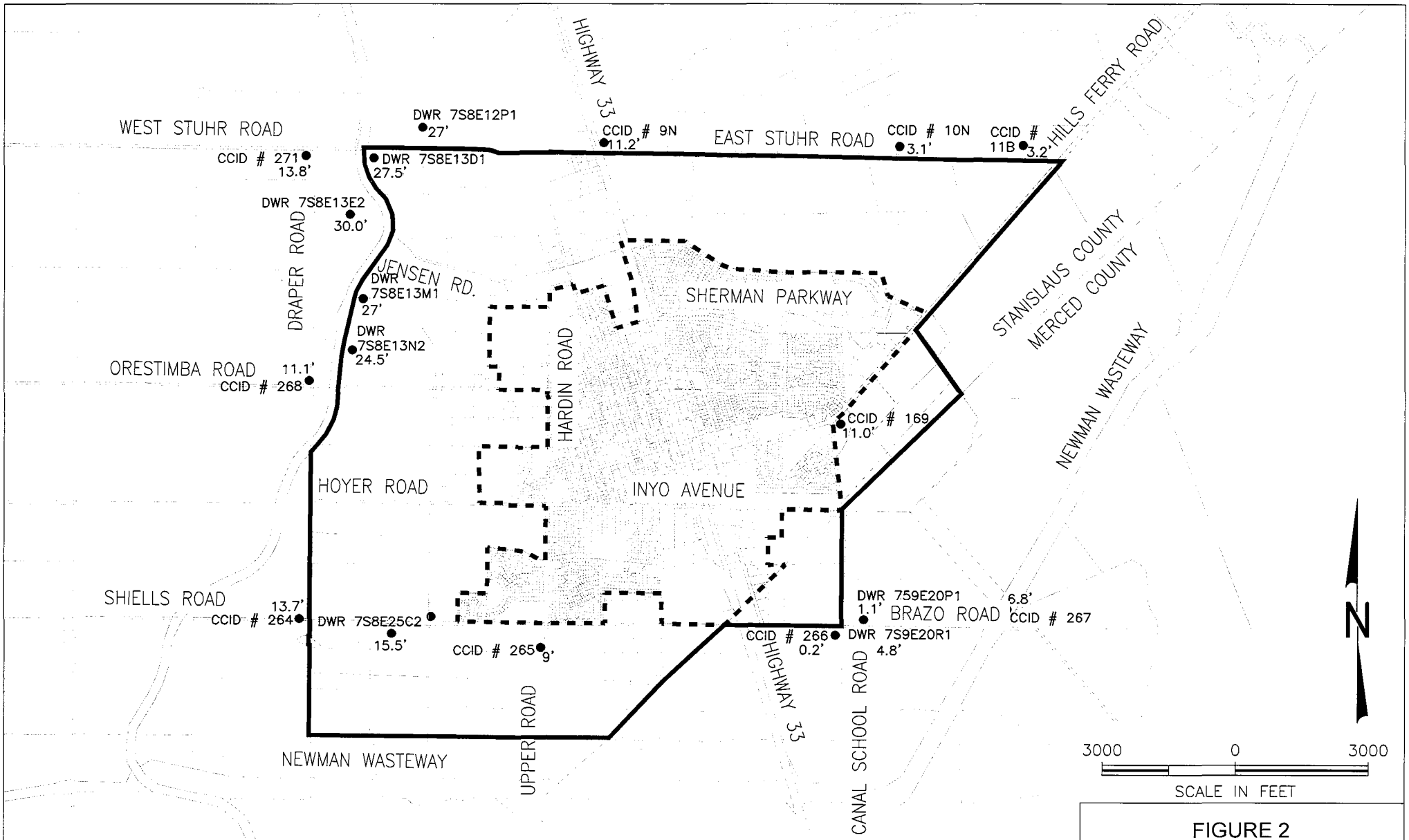
DATE: Nov 15, 2007 11:02am XREFS: IMAGES:

FIGURE 1

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

PROJECT AREA



LEGEND

PROJECT AREA BOUNDARY

CITY LIMITS

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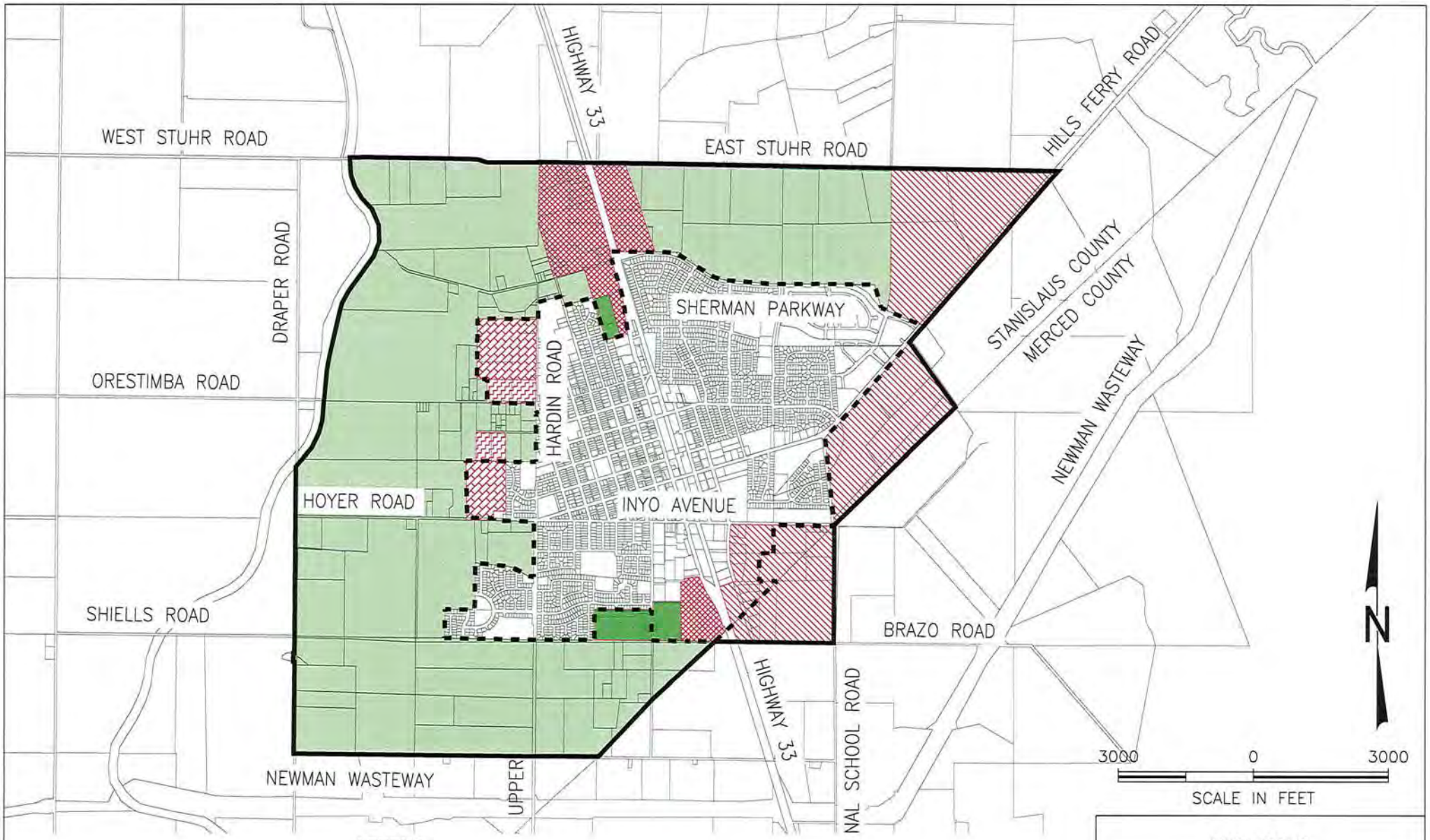
DATE: Nov 15, 2007 10:53am XREFS: IMAGES:

FIGURE 2

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

MINIMUM DEPTH TO GROUNDWATER



LEGEND

- PROJECT AREA BOUNDARY
- CITY LIMITS
- PUBLIC / QUASI PUBLIC
- COMMERCIAL
- INDUSTRIAL
- MEDIUM DENSITY RESIDENTIAL
- MIXED DENSITY RESIDENTIAL
- PARK, RECREATION AND OPEN SPACE

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FIGURE 3

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

LAND USE

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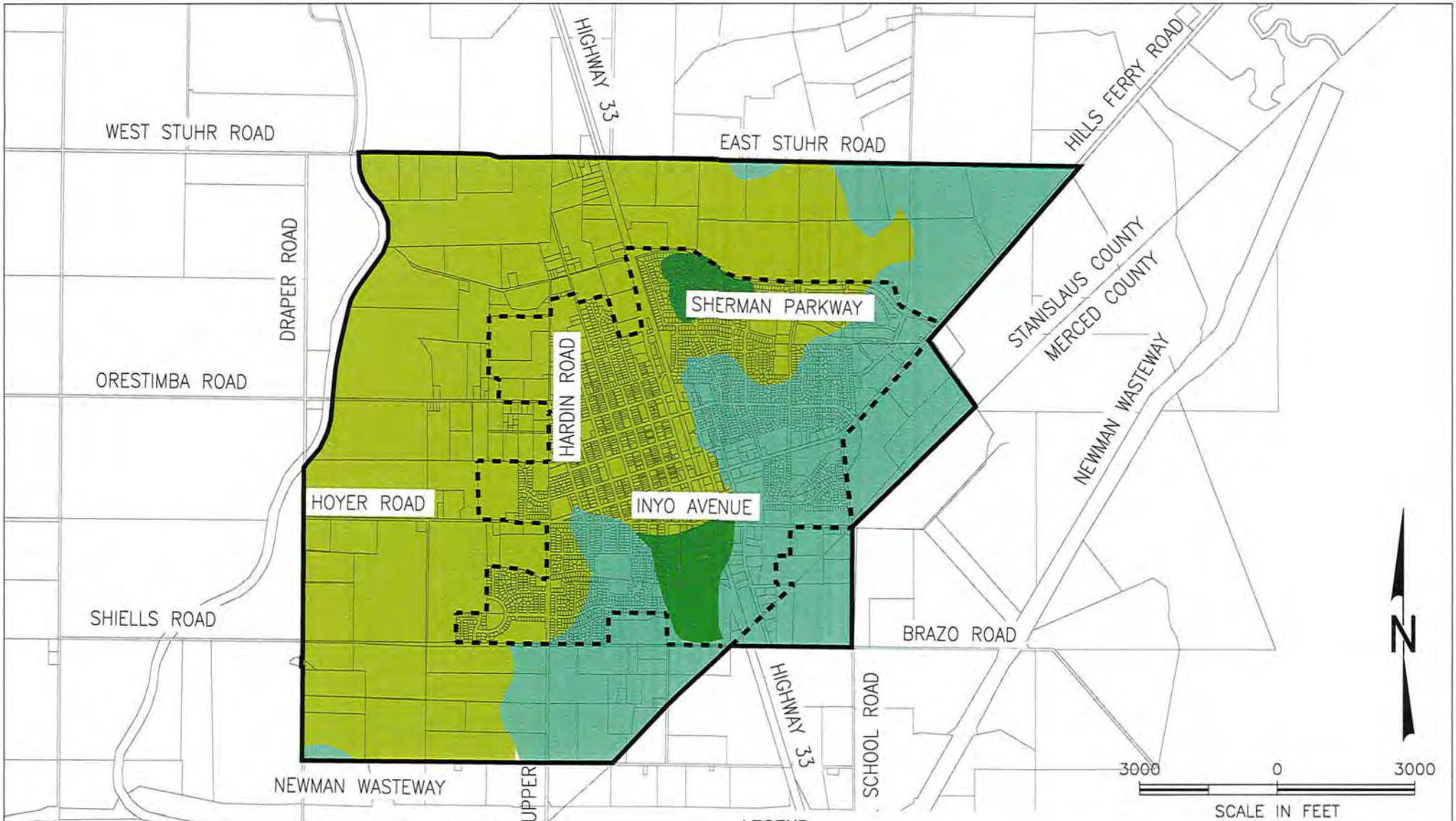
DATE: Nov 15, 2007 10:53am XREFS: IMAGES:



LEGEND

- PROJECT AREA BOUNDARY
- CITY LIMITS
- SOIL TYPE B
- SOIL TYPE C
- SOIL TYPE D

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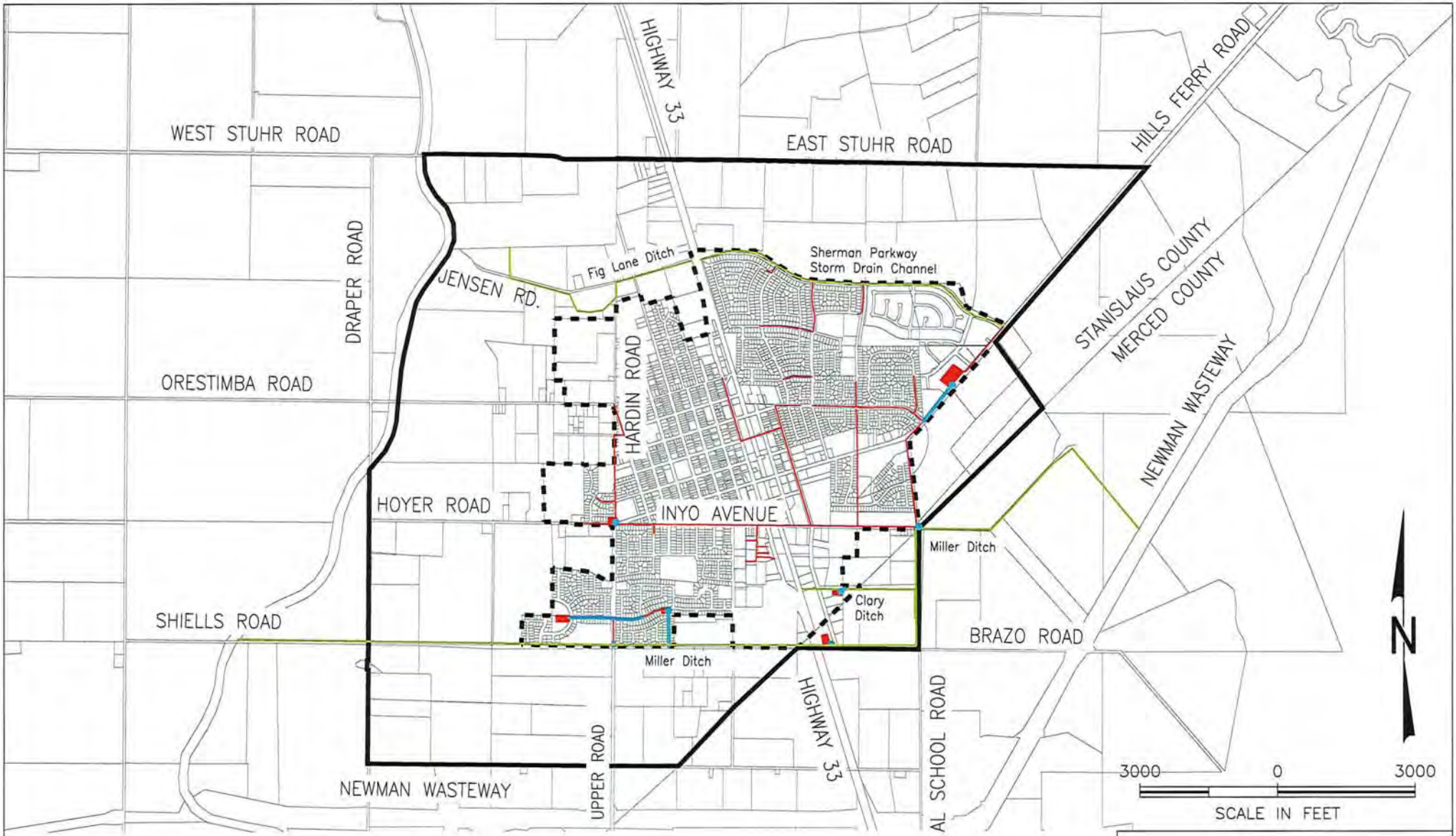
DATE: Nov 15, 2007 10:54am XREFS: IMAGES:

FIGURE 4

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

PROJECT AREA
HYDROLOGIC SOIL GROUPS



LEGEND

- PROJECT AREA BOUNDARY
- CITY LIMITS
- PIPELINES (24" or larger)
- DITCH OR CHANNEL
- DETENTION BASIN
- PUMP STATION
- PUMP DISCHARGE PIPELINE

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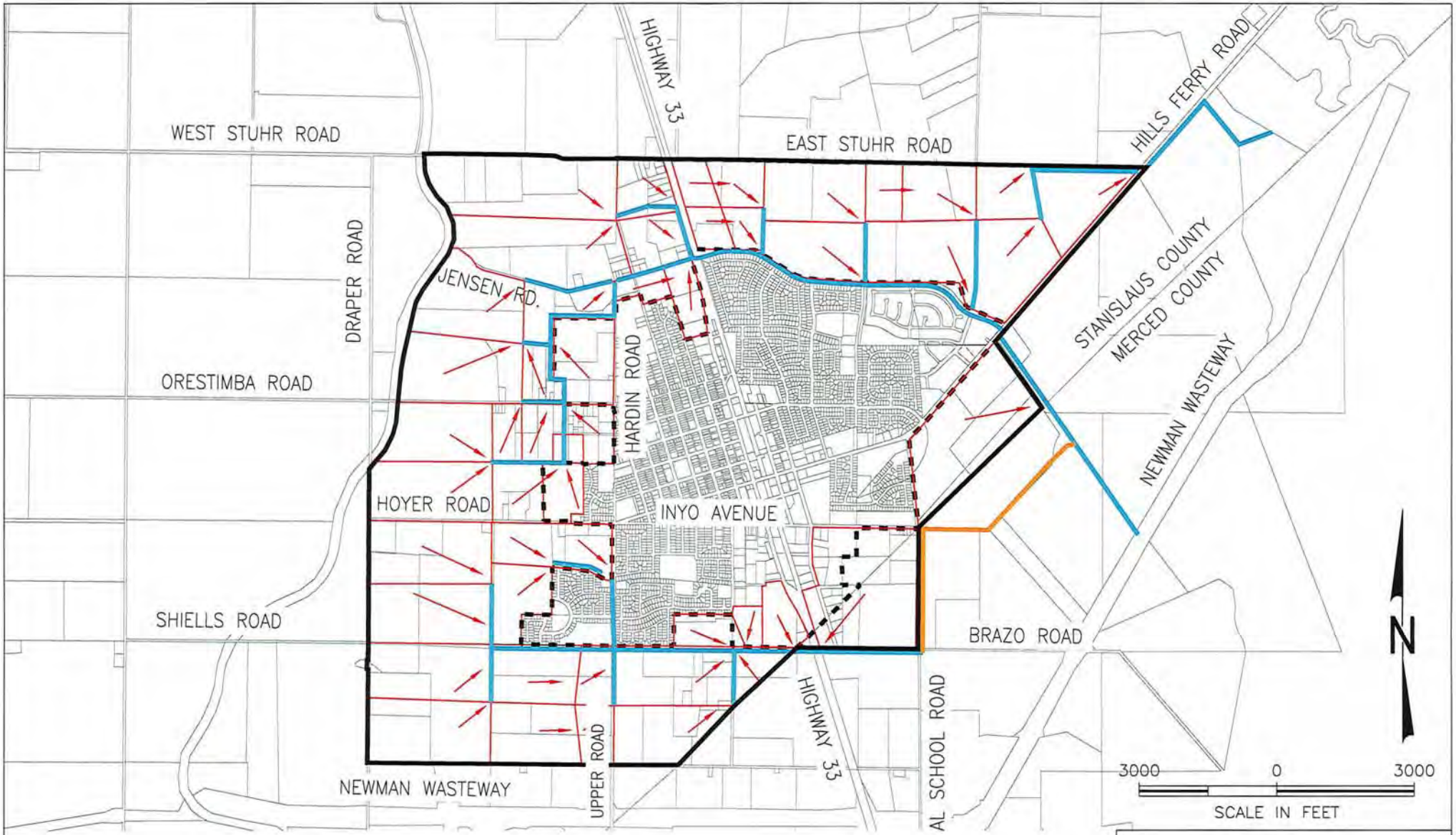
DATE: Dec 14, 2007 9:20am XREFS: IMAGES:

FIGURE 5

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

EXISTING DRAINAGE SYSTEM
MAIN COMPONENTS



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LEGEND

- PROJECT AREA BOUNDARY
- CITY LIMITS
- CONVEYANCE SYSTEM
- SUBCATCHMENT
- DRAINAGE DIRECTION

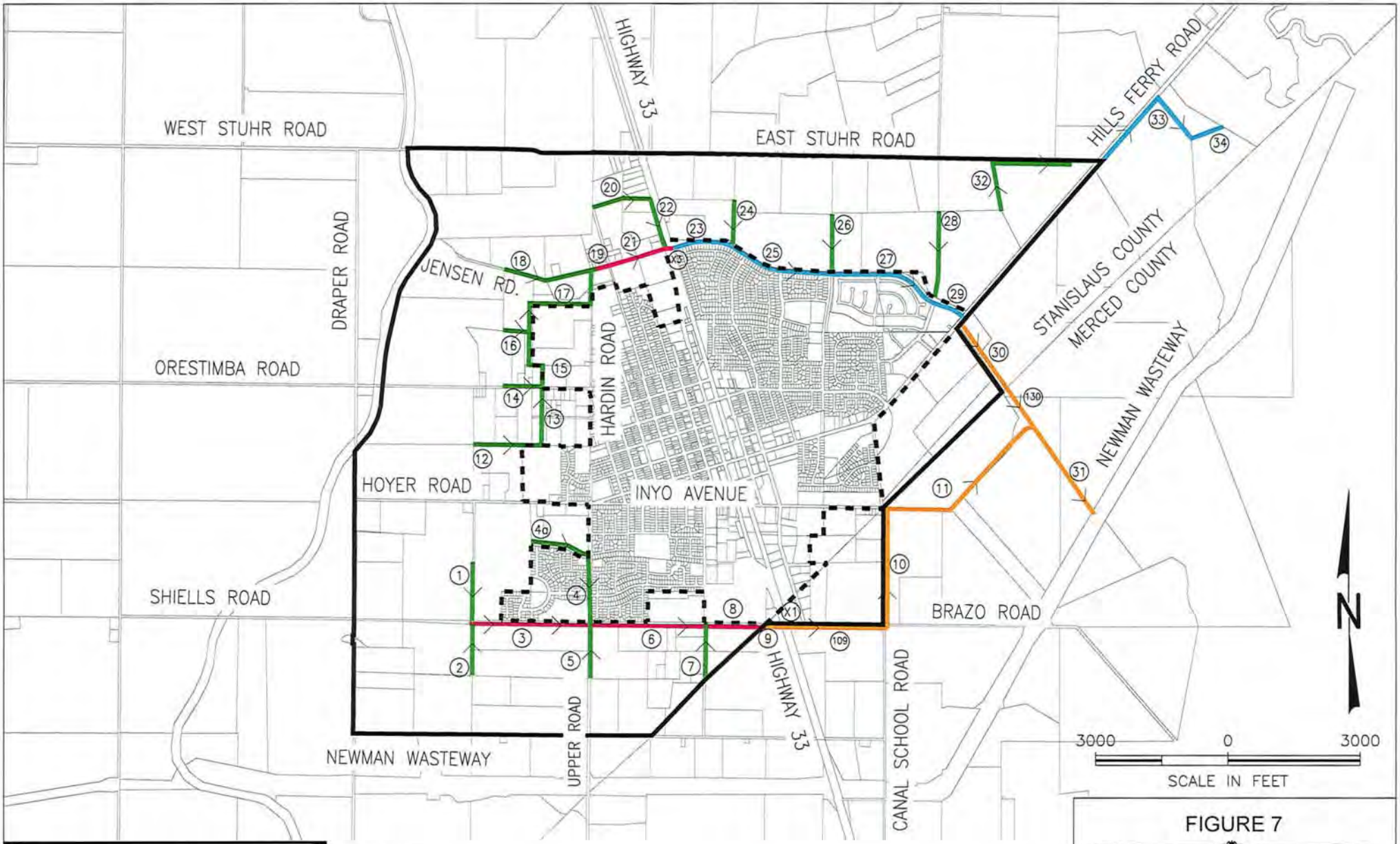
FIGURE 6

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

PROJECT AREA
DRAINAGE SUBCATCHMENTS

DWG: P:\Newman\21461.02\0001\CAD\Design\21461.02 Newman 03.DWG USER: mpascuet
DATE: Dec 13, 2007 8:57am XREFS: IMAGES:



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LEGEND

- PROJECT AREA BOUNDARY
- CITY LIMITS
- PROPOSED PIPELINE
- PROPOSED PIPELINE OR OPEN CHANNEL
- PROPOSED OPEN CHANNEL
- EXISTING OPEN CHANNEL

FIGURE 7

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

PIPE AND OPEN CHANNEL LAYOUT

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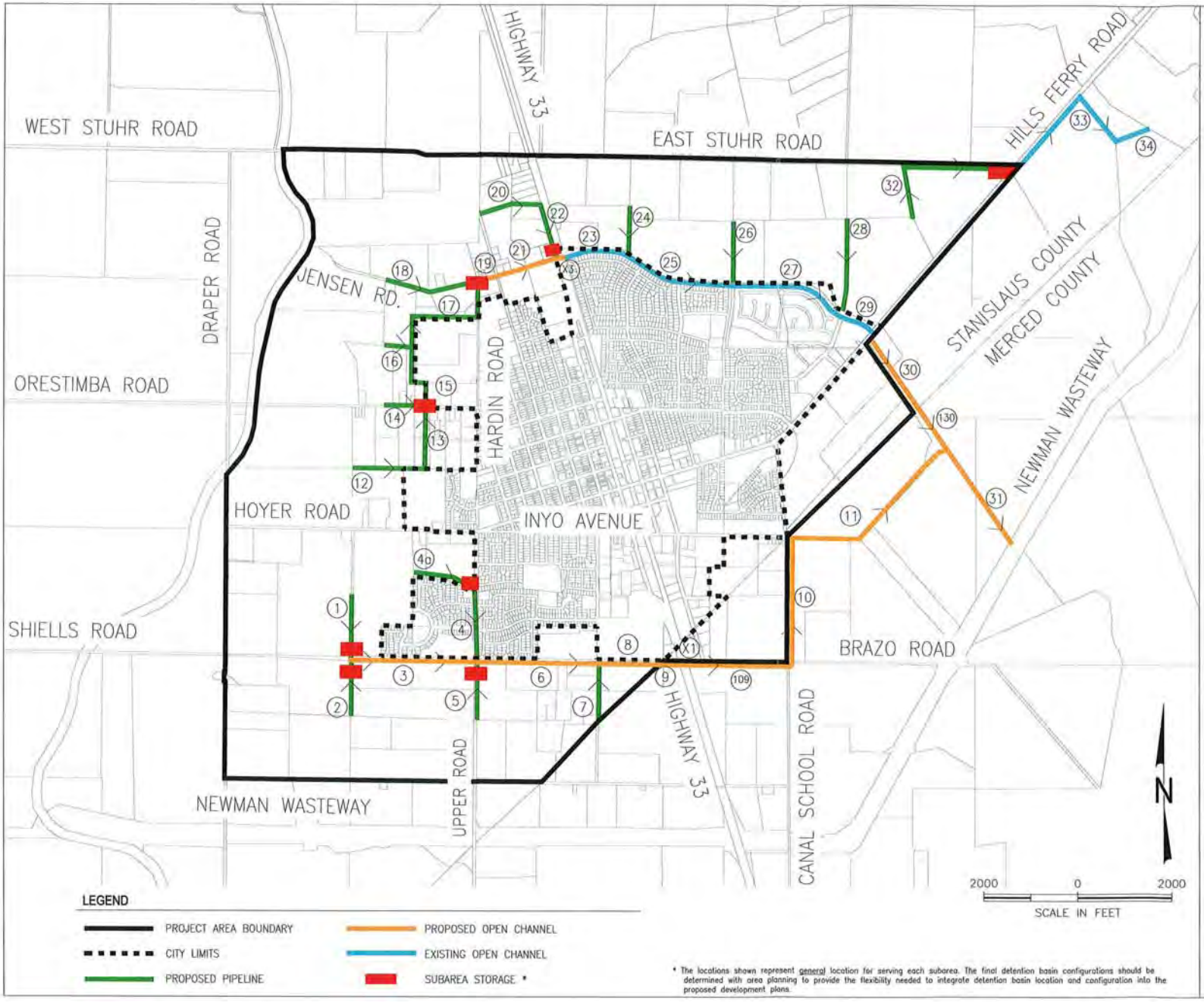

* The locations shown represent general location for serving each subarea. The final detention basin configurations should be determined with area planning to provide the flexibility needed to integrate detention basin location and configuration into the proposed development plans.

FIGURE 8

CITY OF NEWMAN

STORM DRAINAGE MASTER PLAN

PROJECT AREA
PROPOSED
CONVEYANCE PLAN

#	PIPE DIA. (IN)	LINED CHANNEL b x d (FT)	LENGTH (FT)	PEAK FLOW RATE (CFS)	PEAK VELOCITY (FT/SEC)
1	36"	-	1,370	26.2	4.5
2	36"	-	1,250	26.4	4.5
3	-	1' x 1'	1,035	3.6	2.8
4	18"	-	1,460	1.7	1.2
4A	30"	-	1,400	20.9	4.9
5	36"	-	1,300	25.2	4.8
6	-	1.5' x 1.5'	1,230	10.0	3.3
7	42"	-	1,291	29.5	3.2
8	-	3.5' x 3.5'	1,390	102.2	3.6
9	-	4' x 4'	250	111.8	3.0
X1	BOX CULVERT		300	113.0	5.5
109	-	4.5' x 4.5'	2,050	181.1	4.6
10	-	5' x 5'	2,600	154.7	2.7
11	-	5' x 5'	4,160	264.0	6.6
12	48"	-	1,630	48.0	4.2
13	48"	-	1,410	61.6	7.7
14	18"	-	990	6.6	6.0
15	24"	-	4,200	3.9	2.0
16	36"	-	680	36.2	7.1
17	48"	-	2,650	43.6	5.4
18	30"	-	1,920	24.6	6.8
19	-	1' x 2'	430	7.8	2.8
20	48"	-	1,360	82.0	6.5
21	-	1' x 2'	1,240	7.9	2.7
22	60"	-	1,000	98.0	6.4
X3	BOX CULVERT		280	14.2	4.3
23	-	EXISTING	-	-	-
24	36"	-	1,010	11.7	3.1
25	-	EXISTING	-	-	-
26	36"	-	1,280	18.1	4.2
27	-	EXISTING	-	-	-
28	48"	-	1,780	27.7	3.0
29	-	EXISTING	-	-	-
30	-	5' x 5'	2,330	137.9	3.8
130		6' x 5.25'	1,150	154.3	2.7
31	-	10' x 5.5'	1,900	387.3	5.7
32	66"	-	3,190	82.3	6.9
33	-	EXISTING	4,100	7.2	2.0
34	-	EXISTING	25	7.2	3.1

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Appendix A

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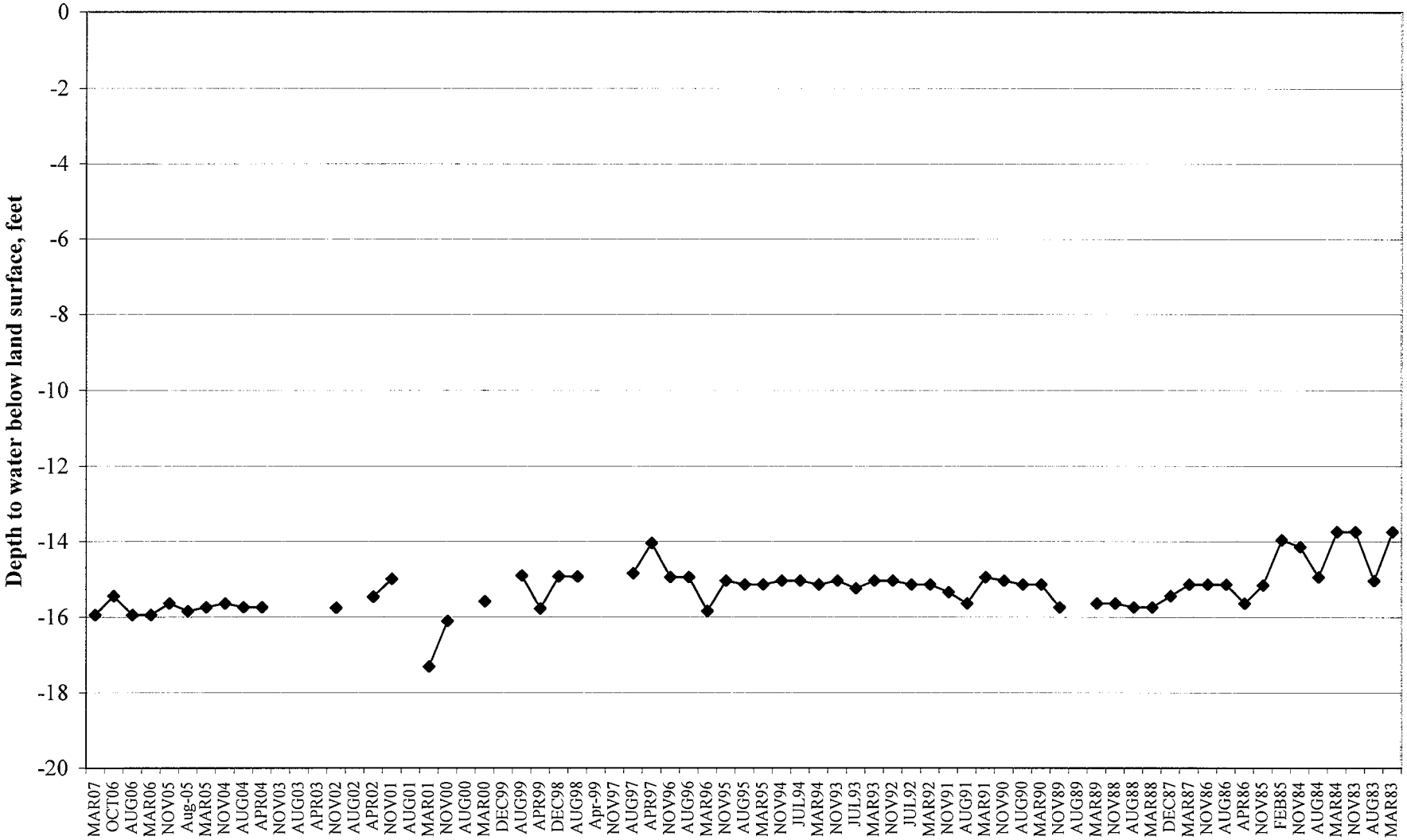

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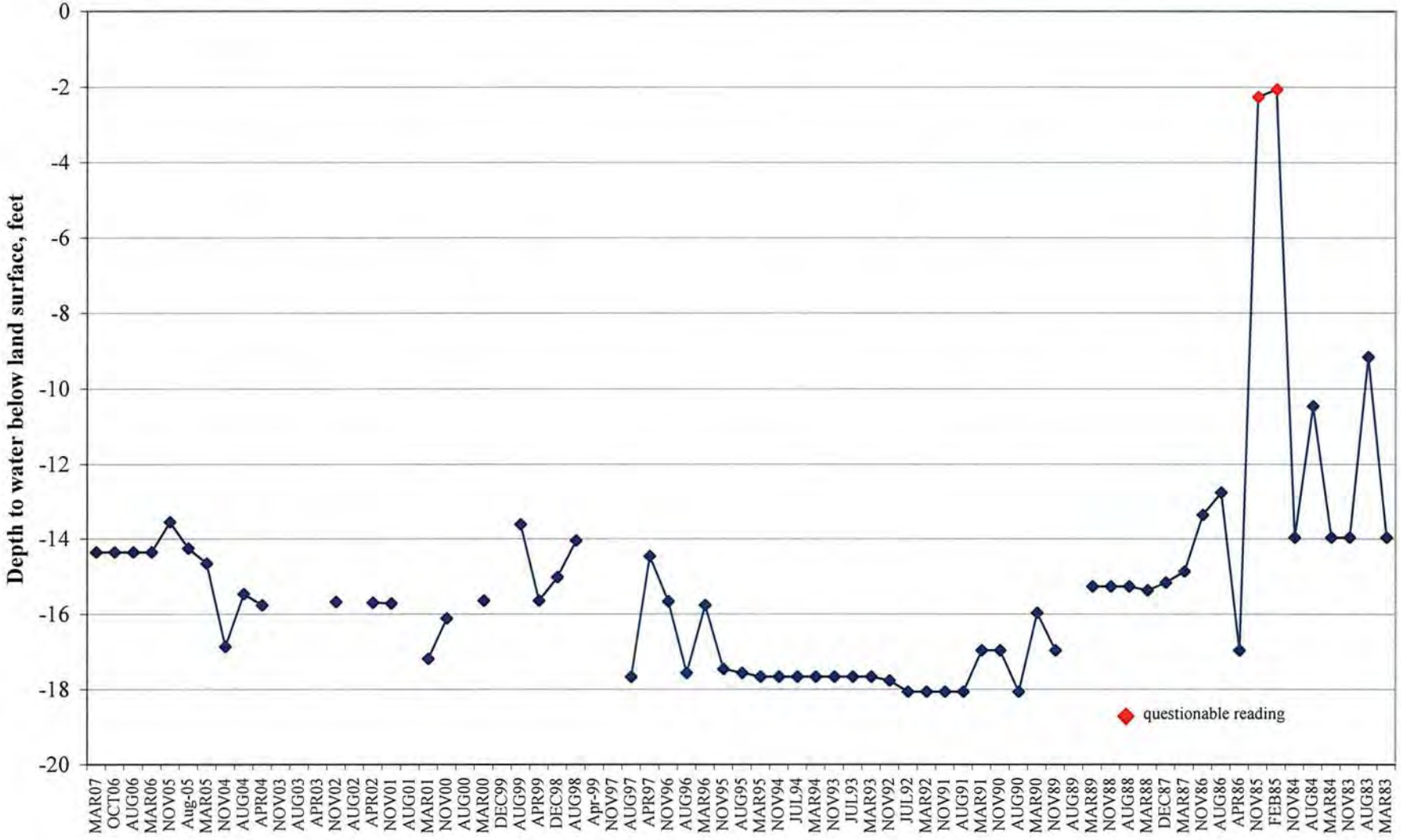

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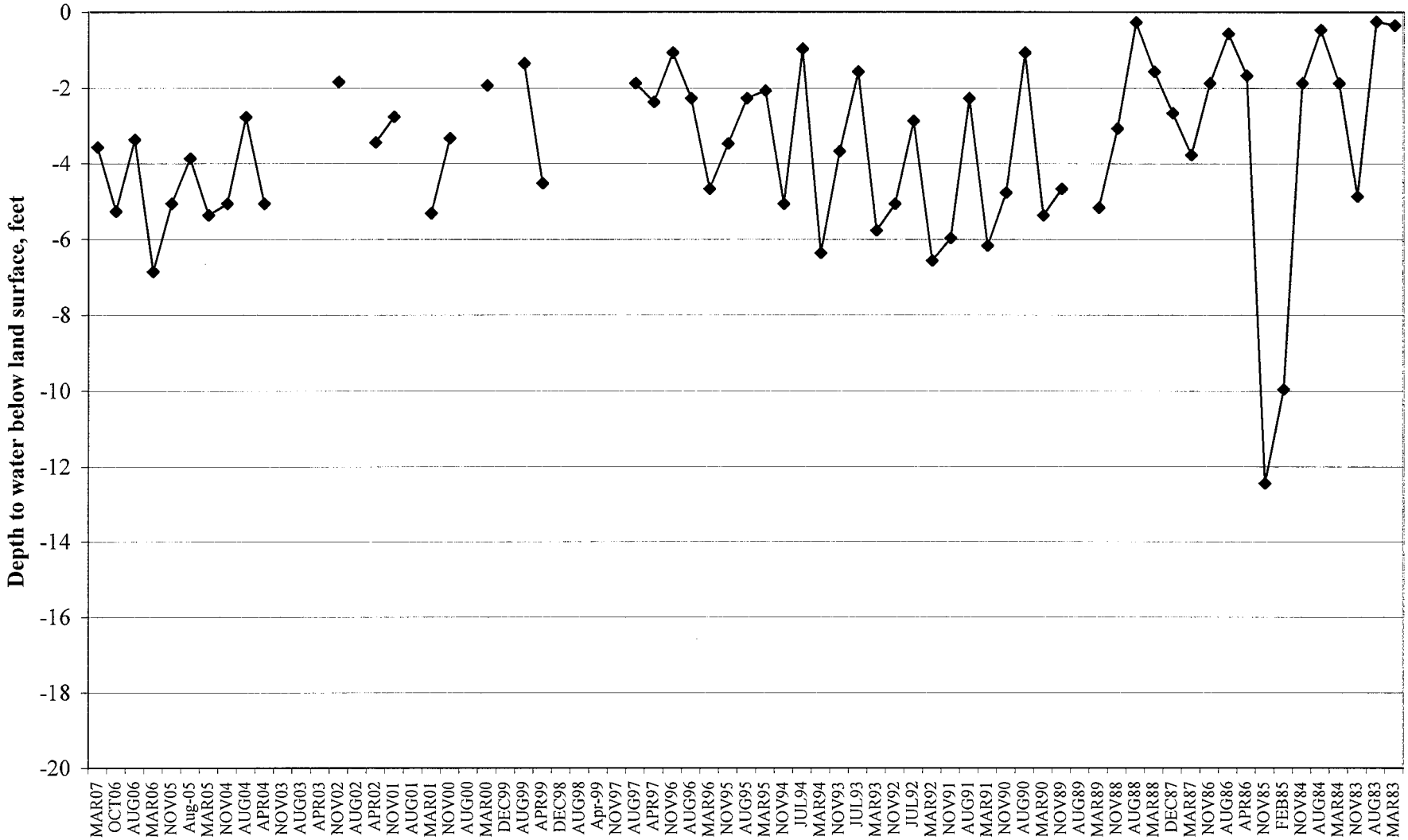

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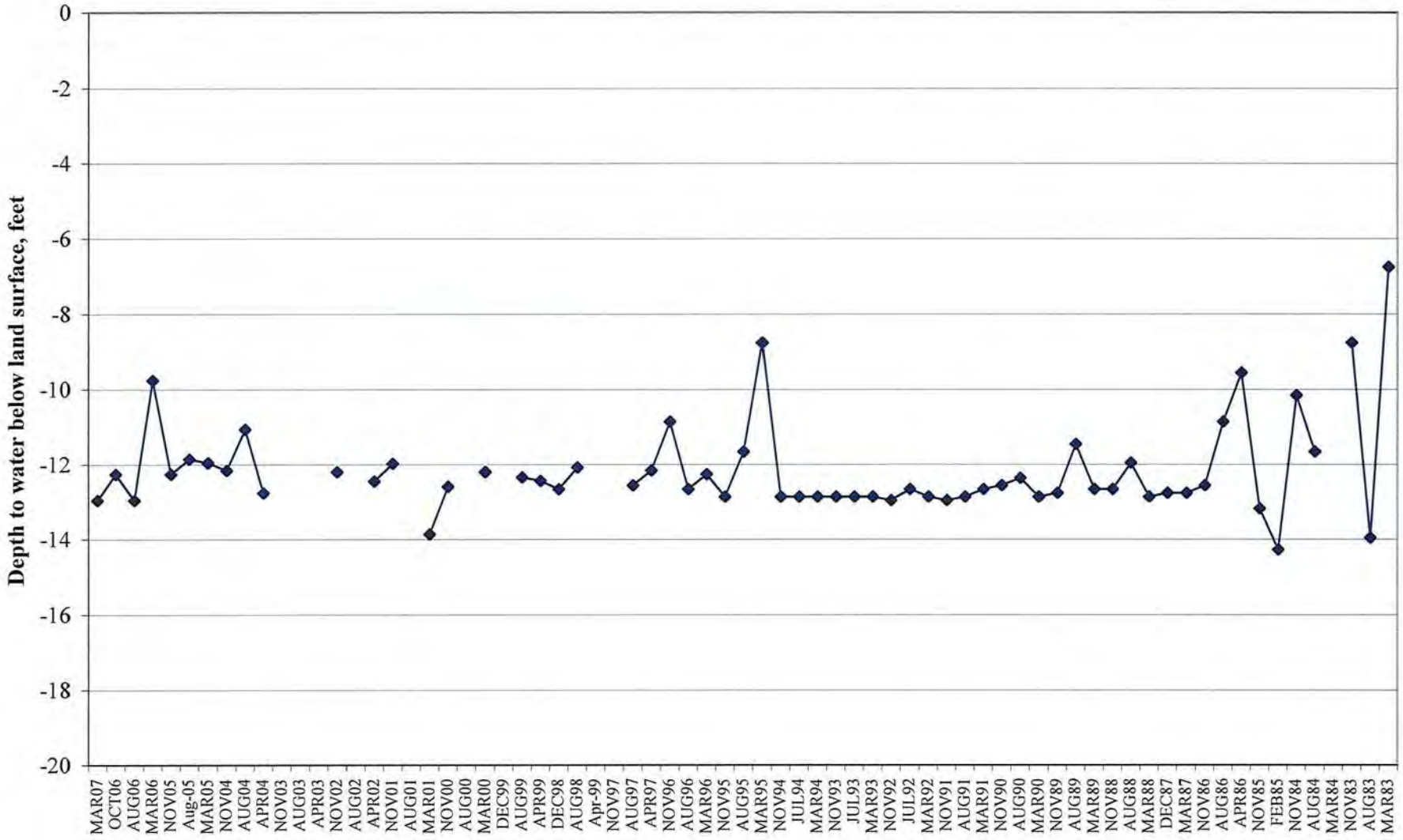

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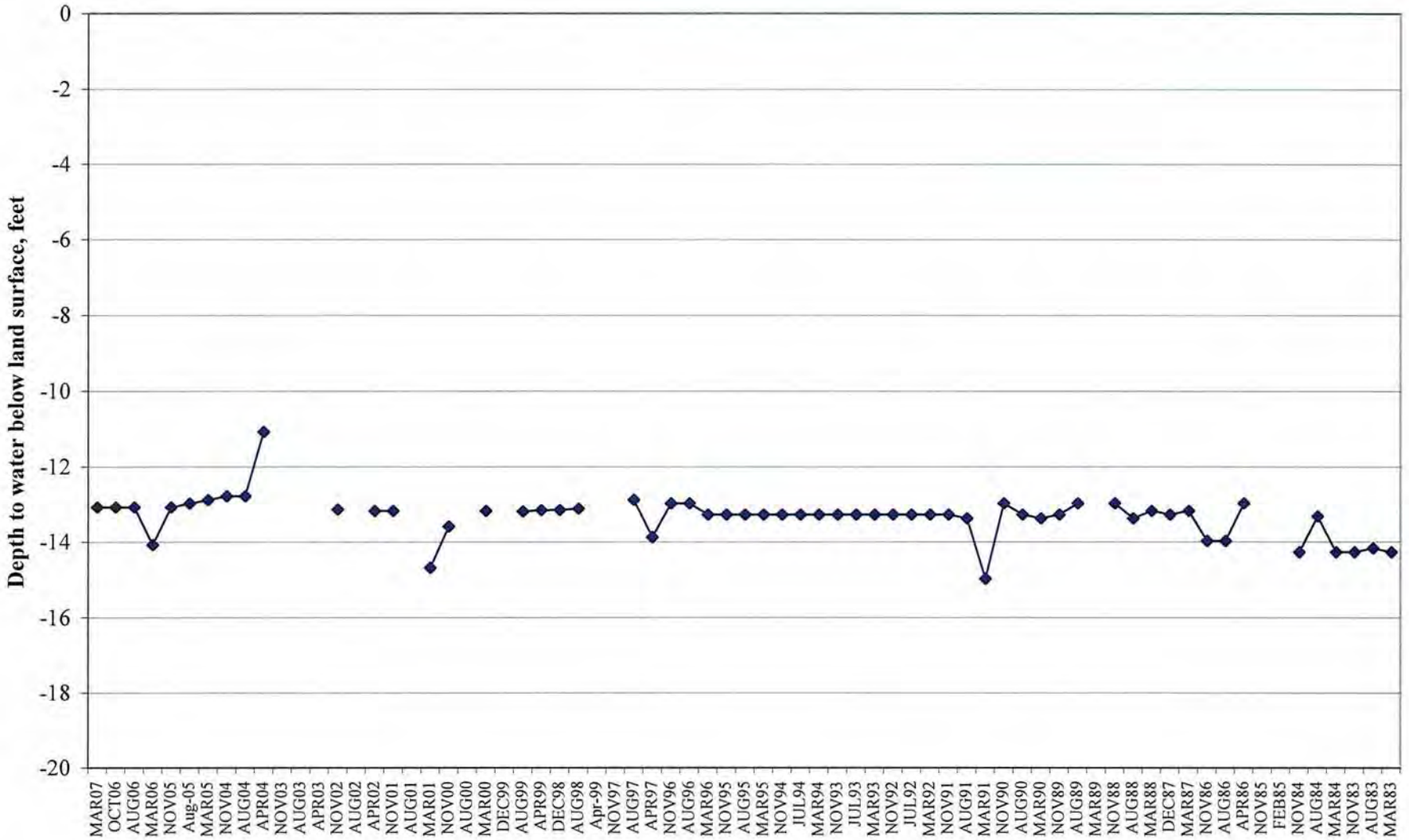

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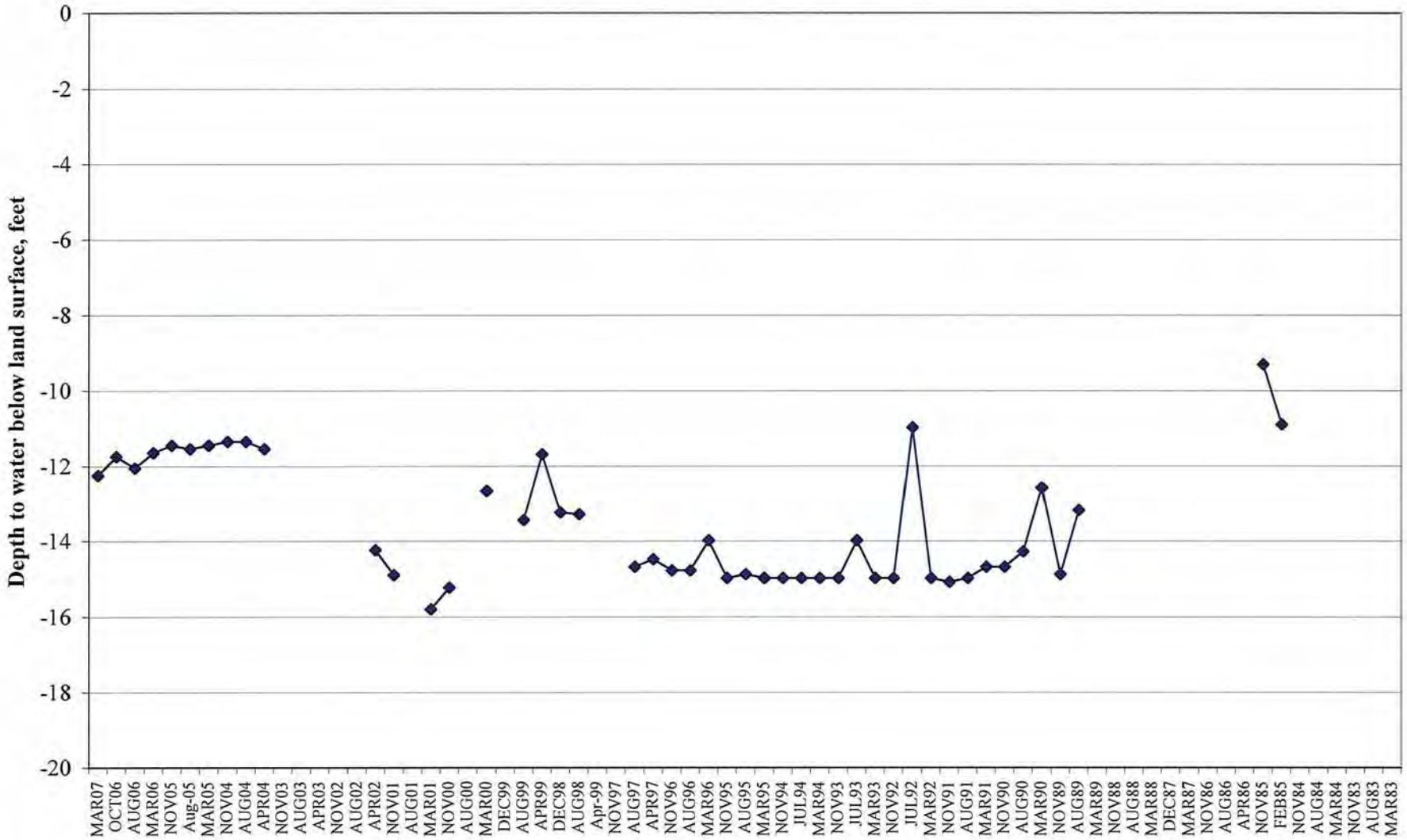

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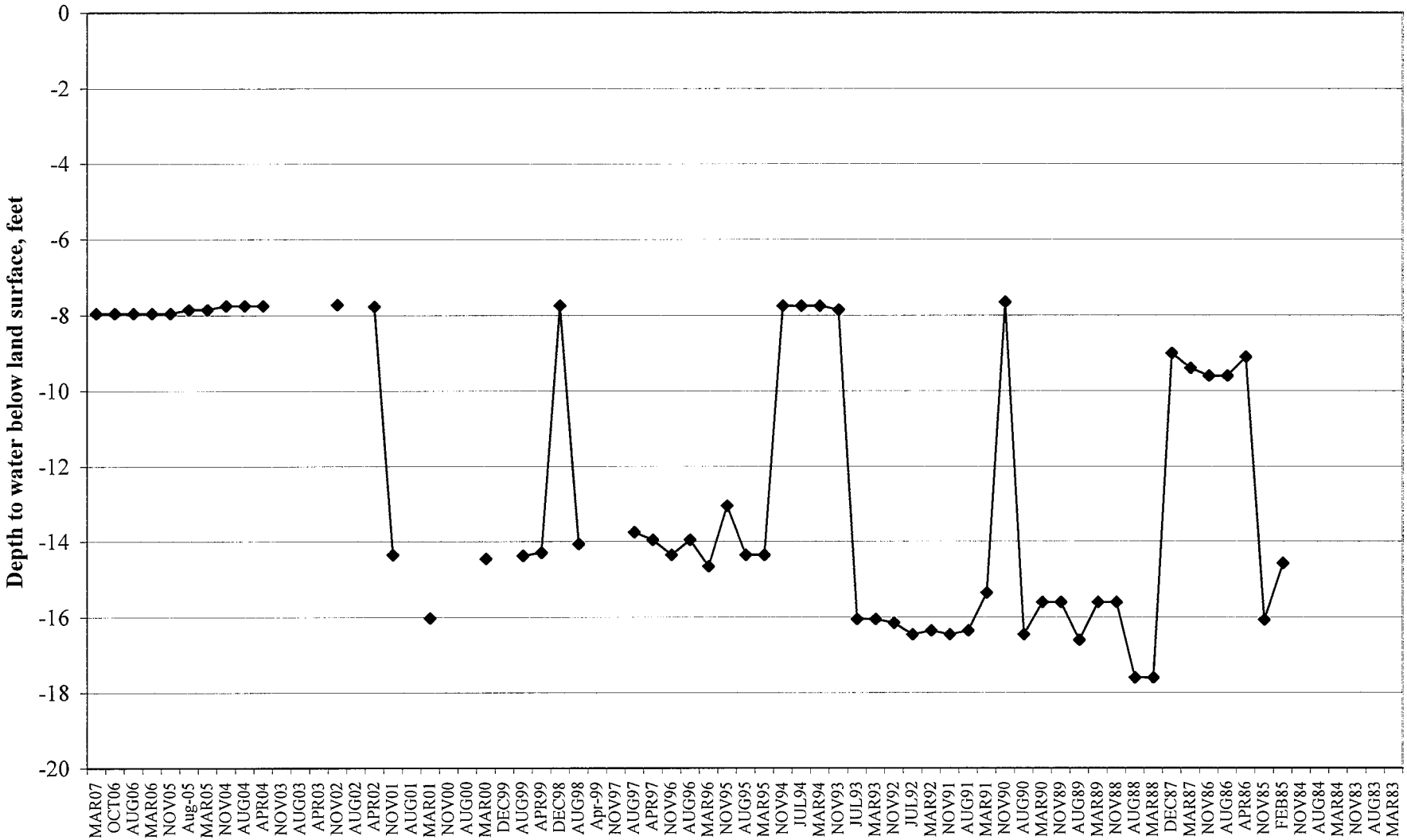

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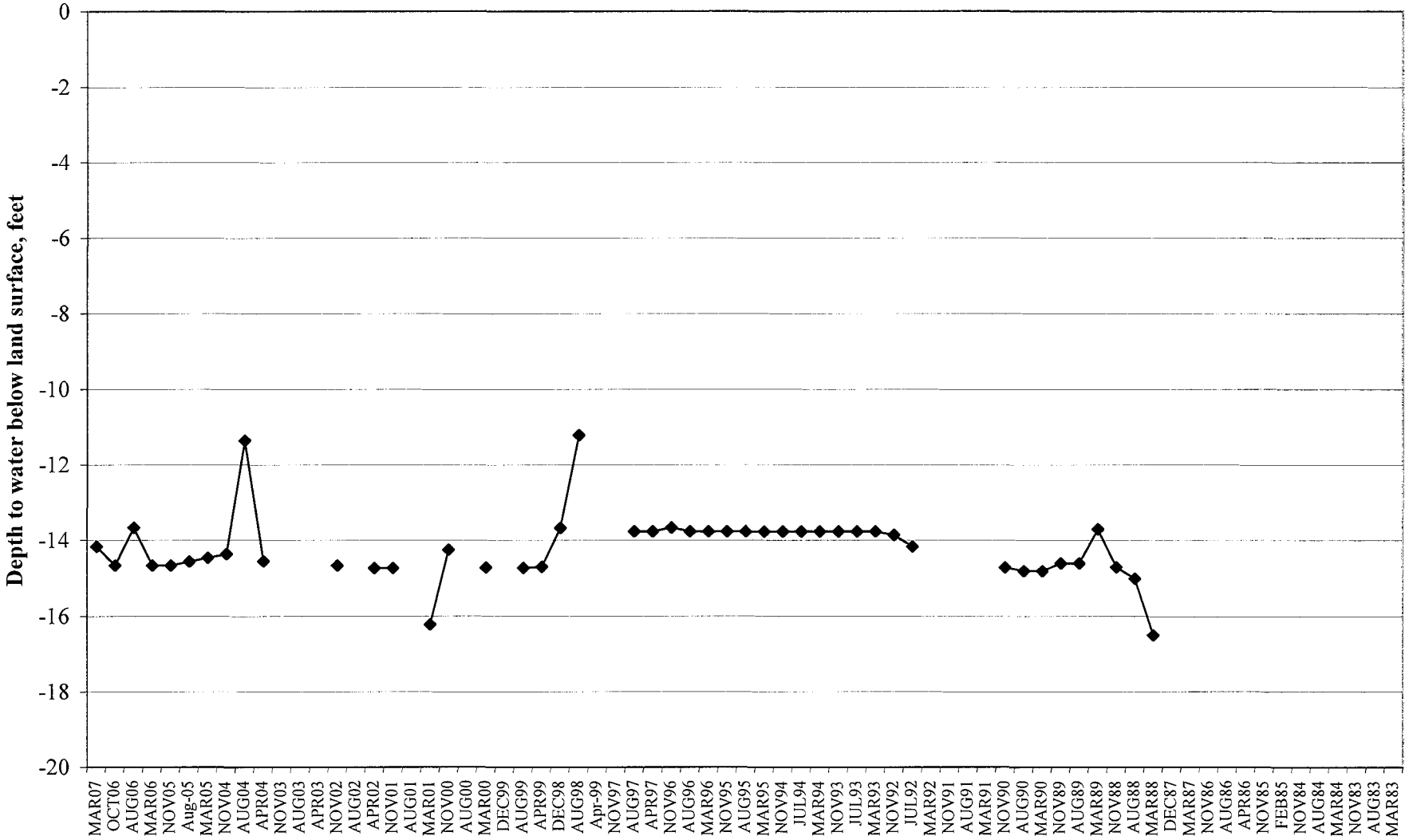
Depth to water below land surface, feet
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
MAR07
OCT06
AUG06
MAR06
NOV05
Aug-05
MAR05
NOV04
AUG04
APR04
NOV03
AUG03
APR03
NOV02
AUG02
APR02
NOV01
AUG01
MAR01
NOV00
AUG00
MAR00
DEC99
AUG99
APR99
DEC98
AUG98
Apr-99
NOV97
AUG97
APR97
NOV96
AUG96
MAR96
NOV95
AUG95
MAR95
NOV94
JUL94
MAR94
NOV93
JUL93
MAR93
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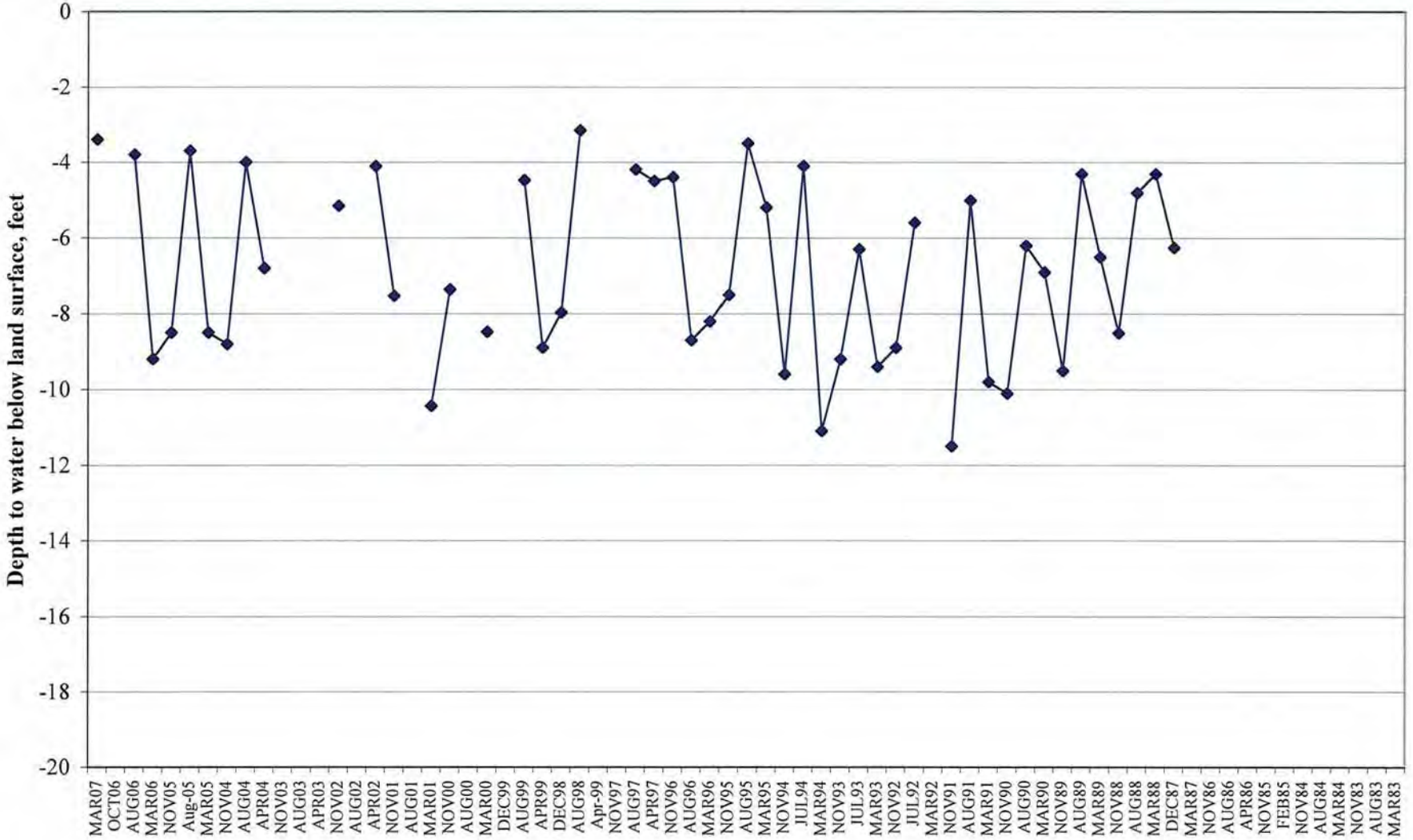
MAR83

CCID Well # 10N



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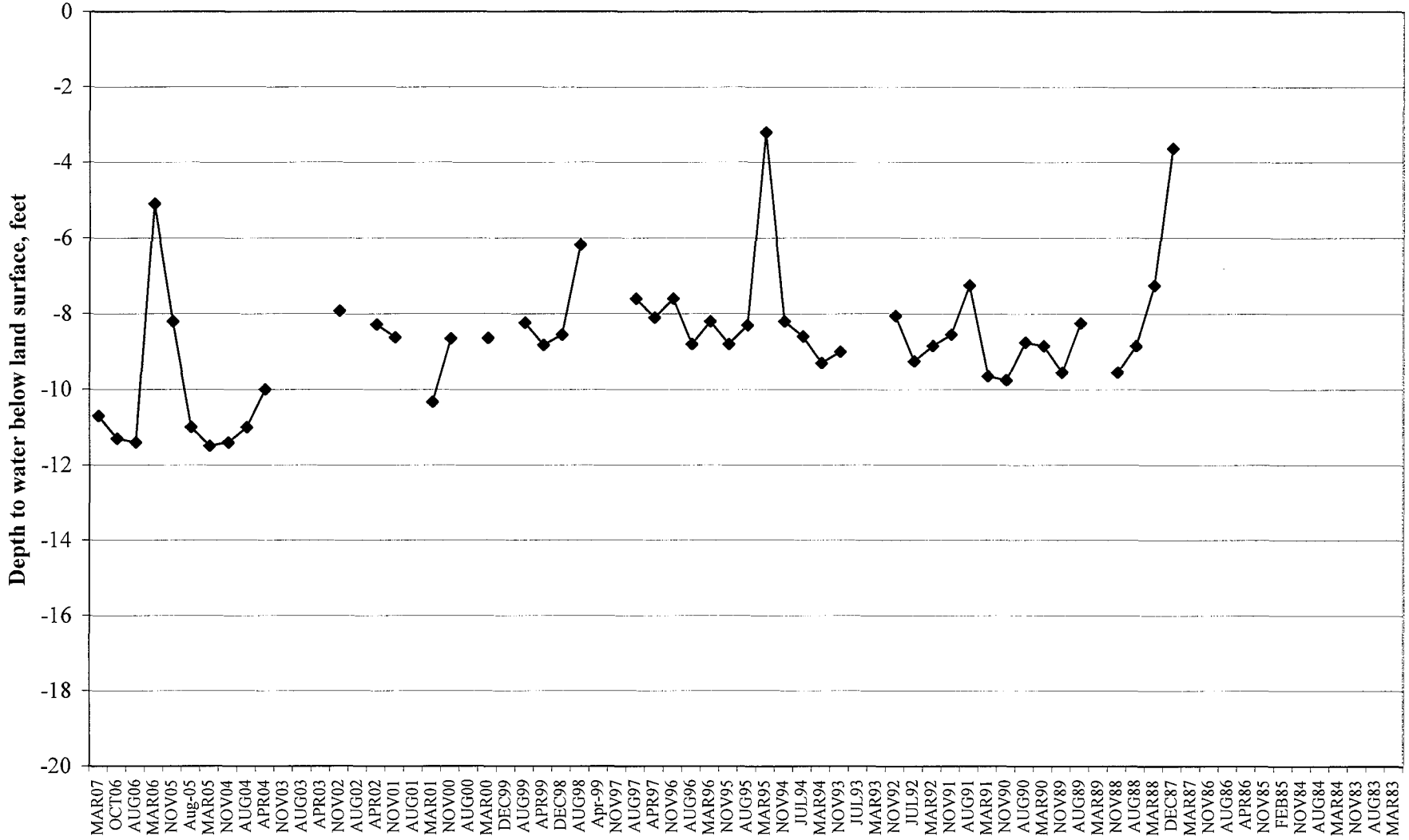

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WDL

Division of Planning and Local Assistance Department of Water Resources

901 P Street
Sacramento, CA 95814

Mailing Address:
Post Office Box 942836
Sacramento, CA 94236-0001

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
01-01-1960	105.0	103.0	49.0	56.0	47.0			5515
01-01-1965	105.0	103.0	50.4	54.6	48.4			5515
01-01-1970	105.0	103.0	43.0	62.0	41.0			5515
01-01-1980	105.0	103.0	47.0	58.0	45.0			5515
03-08-1982	105.0	103.0	40.0	65.0	38.0	8		5515
10-07-1982	105.0	103.0	37.5	67.5	35.5	8		5515
03-09-1983	105.0	103.0	29.0	76.0	27.0	8		5515
10-10-1983	105.0	103.0	32.0	73.0	30.0			5515
09-24-1984	105.0	103.0	33.0	72.0	31.0			5515
03-06-1985	105.0	103.0	32.0	73.0	30.0	8		5515
10-01-1985	105.0	103.0	40.0	65.0	38.0			5515
04-01-1986	105.0	103.0	36.0	69.0	34.0			5515
10-01-1986	105.0	103.0	36.0	69.0	34.0			5515

03-09-1987	105.0	103.0	35.0	70.0	33.0			5515
10-26-1987	105.0	103.0	40.0	65.0	38.0	8		5515
03-01-1988	105.0	103.0					1	5515
10-13-1988	105.0	103.0	40.0	65.0	38.0	8		5515
03-01-1989	105.0	103.0	43.0	62.0	41.0			5515
10-18-1989	105.0	103.0	44.0	61.0	42.0	8		5515
11-30-1990	105.0	103.0	8.1	96.9	6.1			5515
10-14-1991	105.0	103.0					7	5515
01-28-1992	105.0	103.0					7	5515
12-13-1993	105.0	103.0	48.0	57.0	46.0	8		5515
10-14-1994	105.0	103.0	66.0	39.0	64.0			5515
03-03-1995	105.0	103.0	40.0	65.0	38.0			5515
03-18-1996	105.0	103.0	42.0	63.0	40.0			5515
10-11-1996	105.0	103.0	49.0	56.0	47.0			5515
03-04-1997	105.0	103.0	40.0	65.0	38.0			5515
02-16-1998	105.0	103.0	32.5	72.5	30.5			5515
01-07-1999	105.0	103.0	34.8	70.2	32.8			5515
10-20-1999	105.0	103.0	40.9	64.1	38.9			5515
03-08-2001	105.0	103.0	39.8	65.2	37.8			5515
11-13-2001	105.0	103.0	47.5	57.5	45.5			5515
01-30-2002	105.0	103.0	44.9	60.1	42.9			5515
12-04-2002	105.0	103.0	48.3	56.7	46.3			5515
01-30-2003	105.0	103.0	44.9	60.1	42.9			5515
03-10-2003	105.0	103.0	47.3	57.7	45.3			5515

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	673491	4133631	metres	10
LL	NAD27	121.0417	37.3350	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

Phone: 559-230-3326
Fax: 559-230-3301

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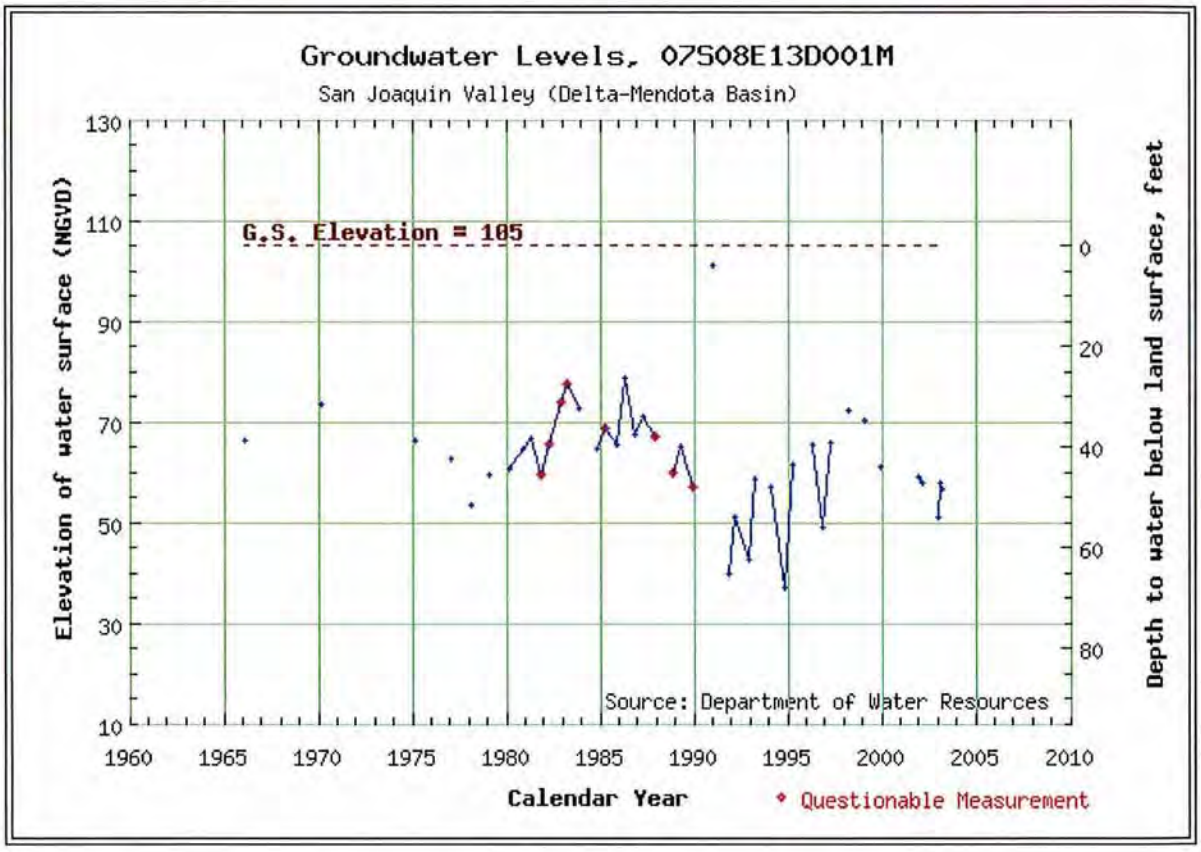

Division of Planning and Local Assistance Department of Water Resources

901 P Street
Sacramento, CA 95814

Mailing Address:
Post Office Box 942836
Sacramento, CA 94236-0001

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
01-01-1966	107.5	105.0	41.2	66.3	38.7			5515
01-01-1970	107.5	105.0	34.0	73.5	31.5			5515
01-01-1975	107.5	105.0	41.3	66.2	38.8			5515
01-01-1977	107.5	105.0	45.0	62.5	42.5			5515
01-01-1978	107.5	105.0	54.0	53.5	51.5			5515
01-01-1979	107.5	105.0	48.0	59.5	45.5			5515
01-01-1980	107.5	105.0	47.0	60.5	44.5			5515
10-29-1980	107.5	105.0	43.0	64.5	40.5			5515
03-12-1981	107.5	105.0	41.0	66.5	38.5			5515
10-15-1981	107.5	105.0	48.0	59.5	45.5	5		5515
03-08-1982	107.5	105.0	42.0	65.5	39.5	5		5515
10-07-1982	107.5	105.0	33.5	74.0	31.0	5		5515
03-09-1983	107.5	105.0	30.0	77.5	27.5	5		5515

10-10-1983	107.5	105.0	35.0	72.5	32.5			5515
09-24-1984	107.5	105.0	43.0	64.5	40.5			5515
03-06-1985	107.5	105.0	39.0	68.5	36.5	5		5515
10-01-1985	107.5	105.0	42.0	65.5	39.5			5515
04-01-1986	107.5	105.0	29.0	78.5	26.5			5515
10-01-1986	107.5	105.0	40.0	67.5	37.5			5515
03-09-1987	107.5	105.0	36.5	71.0	34.0			5515
10-26-1987	107.5	105.0	40.5	67.0	38.0	5		5515
03-01-1988	107.5	105.0					1	5515
10-13-1988	107.5	105.0	47.5	60.0	45.0	8		5515
03-01-1989	107.5	105.0	42.5	65.0	40.0			5515
10-18-1989	107.5	105.0	50.5	57.0	48.0	5		5515
11-30-1990	107.5	105.0	6.6	100.9	4.1			5515
10-14-1991	107.5	105.0	67.5	40.0	65.0			5515
01-28-1992	107.5	105.0	56.5	51.0	54.0			5515
11-10-1992	107.5	105.0	65.0	42.5	62.5			5515
03-10-1993	107.5	105.0	49.0	58.5	46.5			5515
12-13-1993	107.5	105.0	50.5	57.0	48.0			5515
10-14-1994	107.5	105.0	70.5	37.0	68.0			5515
03-03-1995	107.5	105.0	46.0	61.5	43.5			5515
03-18-1996	107.5	105.0	42.0	65.5	39.5			5515
10-11-1996	107.5	105.0	58.5	49.0	56.0			5515
03-04-1997	107.5	105.0	41.5	66.0	39.0			5515
02-16-1998	107.5	105.0	35.4	72.1	32.9			5515
01-07-1999	107.5	105.0	37.3	70.2	34.8			5515
10-20-1999	107.5	105.0	46.3	61.2	43.8			5515
03-08-2001	107.5	105.0					7	5515
11-13-2001	107.5	105.0	48.6	58.9	46.1			5515
01-30-2002	107.5	105.0	49.6	57.9	47.1			5515
12-04-2002	107.5	105.0	56.3	51.2	53.8			5515
01-30-2003	107.5	105.0	49.6	57.9	47.1			5515
03-10-2003	107.5	105.0	50.9	56.6	48.4			5515

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	673251	4133317	metres	10
LL	NAD27	121.0444	37.3322	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

Phone: 559-230-3326
Fax: 559-230-3301

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Groundwater Level Data, 07S08E13E002M

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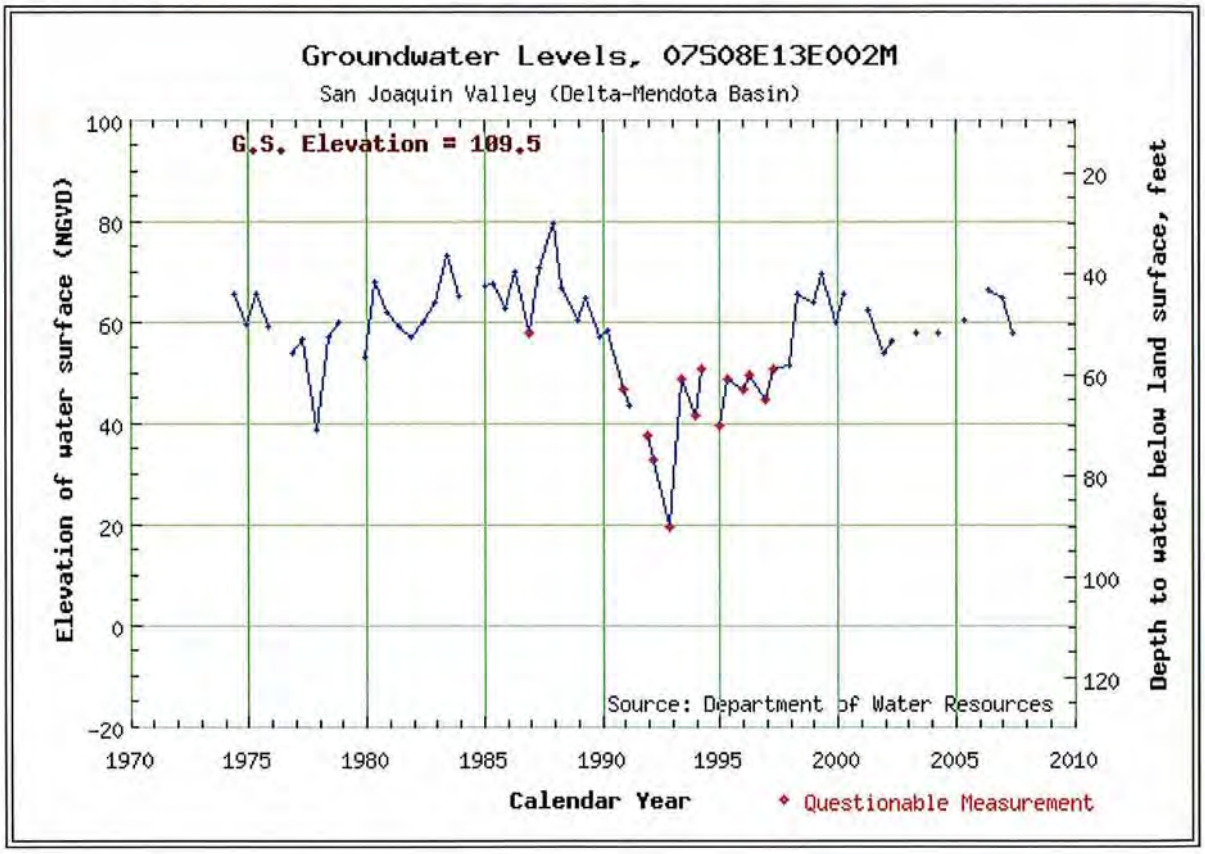

Division of Planning and Local Assistance
Department of Water Resources

901 P Street
Sacramento, CA 95814

Mailing Address:
Post Office Box 942836
Sacramento, CA 94236-0001

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
04-08-1974	110.0	109.5	44.5	65.5	44.0			5050
10-18-1974	110.0	109.5	50.5	59.5	50.0			5050
03-27-1975	110.0	109.5	44.5	65.5	44.0			5050
10-14-1975	110.0	109.5	51.0	59.0	50.5			5050
10-13-1976	110.0	109.5	56.0	54.0	55.5			5050
03-14-1977	110.0	109.5	53.5	56.5	53.0			5050
10-17-1977	110.0	109.5	71.5	38.5	71.0			5050
04-10-1978	110.0	109.5	53.0	57.0	52.5			5050
09-26-1978	110.0	109.5	50.0	60.0	49.5			5050
03-12-1979	110.0	109.5					1	5050
10-15-1979	110.0	109.5	57.0	53.0	56.5			5050
03-20-1980	110.0	109.5	42.0	68.0	41.5			5050
10-20-1980	110.0	109.5	48.0	62.0	47.5			5050

04-01-1981	110.0	109.5	51.0	59.0	50.5			5050
10-20-1981	110.0	109.5	53.0	57.0	52.5			5050
04-20-1982	110.0	109.5	50.0	60.0	49.5			5050
11-02-1982	110.0	109.5	46.0	64.0	45.5			5050
04-21-1983	110.0	109.5	37.0	73.0	36.5			5050
11-08-1983	110.0	109.5	45.0	65.0	44.5			5050
11-28-1984	110.0	109.5	43.0	67.0	42.5			5050
04-17-1985	110.0	109.5	42.5	67.5	42.0			5050
10-24-1985	110.0	109.5	47.5	62.5	47.0			5050
03-27-1986	110.0	109.5	40.0	70.0	39.5			5050
10-21-1986	110.0	109.5	52.0	58.0	51.5	9		5050
03-27-1987	110.0	109.5	39.5	70.5	39.0			5050
11-03-1987	110.0	109.5	30.5	79.5	30.0			5050
03-15-1988	110.0	109.5	43.5	66.5	43.0			5050
11-01-1988	110.0	109.5	49.8	60.2	49.3			5050
03-21-1989	110.0	109.5	45.5	64.5	45.0			5050
10-20-1989	110.0	109.5	53.1	56.9	52.6			5050
02-13-1990	110.0	109.5	51.7	58.3	51.2			5050
10-23-1990	110.0	109.5	63.5	46.5	63.0	9		5050
01-15-1991	110.0	109.5	66.5	43.5	66.0			5050
10-22-1991	110.0	109.5	72.5	37.5	72.0	9		5050
02-03-1992	110.0	109.5	77.5	32.5	77.0	9		5050
10-20-1992	110.0	109.5	90.5	19.5	90.0	9		5050
04-13-1993	110.0	109.5	61.5	48.5	61.0	9		5050
11-02-1993	110.0	109.5	68.5	41.5	68.0	9		5050
03-01-1994	110.0	109.5	59.5	50.5	59.0	9		5050
11-15-1994	110.0	109.5	70.5	39.5	70.0	9		5050
03-29-1995	110.0	109.5	61.5	48.5	61.0	9		5050
11-15-1995	110.0	109.5	63.5	46.5	63.0	9		5050
03-13-1996	110.0	109.5	60.5	49.5	60.0	9		5050
11-21-1996	110.0	109.5	65.5	44.5	65.0	9		5050
03-04-1997	110.0	109.5	59.5	50.5	59.0	9		5050
11-19-1997	110.0	109.5	58.5	51.5	58.0			5050
03-17-1998	110.0	109.5	44.5	65.5	44.0			5050
11-17-1998	110.0	109.5	46.0	64.0	45.5			5050
03-17-1999	110.0	109.5	40.7	69.3	40.2			5050
11-09-1999	110.0	109.5	50.1	59.9	49.6			5050
03-16-2000	110.0	109.5	44.5	65.5	44.0			5050
03-20-2001	110.0	109.5	47.7	62.3	47.2			5050
11-28-2001	110.0	109.5	56.2	53.8	55.7			5050
03-19-2002	110.0	109.5	53.7	56.3	53.2			5050
03-20-2003	110.0	109.5	52.0	58.0	51.5			5050
03-16-2004	110.0	109.5	52.1	57.9	51.6			5050
04-07-2005	110.0	109.5	49.7	60.3	49.2			5050
04-20-2006	110.0	109.5	43.8	66.2	43.3			5050
11-28-2006	110.0	109.5	45.4	64.6	44.9			5050
04-11-2007	110.0	109.5	52.1	57.9	51.6			5050

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	672938	4132972	metres	10
LL	NAD27	121.0481	37.3292	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section

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Fresno, CA 93726

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Groundwater Level Data, 07S08E13M001M

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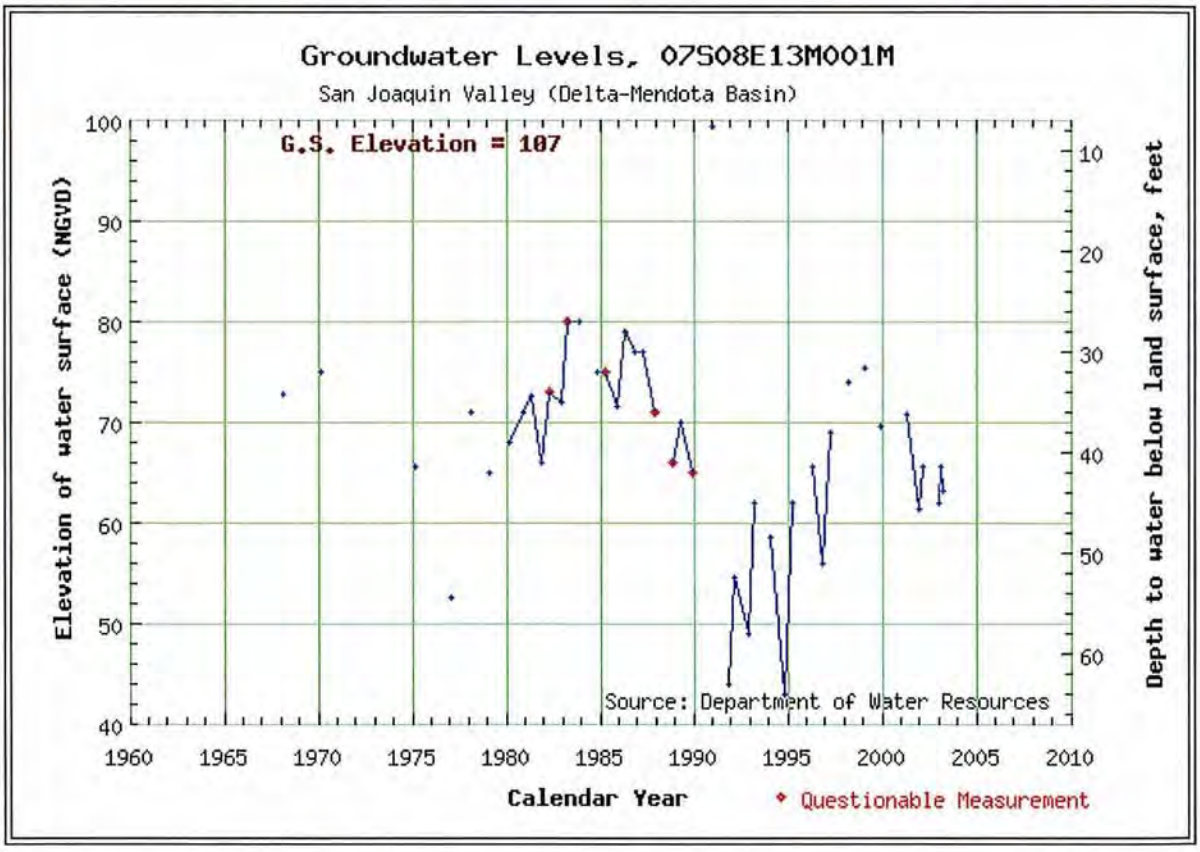

Division of Planning and Local Assistance Department of Water Resources

901 P Street
Sacramento, CA 95814

Mailing Address:
Post Office Box 942836
Sacramento, CA 94236-0001

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
01-01-1968	110.0	107.0	37.3	72.7	34.3			5515
01-01-1970	110.0	107.0	35.0	75.0	32.0			5515
01-01-1975	110.0	107.0	44.6	65.4	41.6			5515
01-01-1977	110.0	107.0	57.5	52.5	54.5			5515
01-01-1978	110.0	107.0	39.0	71.0	36.0			5515
01-01-1979	110.0	107.0	45.0	65.0	42.0			5515
01-01-1980	110.0	107.0	42.0	68.0	39.0			5515
10-29-1980	110.0	107.0	39.0	71.0	36.0			5515
03-12-1981	110.0	107.0	37.5	72.5	34.5			5515
10-15-1981	110.0	107.0	44.0	66.0	41.0			5515
03-08-1982	110.0	107.0	37.0	73.0	34.0	8		5515
10-07-1982	110.0	107.0	38.0	72.0	35.0			5515
03-09-1983	110.0	107.0	30.0	80.0	27.0	8		5515

10-10-1983	110.0	107.0	30.0	80.0	27.0			5515
09-24-1984	110.0	107.0	35.0	75.0	32.0			5515
03-06-1985	110.0	107.0	35.0	75.0	32.0	8		5515
10-01-1985	110.0	107.0	38.5	71.5	35.5			5515
04-01-1986	110.0	107.0	31.0	79.0	28.0			5515
10-01-1986	110.0	107.0	33.0	77.0	30.0			5515
03-09-1987	110.0	107.0	33.0	77.0	30.0			5515
10-26-1987	110.0	107.0	39.0	71.0	36.0	8		5515
03-01-1988	110.0	107.0					1	5515
10-13-1988	110.0	107.0	44.0	66.0	41.0	8		5515
03-01-1989	110.0	107.0	40.0	70.0	37.0			5515
10-18-1989	110.0	107.0	45.0	65.0	42.0	8		5515
11-30-1990	110.0	107.0	10.7	99.3	7.7			5515
10-14-1991	110.0	107.0	66.0	44.0	63.0			5515
01-28-1992	110.0	107.0	55.5	54.5	52.5			5515
11-10-1992	110.0	107.0	61.0	49.0	58.0			5515
03-10-1993	110.0	107.0	48.0	62.0	45.0			5515
12-13-1993	110.0	107.0	51.4	58.6	48.4			5515
10-14-1994	110.0	107.0	67.0	43.0	64.0			5515
03-03-1995	110.0	107.0	48.0	62.0	45.0			5515
03-18-1996	110.0	107.0	44.5	65.5	41.5			5515
10-11-1996	110.0	107.0	54.0	56.0	51.0			5515
03-04-1997	110.0	107.0	41.0	69.0	38.0			5515
02-16-1998	110.0	107.0	36.0	74.0	33.0			5515
01-07-1999	110.0	107.0	34.7	75.3	31.7			5515
10-20-1999	110.0	107.0	40.6	69.4	37.6			5515
03-21-2001	110.0	107.0	39.3	70.7	36.3			5515
11-13-2001	110.0	107.0	48.6	61.4	45.6			5515
01-30-2002	110.0	107.0	44.5	65.5	41.5			5515
12-04-2002	110.0	107.0	48.0	62.0	45.0			5515
01-30-2003	110.0	107.0	44.5	65.5	41.5			5515
03-10-2003	110.0	107.0	46.9	63.1	43.9			5515

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	673269	4132454	metres	10
LL	NAD27	121.0444	37.3244	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

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Groundwater Level Data, 07S08E13N002M

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Division of Planning and Local Assistance
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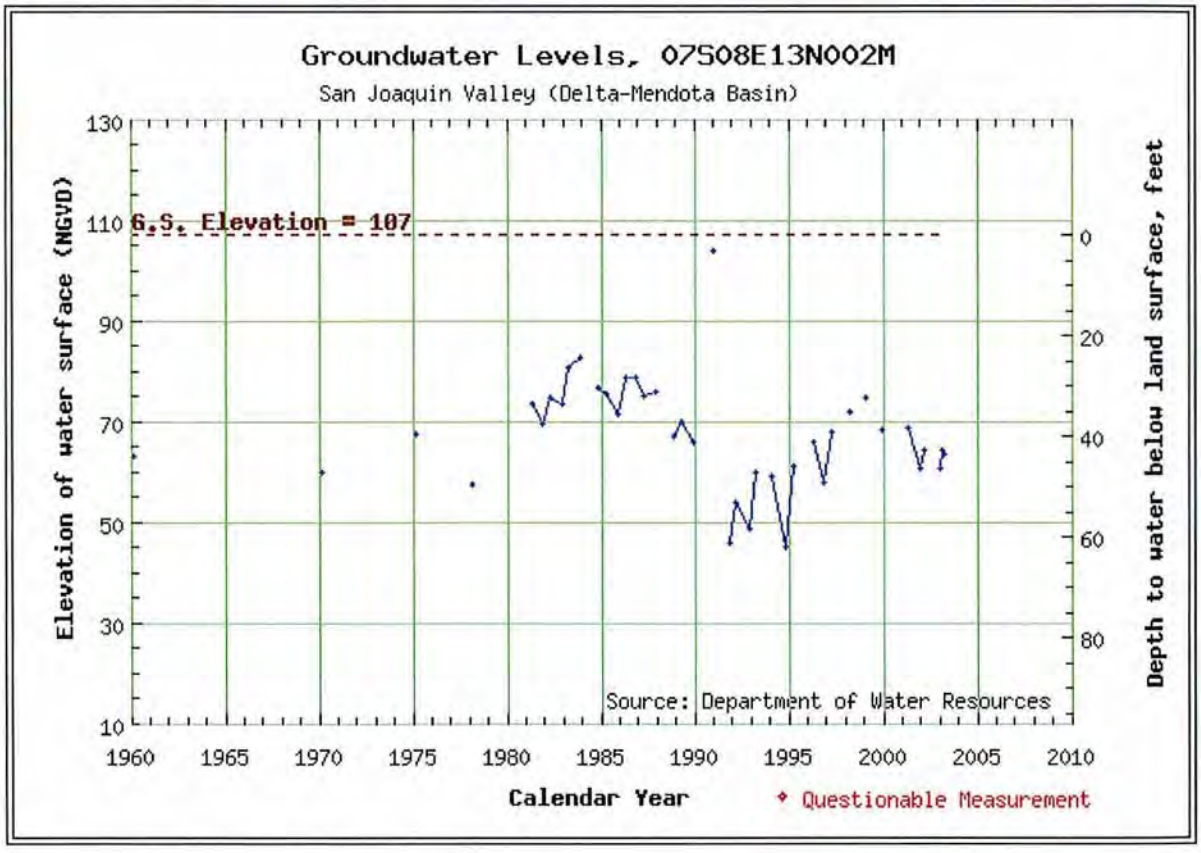

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
01-01-1960	109.5	107.0	46.5	63.0	44.0			5515
01-01-1970	109.5	107.0	49.5	60.0	47.0			5515
01-01-1975	109.5	107.0	42.2	67.3	39.7			5515
01-01-1978	109.5	107.0	52.0	57.5	49.5			5515
03-12-1981	109.5	107.0	36.0	73.5	33.5			5515
10-15-1981	109.5	107.0	40.0	69.5	37.5			5515
03-08-1982	109.5	107.0	35.0	74.5	32.5			5515
10-07-1982	109.5	107.0	36.0	73.5	33.5			5515
03-09-1983	109.5	107.0	29.0	80.5	26.5			5515
10-10-1983	109.5	107.0	27.0	82.5	24.5			5515
09-24-1984	109.5	107.0	33.0	76.5	30.5			5515
03-06-1985	109.5	107.0	34.0	75.5	31.5			5515
10-01-1985	109.5	107.0	38.0	71.5	35.5			5515

04-01-1986	109.5	107.0	31.0	78.5	28.5			5515
10-01-1986	109.5	107.0	31.0	78.5	28.5			5515
03-09-1987	109.5	107.0	34.5	75.0	32.0			5515
10-26-1987	109.5	107.0	33.5	76.0	31.0			5515
03-01-1988	109.5	107.0					1	5515
10-13-1988	109.5	107.0	42.5	67.0	40.0			5515
03-01-1989	109.5	107.0	39.5	70.0	37.0			5515
10-18-1989	109.5	107.0	43.5	66.0	41.0			5515
11-30-1990	109.5	107.0	5.5	104.0	3.0			5515
10-14-1991	109.5	107.0	63.5	46.0	61.0			5515
01-28-1992	109.5	107.0	55.5	54.0	53.0			5515
11-10-1992	109.5	107.0	61.0	48.5	58.5			5515
03-10-1993	109.5	107.0	49.5	60.0	47.0			5515
12-13-1993	109.5	107.0	50.5	59.0	48.0			5515
10-14-1994	109.5	107.0	64.5	45.0	62.0			5515
03-03-1995	109.5	107.0	48.5	61.0	46.0			5515
03-18-1996	109.5	107.0	43.5	66.0	41.0			5515
10-11-1996	109.5	107.0	51.5	58.0	49.0			5515
03-04-1997	109.5	107.0	41.5	68.0	39.0			5515
02-16-1998	109.5	107.0	37.7	71.8	35.2			5515
01-07-1999	109.5	107.0	34.7	74.8	32.2			5515
10-20-1999	109.5	107.0	41.2	68.3	38.7			5515
03-21-2001	109.5	107.0	40.9	68.6	38.4			5515
11-13-2001	109.5	107.0	48.8	60.7	46.3			5515
01-30-2002	109.5	107.0	45.2	64.3	42.7			5515
12-04-2002	109.5	107.0	48.8	60.7	46.3			5515
01-30-2003	109.5	107.0	45.2	64.3	42.7			5515
03-10-2003	109.5	107.0	46.1	63.4	43.6			5515

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	673178	4132082	metres	10
LL	NAD27	121.0456	37.3211	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

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Groundwater Level Data, 07S08E25C002M

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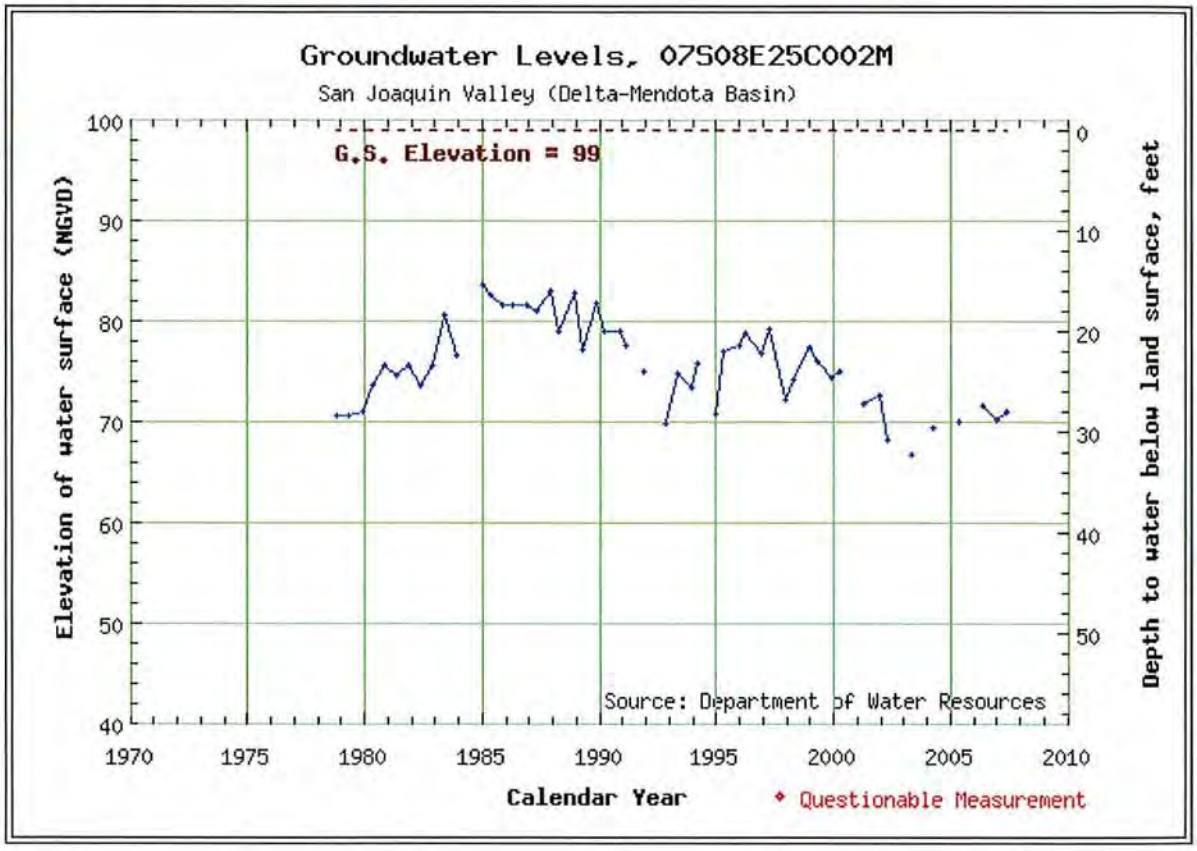

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
09-25-1978	99.0	99.0	28.5	70.5	28.5			5050
03-13-1979	99.0	99.0	28.5	70.5	28.5			5050
10-15-1979	99.0	99.0	28.0	71.0	28.0			5050
03-20-1980	99.0	99.0	25.5	73.5	25.5			5050
10-20-1980	99.0	99.0	23.5	75.5	23.5			5050
04-02-1981	99.0	99.0	24.5	74.5	24.5			5050
10-20-1981	99.0	99.0	23.5	75.5	23.5			5050
04-20-1982	99.0	99.0	25.5	73.5	25.5			5050
11-02-1982	99.0	99.0	23.5	75.5	23.5			5050
04-21-1983	99.0	99.0	18.5	80.5	18.5			5050
11-09-1983	99.0	99.0	22.5	76.5	22.5			5050
11-28-1984	99.0	99.0	15.5	83.5	15.5			5050
04-17-1985	99.0	99.0	16.5	82.5	16.5			5050

10-24-1985	99.0	99.0	17.5	81.5	17.5			5050
03-27-1986	99.0	99.0	17.5	81.5	17.5			5050
10-21-1986	99.0	99.0	17.5	81.5	17.5			5050
03-27-1987	99.0	99.0	18.0	81.0	18.0			5050
11-03-1987	99.0	99.0	16.0	83.0	16.0			5050
03-15-1988	99.0	99.0	20.1	78.9	20.1			5050
11-01-1988	99.0	99.0	16.3	82.7	16.3			5050
03-21-1989	99.0	99.0	21.9	77.1	21.9			5050
10-20-1989	99.0	99.0	17.3	81.7	17.3			5050
02-13-1990	99.0	99.0	20.1	78.9	20.1			5050
10-23-1990	99.0	99.0	20.1	78.9	20.1			5050
01-15-1991	99.0	99.0	21.4	77.6	21.4			5050
10-22-1991	99.0	99.0	24.1	74.9	24.1			5050
02-03-1992	99.0	99.0					1	5050
10-20-1992	99.0	99.0	29.3	69.7	29.3			5050
04-13-1993	99.0	99.0	24.2	74.8	24.2			5050
11-02-1993	99.0	99.0	25.7	73.3	25.7			5050
03-01-1994	99.0	99.0	23.3	75.7	23.3			5050
11-15-1994	99.0	99.0	28.2	70.8	28.2			5050
03-29-1995	99.0	99.0	22.1	76.9	22.1			5050
11-15-1995	99.0	99.0	21.6	77.4	21.6			5050
03-13-1996	99.0	99.0	20.3	78.7	20.3			5050
11-22-1996	99.0	99.0	22.2	76.8	22.2			5050
03-04-1997	99.0	99.0	19.9	79.1	19.9			5050
11-19-1997	99.0	99.0	26.9	72.1	26.9			5050
03-17-1998	99.0	99.0	24.9	74.1	24.9			5050
11-17-1998	99.0	99.0	21.7	77.3	21.7			5050
03-17-1999	99.0	99.0	23.1	75.9	23.1			5050
11-09-1999	99.0	99.0	24.7	74.3	24.7			5050
03-16-2000	99.0	99.0	24.0	75.0	24.0			5050
03-20-2001	99.0	99.0	27.3	71.7	27.3			5050
11-28-2001	99.0	99.0	26.5	72.5	26.5			5050
03-19-2002	99.0	99.0	30.8	68.2	30.8			5050
03-20-2003	99.0	99.0	32.2	66.8	32.2			5050
03-16-2004	99.0	99.0	29.7	69.3	29.7			5050
04-07-2005	99.0	99.0	29.0	70.0	29.0			5050
04-20-2006	99.0	99.0	27.5	71.5	27.5			5050
11-28-2006	99.0	99.0	28.9	70.1	28.9			5050
04-11-2007	99.0	99.0	28.0	71.0	28.0			5050

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	673566	4129994	metres	10
LL	NAD27	121.0417	37.3022	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

Phone: 559-230-3326
Fax: 559-230-3301

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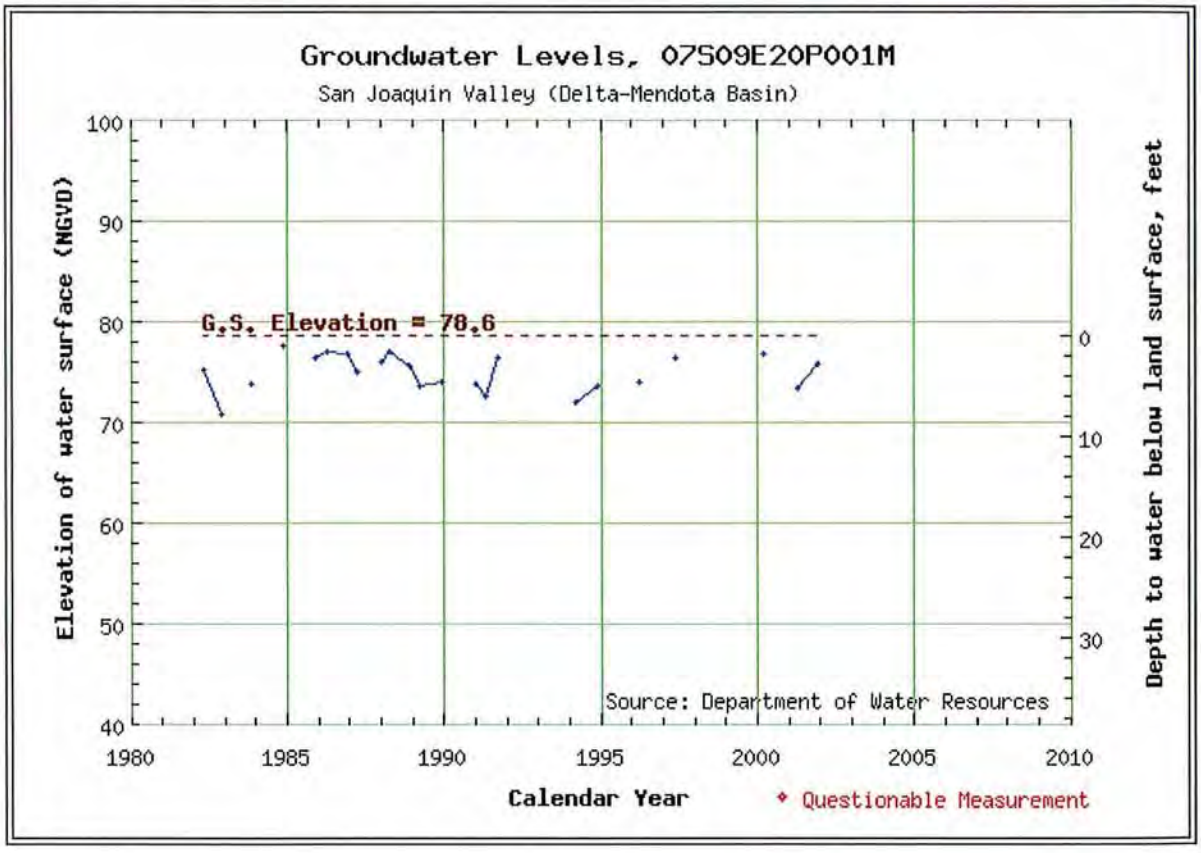
Your selection returned a total of **23** records. Wells in the Department of Water Resources monitoring network are identified by a State Well Number, which is based on the Public Land Grid System. The table headings and records contain several codes and abbreviations. Press the ***New Search*** or ***Nearby Search*** buttons or at the bottom of the page to begin a new data retrieval. Data for this well can also be downloaded in MS Excel or text delimited format.



Groundwater Level Readings								
Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
04-07-1982	79.9	78.6	4.8	75.1	3.5			5515
11-01-1982	79.9	78.6	9.2	70.7	7.9			5515
10-20-1983	79.9	78.6	6.2	73.7	4.9			5515
10-20-1984	79.9	78.6	2.4	77.5	1.1			5050
11-14-1985	79.9	78.6	3.6	76.3	2.3			5515
04-01-1986	79.9	78.6	3.0	76.9	1.7			5515
11-01-1986	79.9	78.6	3.2	76.7	1.9			5515
03-03-1987	79.9	78.6	5.1	74.8	3.8			5515
12-03-1987	79.9	78.6	4.0	75.9	2.7			5515
03-15-1988	79.9	78.6	2.9	77.0	1.6			5515
11-01-1988	79.9	78.6	4.4	75.5	3.1			5515
03-01-1989	79.9	78.6	6.5	73.4	5.2			5515
11-01-1989	79.9	78.6	6.0	73.9	4.7			5515

Division of Planning and Local Assistance Department of Water Resources

901 P Street
Sacramento, CA 95814

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Sacramento, CA 94236-0001

11-30-1990	79.9	78.6	6.1	73.8	4.8			5515
04-01-1991	79.9	78.6	7.5	72.4	6.2			5515
09-01-1991	79.9	78.6	3.6	76.3	2.3			5515
03-01-1994	79.9	78.6	7.9	72.0	6.6			5515
11-10-1994	79.9	78.6	6.4	73.5	5.1			5515
03-16-1996	79.9	78.6	6.0	73.9	4.7			5515
04-26-1997	79.9	78.6	3.7	76.2	2.4			5515
03-01-2000	79.9	78.6	3.2	76.7	1.9			5515
04-01-2001	79.9	78.6	6.6	73.3	5.3			5515
11-08-2001	79.9	78.6	4.1	75.8	2.8			5515

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	676852	4129507	metres	10
LL	NAD27	121.0053	37.3061	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

Phone: 559-230-3326
Fax: 559-230-3301

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Search for wells within 0.5 mile radius. Nearby Search

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Groundwater Level Data, 07S09E20R001M

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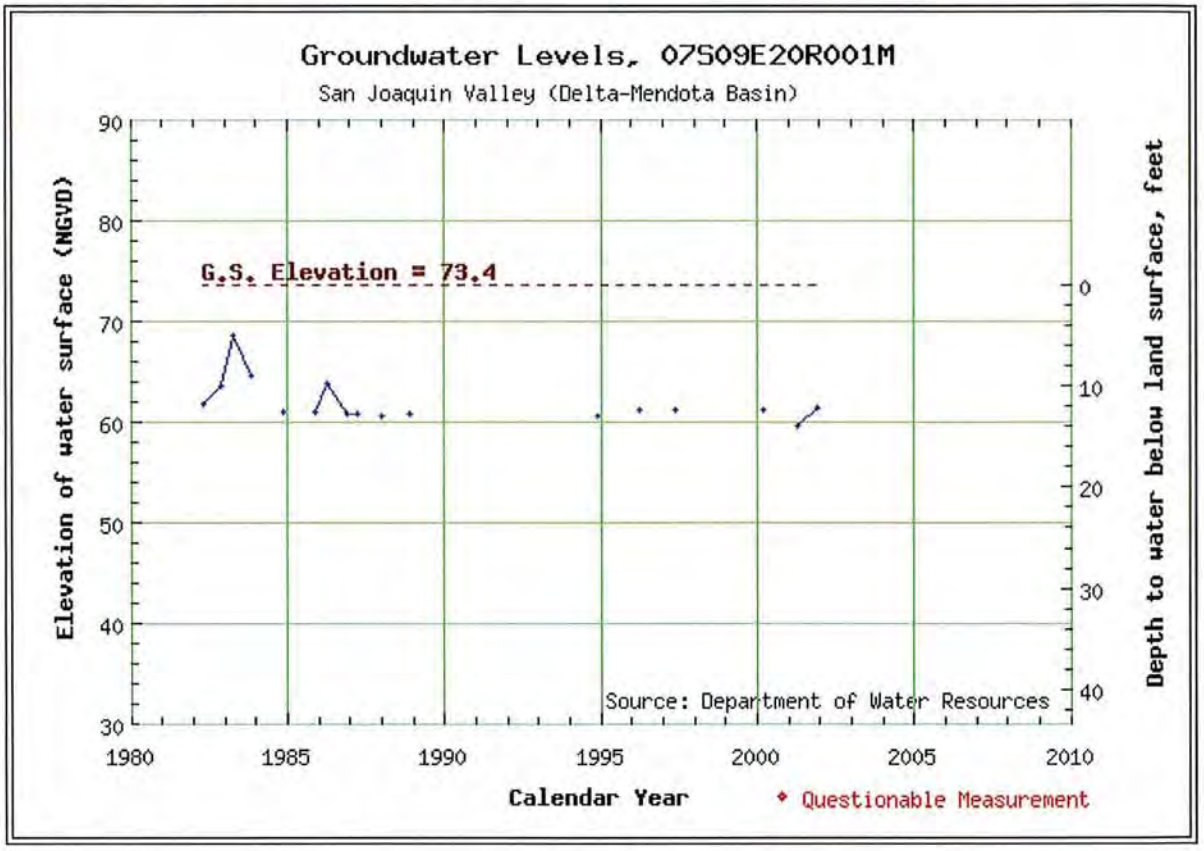

Division of Planning and Local Assistance Department of Water Resources

901 P Street
Sacramento, CA 95814

Mailing Address:
Post Office Box 942836
Sacramento, CA 94236-0001

Groundwater Level Readings

Meas. Date	R.P. Elev.	G.S. Elev.	RPWS	WSE	GSWS	QM Code	NM Code	Agency
04-07-1982	74.7	73.4	13.0	61.7	11.7			5515
11-01-1982	74.7	73.4	11.1	63.6	9.8			5515
04-01-1983	74.7	73.4	6.1	68.6	4.8			5515
10-20-1983	74.7	73.4	10.1	64.6	8.8			5515
10-20-1984	74.7	73.4	13.7	61.0	12.4			5050
11-14-1985	74.7	73.4	13.8	60.9	12.5			5515
04-01-1986	74.7	73.4	10.9	63.8	9.6			5515
11-01-1986	74.7	73.4	13.9	60.8	12.6			5515
03-03-1987	74.7	73.4	14.1	60.7	12.8			5515
12-03-1987	74.7	73.4	14.1	60.6	12.8			5515
03-15-1988	74.7	73.4					D	5515
11-01-1988	74.7	73.4	14.0	60.8	12.7			5515
03-01-1989	74.7	73.4					D	5515

11-01-1989	74.7	73.4					D	5515
11-30-1990	74.7	73.4					7	5515
04-01-1991	74.7	73.4					D	5515
09-01-1991	74.7	73.4					D	5515
03-01-1994	74.7	73.4					D	5515
11-10-1994	74.7	73.4	14.2	60.5	12.9			5515
03-16-1996	74.7	73.4	13.6	61.1	12.3			5515
04-26-1997	74.7	73.4	13.5	61.2	12.2			5515
03-01-2000	74.7	73.4	13.5	61.2	12.2			5515
04-01-2001	74.7	73.4	15.2	59.5	13.9			5515
11-08-2001	74.7	73.4	13.3	61.4	12.0			5515

Well Coordinates

Projection	Datum	Easting	Northing	Units	Zone
UTM	NAD27	677546	4130478	metres	10
LL	NAD27	120.9967	37.3058	decimal degrees	

Well Use: Undetermined

For more information contact:
Department of Water Resources, San Joaquin District
Water Management Section
3374 East Shields Avenue
Fresno, CA 93726

Phone: 559-230-3326
Fax: 559-230-3301

New Search

Search for wells within 0.5 mile radius. Nearby Search

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Appendix B

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.009)

****
Analysis Options
****
Flow Units ..... CFS
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date JAN-01-2007 00:00:00
Ending Date JAN-04-2007 18:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 60
Number of nodes 78
Number of links 76
Number of pollutants 0
Number of land uses 5

****
Landuse Summary
****

Name	Sweeping Interval	Maximum Removal	Last Swept
LD	0.00	0.00	0.00
HD	0.00	0.00	0.00
LI/I	0.00	0.00	0.00
O/P/S	0.00	0.00	0.00
C	0.00	0.00	0.00

****
Raingage Summary
****

Name	Data Source	Data Type	Interval hours
RG-1	10yr_24hr_Cum_SCS_I	CUMULATIVE	0.25

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
800	81.82	567240.81	0.00	0.1500	RG-1	125
801	36.44	252630.80	0.00	0.1500	RG-1	027
802	32.84	227627.80	0.00	0.1760	RG-1	127
803	33.51	232317.80	0.00	0.2860	RG-1	029
805	62.89	36734.16	0.00	0.1149	RG-1	R-400
869	58.77	23763.97	0.00	0.0772	RG-1	R-401
870	4.91	150000.00	0.00	0.2500	RG-1	R-401
871	15.41	69460.50	0.00	0.2650	RG-1	030
873	10.81	150000.00	0.00	0.5310	RG-1	R-301
A-1	23.20	163128.50	0.00	0.1900	RG-1	A-2
A-2	45.41	318839.00	0.00	0.1970	RG-1	028
A-3	76.84	537707.13	0.00	0.2320	RG-1	029
B-1	18.27	125622.10	0.00	0.2840	RG-1	B-2
B-2	26.57	184620.20	0.00	0.3620	RG-1	024
B-3	67.20	465883.41	0.00	0.1160	RG-1	026
B-4	16.58	117580.10	0.00	0.2690	RG-1	B-5
B-5	15.81	110924.60	0.00	0.5000	RG-1	025
B-6	59.62	413332.91	0.00	0.1540	RG-1	027
C-1	124.08	855159.63	0.00	0.2260	RG-1	020
C-2	33.78	234813.59	0.00	0.1230	RG-1	022

C-3	122.25	847533.50	0.00	0.3110	RG-1	020
C-4	36.36	252214.91	0.00	0.1650	RG-1	RX-3
C-5	15.44	103090.60	0.00	0.0550	RG-1	RX-3
C-6	23.10	160355.41	0.00	0.0550	RG-1	RX-3
D-1	80.45	563982.38	0.00	0.1100	RG-1	018
D-2	39.84	284313.69	0.00	0.2840	RG-1	R-19
D-3	85.57	597467.81	0.00	0.2330	RG-1	016
D-4	22.93	159731.50	0.00	0.1148	RG-1	016
D-5	53.37	373192.00	0.00	0.1148	RG-1	017
E-1	64.19	452433.81	0.00	0.2870	RG-1	012
E-2	19.06	130197.80	0.00	0.1410	RG-1	014
E-3	49.42	344629.00	0.00	0.1440	RG-1	R-15
E-4	9.48	65237.00	0.00	0.0550	RG-1	013
E-5	80.15	555732.38	0.00	0.3361	RG-1	012
E-6	33.93	232595.09	0.00	0.1170	RG-1	013
E-7	25.00	175815.50	0.00	0.0550	RG-1	013
F-1	83.00	575421.00	0.00	0.3300	RG-1	001
F-2	30.20	209647.50	0.00	0.1880	RG-1	4A
F-3	78.97	547482.38	0.00	0.3000	RG-1	R-03A
F-4	31.17	216095.00	0.00	0.1097	RG-1	R-04
F-5	39.24	272042.69	0.00	0.1880	RG-1	4A
G-1	75.46	523148.31	0.00	0.1400	RG-1	R-03B
G-2	55.05	381650.09	0.00	0.2000	RG-1	G-5
G-3	84.95	588940.50	0.00	0.1700	RG-1	002
G-4	56.27	390108.09	0.00	0.2000	RG-1	G-6
G-5	23.88	165555.00	0.00	0.2000	RG-1	R-06
G-6	24.06	166802.91	0.00	0.2000	RG-1	005
H-1	20.18	139765.00	0.00	0.1620	RG-1	008
H-2	77.29	535835.31	0.00	0.2400	RG-1	008
H-3	58.80	407648.00	0.00	0.2400	RG-1	007
I-1	135.79	941403.50	0.00	0.1200	RG-1	X-2
I-2	24.20	169368.00	0.00	0.2000	RG-1	009
I-3	11.02	76399.30	0.00	0.1100	RG-1	008
I-4	22.75	157721.00	0.00	0.2300	RG-1	008
J-1	121.61	843096.50	0.00	0.0530	RG-1	130
K-1	165.66	1148485.88	0.00	0.1040	RG-1	032
EX-3	139.21	60676.18	0.00	0.1268	RG-1	011
EX-2	157.54	61341.36	0.00	0.1570	RG-1	315
EX-4	27.50	10707.68	0.00	0.2100	RG-1	Existing
EX-1	505.18	201147.70	0.00	0.1316	RG-1	011

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
001	JUNCTION	92.00	6.00	100	
002	JUNCTION	92.00	6.00	100	
003	JUNCTION	96.00	2.00	100	
004	JUNCTION	87.50	4.50	100	
005	JUNCTION	86.00	6.00	100	
006	JUNCTION	85.50	5.00	100	
007	JUNCTION	78.00	7.00	100	
008	JUNCTION	77.75	7.25	100	
009	JUNCTION	76.50	5.50	100	
010	JUNCTION	73.00	6.00	100	
011	JUNCTION	72.00	6.00	100	
012	JUNCTION	90.50	7.50	100	
013	JUNCTION	88.00	7.00	100	
014	JUNCTION	93.50	4.50	100	
015	JUNCTION	90.50	4.50	100	
016	JUNCTION	92.00	6.00	100	
017	JUNCTION	87.10	6.90	100	
018	JUNCTION	96.50	5.50	100	
019	JUNCTION	88.50	4.50	100	
020	JUNCTION	88.00	7.00	100	
021	JUNCTION	87.50	4.50	100	
022	JUNCTION	85.00	8.00	100	
024	JUNCTION	79.00	6.00	100	
025	JUNCTION	78.79	9.31	0	
026	JUNCTION	76.00	6.00	100	
027	JUNCTION	73.37	8.63	0	
028	JUNCTION	69.00	6.00	100	
029	JUNCTION	66.39	8.61	0	
030	JUNCTION	65.46	6.54	0	
130	JUNCTION	65.36	10.64	0	

032	JUNCTION	63.50	8.50	100
033	JUNCTION	61.50	8.50	100
034	JUNCTION	60.00	4.00	0
103	JUNCTION	92.61	3.00	0
106	JUNCTION	84.58	3.00	100
125	JUNCTION	75.54	8.99	0
127	JUNCTION	70.51	8.49	0
301	JUNCTION	66.00	6.00	0
33A	JUNCTION	61.50	8.50	0
400	JUNCTION	85.00	4.00	100
401	JUNCTION	90.00	5.00	0
4A	JUNCTION	88.50	5.50	100
W-01	JUNCTION	65.30	16.25	256
W-02	JUNCTION	65.26	16.25	256
W-03	JUNCTION	64.98	16.25	256
W-04	JUNCTION	55.98	21.02	256
W-05	JUNCTION	55.94	20.06	256
W-06	JUNCTION	55.83	17.17	256
W-07	JUNCTION	55.79	17.21	256
W-08	JUNCTION	55.64	16.36	256
W-09	JUNCTION	46.64	21.36	256
W-10	JUNCTION	46.60	18.40	256
W-11	JUNCTION	46.29	21.25	256
X-1	JUNCTION	76.34	5.41	250
X-2	JUNCTION	76.11	5.79	250
X-3	JUNCTION	85.00	7.00	100
X-4	JUNCTION	82.34	9.66	0
315	JUNCTION	71.00	8.00	100
316	JUNCTION	66.00	6.50	100
131	JUNCTION	65.22	7.78	0
031	JUNCTION	65.31	9.54	0
O-2	OUTFALL	46.28	21.25	0
O-1	OUTFALL	60.00	3.50	0
R-1	STORAGE	66.00	16.2549999998976	
Existing	STORAGE	68.00	10.00	0
R-19	STORAGE	83.40	9.60	0
RX-3	STORAGE	82.41	9.59	0
R-06	STORAGE	83.00	8.00	0
R-03A	STORAGE	90.29	7.71	0
R-03B	STORAGE	90.29	7.71	0
R-04	STORAGE	85.00	7.00	0
R-15	STORAGE	84.80	10.20	0
R-33	STORAGE	69.00	4.00	0
R-301	STORAGE	69.30	3.50	0
R-401	STORAGE	91.10	4.90	10000
R-400	STORAGE	83.00	6.00	10000
R-211	STORAGE	0.00	4.00	0
R-402	STORAGE	74.50	16.00	0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	N
OP-1	034	O-1	CONDUIT	25	0.0040	0.0150
P-001	001	R-03A	CONDUIT	1370	0.0518	0.0130
P-002	002	R-03B	CONDUIT	1249	0.0568	0.0130
P-003	003	103	CONDUIT	1035	0.2310	0.0130
P-004	004	006	CONDUIT	1455	0.1374	0.0130
P-004A	4A	R-04	CONDUIT	1397	0.1790	0.0130
P-005	005	R-06	CONDUIT	1302	0.1536	0.0130
P-006	006	106	CONDUIT	1226	0.1974	0.0130
P-007	007	008	CONDUIT	1291	0.0194	0.0130
P-008	008	009	CONDUIT	1386	0.0541	0.0130
P-009	009	X-1	CONDUIT	248	0.0242	0.0300
P-010	010	011	CONDUIT	2604	0.0384	0.0300
P-012	012	013	CONDUIT	1630	0.1534	0.0130
P-013	013	R-15	CONDUIT	1415	0.2261	0.0130
P-014	014	R-15	CONDUIT	991	0.8778	0.0130
P-015	015	019	CONDUIT	4199	0.0476	0.0130
P-016	016	017	CONDUIT	676	0.4288	0.0130
P-017	017	R-19	CONDUIT	2664	0.1389	0.0130
P-018	018	R-19	CONDUIT	1918	0.5265	0.0130
P-019	019	021	CONDUIT	429	0.2332	0.0150
P-020	020	022	CONDUIT	1360	0.2206	0.0130
P-021	021	X-3	CONDUIT	1243	0.1609	0.0150
P-022	022	RX-3	CONDUIT	997	0.0592	0.0130

P-024	024	025	CONDUIT	1007	0.0209	0.0130
P-025	025	125	CONDUIT	1132	0.2870	0.0150
P-026	026	027	CONDUIT	1278	0.2057	0.0130
P-027	027	127	CONDUIT	1031	0.2773	0.0150
P-028	028	029	CONDUIT	1784	0.1463	0.0130
P-029	029	030	CONDUIT	808	0.1151	0.0150
P-030	030	130	CONDUIT	2333	0.0043	0.0150
P-032	032	33A	CONDUIT	3190	0.0627	0.0130
P-033	033	034	CONDUIT	4100	0.0854	0.0150
P-103	103	006	CONDUIT	1548	0.3948	0.0130
P-106	106	008	CONDUIT	1413	0.2888	0.0130
P-109	X-2	010	CONDUIT	2053	0.1271	0.0130
P-123	X-4	025	CONDUIT	1316	0.2697	0.0150
P-125	125	027	CONDUIT	1304	0.1664	0.0150
P-127	127	029	CONDUIT	1485	0.2775	0.0150
P-400	400	106	CONDUIT	808	0.0520	0.0110
PX-1	X-1	X-2	CONDUIT	304	0.0756	0.0130
WW-01	W-01	W-02	CONDUIT	781	0.0051	0.0300
WW-02	W-02	W-03	CONDUIT	1883	0.0149	0.0300
WW-03	W-03	W-04	CONDUIT	878	1.0255	0.0150
WW-04	W-04	W-05	CONDUIT	1499	0.0027	0.0300
WW-05	W-05	W-06	CONDUIT	2521	0.0044	0.0300
WW-06	W-06	W-07	CONDUIT	1057	0.0038	0.0300
WW-07	W-07	W-08	CONDUIT	3000	0.0050	0.0300
WW-08	W-08	W-09	CONDUIT	316	2.8481	0.0150
WW-09	W-09	W-10	CONDUIT	732	0.0055	0.0210
WW-10	W-10	W-11	CONDUIT	6222	0.0050	0.0300
WW-11	W-11	O-2	CONDUIT	50	0.0200	0.0300
PX-3	X-3	X-4	CONDUIT	280	0.0571	0.0130
P-316	315	316	CONDUIT	809	0.9892	0.0130
P-315	315	Existing	CONDUIT	2495	0.1202	0.0130
P-401	401	R-402	CONDUIT	1546	0.2911	0.0110
P-130	130	031	CONDUIT	1147	0.0044	0.0130
P-031	031	131	CONDUIT	1903	0.0047	0.0130
P-011	011	031	CONDUIT	4165	0.1486	0.0130
RXP-01	Existing	011	PUMP			
RP-03A	R-03A	003	PUMP			
RP-04	R-04	004	PUMP			
RP-06	R-06	006	PUMP			
RP-15	R-15	015	PUMP			
RP-19	R-19	019	PUMP			
RXP-3	RX-3	X-3	PUMP			
RP-33A	33A	R-33	PUMP			
RP-400	R-400	400	PUMP			
RP-03B	R-03B	003	PUMP			
RP-EX	Existing	011	PUMP			
RP-301	R-301	316	PUMP			
RP-402	R-402	006	PUMP			
OR-1	W-01	R-1	OUTLET			
OR-33	033	R-33	OUTLET			
OR-301	R-301	301	OUTLET			
OR-401	R-401	401	OUTLET			
OR-132	131	W-06	OUTLET			

****
Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
OP-1	TRAPEZOIDAL	3.50	36.75	1.92	17.50	1	35.56
P-001	CIRCULAR	3.00	7.07	0.75	3.00	1	15.18
P-002	CIRCULAR	3.00	7.07	0.75	3.00	1	15.90
P-003	TRAPEZOIDAL	1.00	3.00	0.55	5.00	1	11.04
P-004	CIRCULAR	1.50	1.77	0.38	1.50	1	3.89
P-004A	CIRCULAR	2.50	4.91	0.63	2.50	1	17.35
P-005	CIRCULAR	3.00	7.07	0.75	3.00	1	26.14
P-006	TRAPEZOIDAL	1.50	6.75	0.82	7.50	1	30.09
P-007	CIRCULAR	3.50	9.62	0.88	3.50	1	14.00
P-008	TRAPEZOIDAL	3.50	36.75	1.92	17.50	1	150.89
P-009	TRAPEZOIDAL	4.00	48.00	2.19	20.00	1	62.46
P-010	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	142.59
P-012	CIRCULAR	4.00	12.57	1.00	4.00	1	56.26
P-013	CIRCULAR	4.00	12.57	1.00	4.00	1	68.30
P-014	CIRCULAR	1.50	1.77	0.38	1.50	1	9.84
P-015	CIRCULAR	2.00	3.14	0.50	2.00	1	4.94
P-016	CIRCULAR	3.00	7.07	0.75	3.00	1	43.67

P-017	CIRCULAR	4.00	12.57	1.00	4.00	1	53.53
P-018	CIRCULAR	2.50	4.91	0.63	2.50	1	29.76
P-019	TRAPEZOIDAL	2.00	10.00	1.01	9.00	1	48.02
P-020	CIRCULAR	4.00	12.57	1.00	4.00	1	67.46
P-021	TRAPEZOIDAL	2.00	10.00	1.01	9.00	1	39.88
P-022	CIRCULAR	5.00	19.63	1.25	5.00	1	63.36
P-024	CIRCULAR	3.00	7.07	0.75	3.00	1	9.63
P-025	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	779.64
P-026	CIRCULAR	3.00	7.07	0.75	3.00	1	30.25
P-027	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	766.34
P-028	CIRCULAR	4.00	12.57	1.00	4.00	1	54.94
P-029	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	493.69
P-030	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	95.27
P-032	CIRCULAR	5.50	23.76	1.38	5.50	1	84.08
P-033	TRAPEZOIDAL	3.00	27.00	1.64	15.00	1	108.89
P-103	TRAPEZOIDAL	1.00	3.00	0.55	5.00	1	14.43
P-106	TRAPEZOIDAL	1.50	6.75	0.82	7.50	1	36.40
P-109	TRAPEZOIDAL	4.50	60.75	2.47	22.50	1	452.03
P-123	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	755.78
P-125	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	593.66
P-127	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	766.66
P-400	CIRCULAR	0.50	0.20	0.13	0.50	1	0.15
PX-1	RECT_CLOSED	3.00	10.50	0.81	3.50	2	28.63
WW-01	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	2827.35
WW-02	TRAPEZOIDAL	16.25	1436.09	11.65	112.75	1	4456.56
WW-03	TRAPEZOIDAL	13.00	435.50	7.15	53.00	1	16221.81
WW-04	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	2041.15
WW-05	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	2609.88
WW-06	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	2430.67
WW-07	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	2794.04
WW-08	TRAPEZOIDAL	13.00	435.50	7.15	53.00	1	27033.75
WW-09	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	4172.79
WW-10	TRAPEZOIDAL	16.25	1568.13	11.47	129.00	1	2789.07
WW-11	TRAPEZOIDAL	21.25	2263.13	14.23	149.00	1	9310.69
PX-3	CIRCULAR	2.50	4.91	0.63	2.50	1	9.80
P-316	CIRCULAR	1.00	0.79	0.25	1.00	1	3.54
P-315	CIRCULAR	4.50	15.90	1.13	4.50	1	68.19
P-401	CIRCULAR	2.00	3.14	0.50	2.00	1	14.42
P-130	TRAPEZOIDAL	5.25	86.63	2.94	27.00	1	134.16
P-031	TRAPEZOIDAL	5.50	115.50	3.34	32.00	1	202.81
P-011	TRAPEZOIDAL	5.00	75.00	2.74	25.00	1	647.36

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Control Actions Taken
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JAN-01-2007: 00:00:00 Link RP-301 setting changed to   1.00 by Control 301_ON
JAN-01-2007: 00:00:00 Link RP-400 setting changed to   1.00 by Control 400_ON
JAN-01-2007: 00:00:00 Link RP-EX setting changed to   1.00 by Control Existing_ON
JAN-01-2007: 00:14:53 Link RP-EX setting changed to   0.00 by Control Existing_OFF
JAN-01-2007: 06:19:49 Link RXP-3 setting changed to   1.00 by Control X-3_ON
JAN-01-2007: 06:45:05 Link RP-03A setting changed to   1.00 by Control 3A_ON
JAN-01-2007: 06:48:45 Link RP-03B setting changed to   1.00 by Control 3B_ON
JAN-01-2007: 07:04:20 Link RXP-3 setting changed to   0.00 by Control X-3_OFF
JAN-01-2007: 07:06:21 Link RP-04 setting changed to   1.00 by Control 4_ON
JAN-01-2007: 07:12:11 Link RP-19 setting changed to   1.00 by Control 19_ON
JAN-01-2007: 07:15:50 Link RP-06 setting changed to   1.00 by Control 6_ON
JAN-01-2007: 07:33:54 Link RXP-3 setting changed to   1.00 by Control X-3_ON
JAN-01-2007: 07:43:56 Link RP-15 setting changed to   1.00 by Control 15_ON
JAN-01-2007: 08:49:16 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-01-2007: 08:50:35 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-01-2007: 09:20:16 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-01-2007: 09:21:38 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-01-2007: 09:40:11 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-01-2007: 09:41:38 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-01-2007: 09:54:55 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-01-2007: 09:56:26 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-01-2007: 10:05:15 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-01-2007: 10:07:05 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-01-2007: 10:12:49 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-01-2007: 17:20:09 Link RP-301 setting changed to   0.00 by Control 301_OFF
JAN-01-2007: 19:14:50 Link RP-301 setting changed to   1.00 by Control 301_ON
JAN-02-2007: 01:21:09 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-02-2007: 01:26:22 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-02-2007: 01:28:38 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-02-2007: 01:34:10 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-02-2007: 01:36:11 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-02-2007: 01:42:03 Link RP-402 setting changed to   1.00 by Control 402_ON
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JAN-02-2007: 01:43:57 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 01:50:10 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 01:52:02 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 01:58:40 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 02:00:31 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 02:07:36 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 02:09:19 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 02:16:55 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 02:18:36 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 02:26:48 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 02:28:28 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 02:37:20 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 02:38:57 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 02:48:47 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 02:50:18 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 03:01:14 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 03:02:46 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 03:14:53 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 03:16:23 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 03:29:48 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 03:31:17 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 03:46:00 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 03:47:27 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 04:03:28 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 04:04:53 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 04:22:12 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 04:23:36 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 04:42:19 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 04:43:43 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 05:03:54 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 05:05:16 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 05:27:15 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 05:28:37 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 05:52:24 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 05:53:47 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 06:19:18 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 06:20:40 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 06:48:13 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 06:49:36 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 07:19:27 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 07:20:47 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 07:53:13 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 07:54:34 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 08:29:58 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 08:31:19 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 09:10:08 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 09:11:27 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 09:54:13 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 09:55:34 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 10:42:45 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 10:44:04 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 11:20:50 Link RP-301 setting changed to 0.00 by Control 301_OFF
JAN-02-2007: 11:36:36 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 11:37:55 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 12:17:56 Link RP-301 setting changed to 1.00 by Control 301_ON
JAN-02-2007: 12:36:54 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 12:38:11 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 13:44:59 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 13:46:16 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 14:52:40 Link RP-301 setting changed to 0.00 by Control 301_OFF
JAN-02-2007: 15:02:39 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 15:03:57 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 15:43:36 Link RP-301 setting changed to 1.00 by Control 301_ON
JAN-02-2007: 16:35:26 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 16:36:44 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 17:43:50 Link RP-400 setting changed to 0.00 by Control 400_OFF
JAN-02-2007: 18:17:52 Link RP-301 setting changed to 0.00 by Control 301_OFF
JAN-02-2007: 18:24:20 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 18:25:37 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 19:04:59 Link RP-301 setting changed to 1.00 by Control 301_ON
JAN-02-2007: 20:33:49 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 20:35:05 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-02-2007: 21:39:41 Link RP-301 setting changed to 0.00 by Control 301_OFF
JAN-02-2007: 23:11:15 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-02-2007: 23:12:31 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-03-2007: 02:27:51 Link RP-402 setting changed to 1.00 by Control 402_ON
JAN-03-2007: 02:29:08 Link RP-402 setting changed to 0.00 by Control 402_OFF
JAN-03-2007: 06:41:59 Link RP-402 setting changed to 1.00 by Control 402_ON

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JAN-03-2007: 06:43:15 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-03-2007: 07:27:11 Link RP-04 setting changed to   0.00 by Control 4_OFF
JAN-03-2007: 07:39:30 Link RP-06 setting changed to   0.00 by Control 6_OFF
JAN-03-2007: 07:41:29 Link RXP-3 setting changed to   0.00 by Control X-3_OFF
JAN-03-2007: 09:30:44 Link RP-19 setting changed to   0.00 by Control 19_OFF
JAN-03-2007: 11:02:00 Link RP-15 setting changed to   0.00 by Control 15_OFF
JAN-03-2007: 12:26:21 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-03-2007: 12:27:37 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-03-2007: 20:47:26 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-03-2007: 20:48:42 Link RP-402 setting changed to   0.00 by Control 402_OFF
JAN-04-2007: 07:51:04 Link RP-03B setting changed to   0.00 by Control 3B_OFF
JAN-04-2007: 08:39:26 Link RP-03A setting changed to   0.00 by Control 3A_OFF
JAN-04-2007: 10:30:13 Link RP-402 setting changed to   1.00 by Control 402_ON
JAN-04-2007: 10:31:29 Link RP-402 setting changed to   0.00 by Control 402_OFF
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********** Runoff Quantity Continuity **********	Volume acre-feet	Depth inches
Total Precipitation	535.961	1.760
Evaporation Loss	0.000	0.000
Infiltration Loss	271.163	0.890
Surface Runoff	261.422	0.858
Final Surface Storage	3.246	0.011
Continuity Error (%)	0.024	

********** Flow Routing Continuity **********	Volume acre-feet	Volume Mgallons
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	261.421	85.188
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	33648.723	10964.940
Surface Flooding	3.740	1.219
Evaporation Loss	0.000	0.000
Initial Stored Volume	676598.811	220479.844
Final Stored Volume	648737.092	211400.686
Continuity Error (%)	-0.817	

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Subcatchment Runoff Summary
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Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Peak Runoff CFS	Runoff Coeff
800	1.760	0.000	0.000	0.984	0.765	27.31	0.435
801	1.760	0.000	0.000	0.984	0.765	12.16	0.435
802	1.760	0.000	0.000	0.984	0.765	11.06	0.435
803	1.760	0.000	0.000	0.984	0.765	11.53	0.435
805	1.760	0.000	0.000	0.876	0.873	9.98	0.496
869	1.760	0.000	0.000	1.120	0.628	4.25	0.357
870	1.760	0.000	0.000	1.710	0.000	0.00	0.000
871	1.760	0.000	0.000	0.582	1.168	8.30	0.663
873	1.760	0.000	0.000	1.487	0.224	0.34	0.127
A-1	1.760	0.000	0.000	0.984	0.765	7.85	0.435
A-2	1.760	0.391	0.000	0.711	1.430	28.61	0.665
A-3	1.760	0.000	0.000	0.984	0.765	26.24	0.435
B-1	1.760	0.000	0.000	0.582	1.168	10.09	0.663
B-2	1.760	0.803	0.000	1.449	1.103	12.10	0.431
B-3	1.760	0.000	0.000	1.084	0.665	18.64	0.378
B-4	1.760	0.000	0.000	0.582	1.168	9.15	0.663
B-5	1.760	1.225	0.000	1.575	1.399	9.15	0.469
B-6	1.760	0.000	0.000	1.152	0.597	14.85	0.339
C-1	1.760	0.000	0.000	0.984	0.765	42.27	0.435
C-2	1.760	0.000	0.000	0.582	1.168	18.26	0.663
C-3	1.760	0.000	0.000	0.984	0.765	42.21	0.435
C-4	1.760	0.000	0.000	0.582	1.168	19.83	0.663
C-5	1.760	0.000	0.000	0.881	0.868	5.54	0.493
C-6	1.760	0.000	0.000	0.582	1.167	12.01	0.663
D-1	1.760	0.000	0.000	0.984	0.765	26.36	0.435
D-2	1.760	0.000	0.000	0.984	0.765	13.74	0.435

D-3	1.760	0.000	0.000	0.984	0.765	29.23	0.435
D-4	1.760	0.000	0.000	0.984	0.765	7.53	0.435
D-5	1.760	0.000	0.000	1.380	0.369	7.23	0.210
E-1	1.760	0.000	0.000	0.984	0.765	22.13	0.435
E-2	1.760	0.000	0.000	0.984	0.765	6.33	0.435
E-3	1.760	0.000	0.000	0.984	0.765	16.46	0.435
E-4	1.760	0.000	0.000	1.380	0.369	1.15	0.210
E-5	1.760	0.000	0.000	0.984	0.765	27.75	0.435
E-6	1.760	0.000	0.000	1.152	0.597	8.25	0.339
E-7	1.760	0.000	0.000	1.265	0.484	4.32	0.275
F-1	1.760	0.000	0.000	0.984	0.765	28.72	0.435
F-2	1.760	0.000	0.000	0.984	0.765	10.21	0.435
F-3	1.760	0.000	0.000	0.984	0.765	27.23	0.435
F-4	1.760	0.000	0.000	0.984	0.765	10.19	0.435
F-5	1.760	0.000	0.000	0.984	0.765	13.26	0.435
G-1	1.760	0.000	0.000	0.984	0.765	25.08	0.435
G-2	1.760	0.000	0.000	0.984	0.765	18.66	0.435
G-3	1.760	0.000	0.000	0.984	0.765	28.55	0.435
G-4	1.760	0.000	0.000	0.984	0.765	19.07	0.435
G-5	1.760	1.764	0.000	0.816	2.698	26.42	0.766
G-6	1.760	1.789	0.000	0.817	2.722	26.84	0.767
H-1	1.760	0.000	0.000	0.662	1.087	10.16	0.618
H-2	1.760	0.000	0.000	0.662	1.087	39.37	0.618
H-3	1.760	0.000	0.000	0.662	1.087	29.95	0.618
I-1	1.760	0.000	0.000	0.527	1.222	77.09	0.695
I-2	1.760	0.000	0.000	0.437	1.312	14.99	0.746
I-3	1.760	0.000	0.000	0.681	1.068	5.36	0.607
I-4	1.760	0.000	0.000	0.582	1.168	12.51	0.663
J-1	1.760	0.000	0.000	0.527	1.222	66.51	0.694
K-1	1.760	0.000	0.000	0.527	1.222	93.58	0.695
EX-3	1.760	0.000	0.000	0.792	0.956	22.33	0.543
EX-2	1.760	0.000	0.000	0.998	0.750	17.48	0.426
EX-4	1.760	0.000	0.000	0.995	0.753	3.26	0.428
EX-1	1.760	0.000	0.000	0.875	0.873	68.46	0.496
System	1.760	0.039	0.000	0.890	0.898	1222.83	0.499

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Node Depth Summary
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Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Total Flooding acre-in	Total Minutes Flooded
001	JUNCTION	1.65	4.22	96.22	1 00:22	0	0
002	JUNCTION	1.65	4.18	96.18	1 00:28	0	0
003	JUNCTION	0.52	0.65	96.65	0 10:01	0	0
004	JUNCTION	0.41	0.84	88.34	0 11:59	0	0
005	JUNCTION	0.19	2.57	88.57	0 10:16	0	0
006	JUNCTION	1.98	2.49	87.99	0 11:53	0	0
007	JUNCTION	0.63	3.74	81.74	0 10:15	0	0
008	JUNCTION	0.82	2.99	80.74	0 10:15	0	0
009	JUNCTION	1.02	3.74	80.24	0 10:17	0	0
010	JUNCTION	1.36	5.13	78.13	0 10:25	0	0
011	JUNCTION	0.70	3.26	75.26	0 10:34	0	0
012	JUNCTION	0.18	2.99	93.49	0 10:15	0	0
013	JUNCTION	0.22	3.92	91.92	0 10:16	0	0
014	JUNCTION	0.06	1.00	94.50	0 10:05	0	0
015	JUNCTION	0.91	1.70	92.20	2 11:02	0	0
016	JUNCTION	0.14	2.14	94.14	0 10:15	0	0
017	JUNCTION	0.30	3.53	90.63	0 10:16	0	0
018	JUNCTION	0.12	1.77	98.27	0 10:16	0	0
019	JUNCTION	0.53	0.91	89.41	0 10:51	0	0
020	JUNCTION	0.22	5.96	93.96	0 10:15	0	0
021	JUNCTION	0.59	1.03	88.53	2 08:07	0	0
022	JUNCTION	0.83	4.52	89.52	0 10:16	0	0
024	JUNCTION	0.33	2.12	81.12	0 10:15	0	0
025	JUNCTION	0.39	1.06	79.85	0 10:17	0	0
026	JUNCTION	0.12	1.67	77.67	0 10:15	0	0
027	JUNCTION	0.44	1.89	75.26	0 10:17	0	0
028	JUNCTION	0.14	2.01	71.01	0 10:15	0	0
029	JUNCTION	1.29	3.86	70.25	0 10:41	0	0
030	JUNCTION	2.19	4.76	70.22	0 10:40	0	0
130	JUNCTION	2.24	4.73	70.09	0 10:39	0	0
032	JUNCTION	0.51	7.29	70.79	0 10:16	0	0

033	JUNCTION	2.25	2.99	64.49	0	17:23	0	0
034	JUNCTION	0.20	0.57	60.57	0	17:25	0	0
103	JUNCTION	1.34	1.52	94.13	0	10:13	0	0
106	JUNCTION	0.61	0.95	85.53	0	12:08	0	0
125	JUNCTION	0.51	1.63	77.17	0	10:17	0	0
127	JUNCTION	0.45	1.96	72.47	0	10:18	0	0
301	JUNCTION	1.13	8.00	74.00	0	00:00	44.87	434
33A	JUNCTION	0.00	8.50	70.00	0	09:47	0.00	0
400	JUNCTION	16.75	42.25	127.25	1	14:32	0	0
401	JUNCTION	0.16	0.72	90.72	0	11:55	0	0
4A	JUNCTION	0.16	3.00	91.50	0	10:16	0	0
W-01	JUNCTION	10.62	16.28	81.58	0	00:00	0	0
W-02	JUNCTION	10.10	10.08	75.34	0	00:31	0	0
W-03	JUNCTION	6.91	6.92	71.90	0	00:33	0	0
W-04	JUNCTION	12.99	13.24	69.22	0	11:02	0	0
W-05	JUNCTION	12.51	12.82	68.76	0	11:02	0	0
W-06	JUNCTION	11.60	12.00	67.83	0	10:59	0	0
W-07	JUNCTION	11.10	11.47	67.26	0	11:00	0	0
W-08	JUNCTION	5.31	8.99	64.63	0	00:00	0	0
W-09	JUNCTION	12.92	13.94	60.58	0	00:00	0	0
W-10	JUNCTION	12.84	13.26	59.86	0	11:11	0	0
W-11	JUNCTION	5.47	12.00	58.29	0	00:00	0	0
X-1	JUNCTION	0.59	3.56	79.90	0	10:17	0	0
X-2	JUNCTION	0.58	2.96	79.07	0	10:16	0	0
X-3	JUNCTION	1.14	1.94	86.94	0	10:57	0	0
X-4	JUNCTION	0.39	1.00	83.34	0	00:00	0	0
315	JUNCTION	0.86	2.98	73.98	0	10:47	0	0
316	JUNCTION	11.20	19.90	85.90	0	03:45	0	0
131	JUNCTION	2.20	3.41	68.63	0	10:45	0	0
031	JUNCTION	2.26	4.71	70.02	0	10:38	0	0
O-2	OUTFALL	5.08	11.10	57.38	0	00:00	0	0
O-1	OUTFALL	0.15	0.46	60.46	0	18:33	0	0
R-1	STORAGE	16.04	16.25	82.25	0	00:00	0	0
Existing	STORAGE	0.00	2.99	70.99	0	00:00	0	0
R-19	STORAGE	1.67	4.89	88.29	1	00:22	0	0
RX-3	STORAGE	1.87	5.61	88.02	1	00:16	0	0
R-06	STORAGE	1.19	3.65	86.65	1	00:19	0	0
R-03A	STORAGE	2.80	5.92	96.21	1	00:25	0	0
R-03B	STORAGE	2.80	5.88	96.17	1	00:26	0	0
R-04	STORAGE	1.32	3.95	88.95	1	00:18	0	0
R-15	STORAGE	1.26	3.68	88.48	1	00:24	0	0
R-33	STORAGE	0.47	2.28	71.28	0	17:32	0	0
R-301	STORAGE	0.09	1.50	70.80	0	00:00	0	0
R-401	STORAGE	0.01	0.05	91.15	0	11:50	0	0
R-400	STORAGE	1.04	4.01	87.01	0	21:33	0	0
R-211	STORAGE	0.00	0.00	0.00	0	00:00	0	0
R-402	STORAGE	4.30	11.04	85.54	0	10:12	0	0

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Node Flow Summary
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Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days	hr:min	Maximum Flooding Overflow CFS	Time of Max Occurrence days	hr:min
001	JUNCTION	28.72	28.72	0	10:14	0.00		
002	JUNCTION	28.55	28.55	0	10:14	0.00		
003	JUNCTION	0.00	3.56	0	09:15	0.00		
004	JUNCTION	0.00	1.60	0	07:06	0.00		
005	JUNCTION	26.84	26.84	0	10:14	0.00		
006	JUNCTION	0.00	36.03	1	01:50	0.00		
007	JUNCTION	29.95	29.95	0	10:14	0.00		
008	JUNCTION	67.40	106.19	0	10:14	0.00		
009	JUNCTION	14.98	117.45	0	10:15	0.00		
010	JUNCTION	0.00	181.54	0	10:16	0.00		
011	JUNCTION	90.61	264.25	0	10:28	0.00		
012	JUNCTION	49.87	49.87	0	10:14	0.00		
013	JUNCTION	13.71	61.43	0	10:15	0.00		
014	JUNCTION	6.32	6.32	0	10:14	0.00		
015	JUNCTION	0.00	3.90	0	07:43	0.00		
016	JUNCTION	36.75	36.75	0	10:14	0.00		
017	JUNCTION	7.23	43.27	0	10:15	0.00		
018	JUNCTION	26.35	26.35	0	10:14	0.00		
019	JUNCTION	0.00	7.80	0	10:57	0.00		

020	JUNCTION	84.47	84.47	0	10:14	0.00		
021	JUNCTION	0.00	7.80	0	10:51	0.00		
022	JUNCTION	18.25	99.71	0	10:15	0.00		
024	JUNCTION	12.10	12.10	0	10:14	0.00		
025	JUNCTION	9.14	39.33	0	00:00	0.00		
026	JUNCTION	18.64	18.64	0	10:14	0.00		
027	JUNCTION	27.01	101.97	0	10:15	0.00		
028	JUNCTION	28.61	28.61	0	10:14	0.00		
029	JUNCTION	37.77	167.11	0	10:15	0.00		
030	JUNCTION	8.30	157.48	0	10:17	0.00		
130	JUNCTION	66.50	185.46	0	10:17	0.00		
032	JUNCTION	93.57	93.57	0	10:14	0.00		
033	JUNCTION	0.00	7.19	0	17:31	0.00		
034	JUNCTION	0.00	7.19	0	18:31	0.00		
103	JUNCTION	0.00	3.56	0	10:12	0.00		
106	JUNCTION	0.00	12.73	0	12:02	0.00		
125	JUNCTION	27.30	60.43	0	10:14	0.00		
127	JUNCTION	11.06	108.99	0	10:16	0.00		
301	JUNCTION	0.00	18.96	1	06:47	9.48	1	06:47
33A	JUNCTION	0.00	82.49	0	10:17	1.73	0	09:50
400	JUNCTION	0.00	1.78	0	00:00	0.00		
401	JUNCTION	0.00	3.87	0	11:50	0.00		
4A	JUNCTION	23.46	23.46	0	10:14	0.00		
W-01	JUNCTION	0.00	4500.00	0	00:00	0.00		
W-02	JUNCTION	0.00	11758.04	0	00:00	0.00		
W-03	JUNCTION	0.00	4499.97	0	00:33	0.00		
W-04	JUNCTION	0.00	4499.96	0	00:33	0.00		
W-05	JUNCTION	0.00	4503.99	0	11:18	0.00		
W-06	JUNCTION	0.00	4861.51	0	10:52	0.00		
W-07	JUNCTION	0.00	4858.49	0	10:57	0.00		
W-08	JUNCTION	0.00	4857.62	0	11:01	0.00		
W-09	JUNCTION	0.00	8238.56	0	00:00	0.00		
W-10	JUNCTION	0.00	8931.20	0	00:01	0.00		
W-11	JUNCTION	0.00	4852.35	0	11:12	0.00		
X-1	JUNCTION	0.00	112.33	0	10:18	0.00		
X-2	JUNCTION	77.08	185.44	0	10:14	0.00		
X-3	JUNCTION	0.00	14.20	0	10:55	0.00		
X-4	JUNCTION	0.00	14.20	0	10:57	0.00		
315	JUNCTION	17.48	20.80	0	10:44	0.00		
316	JUNCTION	0.00	6.24	0	00:00	0.00		
131	JUNCTION	0.00	382.59	0	10:36	0.00		
031	JUNCTION	0.00	389.93	0	10:30	0.00		
O-2	OUTFALL	0.00	16133.91	0	00:00	0.00		
O-1	OUTFALL	0.00	7.19	0	18:33	0.00		
R-1	STORAGE	0.00	0.00	0	00:00	0.00		
Existing	STORAGE	3.26	23.84	0	10:46	0.00		
R-19	STORAGE	13.74	80.30	0	10:16	0.00		
RX-3	STORAGE	37.38	133.62	0	10:15	0.00		
R-06	STORAGE	26.41	50.96	0	10:15	0.00		
R-03A	STORAGE	27.23	53.02	0	10:14	0.00		
R-03B	STORAGE	25.08	50.99	0	10:14	0.00		
R-04	STORAGE	10.19	30.76	0	10:15	0.00		
R-15	STORAGE	16.46	83.21	0	10:15	0.00		
R-33	STORAGE	0.00	82.49	0	10:17	0.00		
R-301	STORAGE	0.34	23.91	0	18:33	0.00		
R-401	STORAGE	4.25	4.25	0	10:45	0.00		
R-400	STORAGE	9.97	9.97	0	10:15	0.00		
R-211	STORAGE	0.00	0.00	0	00:00	0.00		
R-402	STORAGE	0.00	3.87	0	11:56	0.00		

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Storage Volume Summary
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Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
R-1	28913047.552	98	29453125.632	100	0 00:00	4500.00
Existing	0.000	0	0.490	9	0 00:00	167.12
R-19	136.564	13	426.990	41	1 00:22	3.90
RX-3	216.438	16	689.212	50	1 00:16	6.40
R-06	90.659	12	292.501	37	1 00:19	2.70
R-03A	140.239	30	326.508	70	1 00:25	1.80
R-03B	137.529	29	322.529	68	1 00:26	1.78
R-04	52.895	14	171.314	46	1 00:18	1.60

R-15	153.253	10	465.617	29	1	00:24	3.90
R-33	65.534	11	317.718	55	0	17:32	7.19
R-301	21.404	2	369.820	42	0	00:00	22.08
R-401	0.851	0	7.919	1	0	11:50	3.87
R-400	23.020	16	91.479	64	0	21:33	1.78
R-211	0.000	0	0.000	0	0	00:00	0.00
R-402	0.108	27	0.276	69	0	10:12	28.13

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Outfall Loading Summary
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Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS
O-2	100.00	4517.81	16133.91
O-1	74.24	3.07	7.19
System	87.12	4520.88	16133.91

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Link Flow Summary
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Link	Type	Maximum Flow CFS	Time of Max Occurrence days	hr:min	Maximum Velocity ft/sec	Max/ Full Flow	Max/ Full Depth	Total Minutes Surcharged
OP-1	CONDUIT	7.19	0	18:33	3.08	0.20	0.15	0
P-001	CONDUIT	26.23	0	10:16	4.46	1.73	1.00	1480
P-002	CONDUIT	26.38	0	10:16	4.48	1.66	1.00	1483
P-003	CONDUIT	3.56	0	10:12	2.80	0.32	0.59	0
P-004	CONDUIT	1.66	0	07:41	1.21	0.43	0.78	0
P-004A	CONDUIT	20.92	0	10:17	4.91	1.21	0.81	18
P-005	CONDUIT	25.17	0	10:17	4.78	0.96	0.70	0
P-006	CONDUIT	11.73	0	11:59	3.52	0.39	0.65	0
P-007	CONDUIT	29.49	0	10:15	3.17	2.11	0.93	37
P-008	CONDUIT	102.75	0	10:15	3.54	0.68	0.89	0
P-009	CONDUIT	112.33	0	10:18	3.01	1.80	0.90	41
P-010	CONDUIT	152.49	0	10:27	2.84	1.07	0.83	16
P-012	CONDUIT	48.01	0	10:15	4.16	0.85	0.86	0
P-013	CONDUIT	61.61	0	10:17	7.68	0.90	0.61	0
P-014	CONDUIT	6.56	0	10:15	5.95	0.67	0.69	0
P-015	CONDUIT	3.90	0	10:57	2.02	0.79	0.61	0
P-016	CONDUIT	36.17	0	10:15	7.06	0.83	0.68	0
P-017	CONDUIT	43.58	0	10:17	5.41	0.81	0.65	0
P-018	CONDUIT	24.65	0	10:16	6.80	0.83	0.69	0
P-019	CONDUIT	7.80	0	10:51	2.83	0.16	0.49	0
P-020	CONDUIT	82.03	0	10:15	6.53	1.22	1.00	15
P-021	CONDUIT	7.86	2	08:11	2.68	0.20	0.61	0
P-022	CONDUIT	98.01	0	10:16	6.36	1.55	0.73	26
P-024	CONDUIT	11.70	0	10:16	3.08	1.21	0.53	14
P-025	CONDUIT	49.46	0	00:00	7.07	0.06	0.27	0
P-026	CONDUIT	18.11	0	10:15	4.17	0.60	0.59	0
P-027	CONDUIT	99.18	0	10:17	7.06	0.13	0.38	0
P-028	CONDUIT	27.75	0	10:15	2.98	0.51	0.70	0
P-029	CONDUIT	150.58	0	10:17	7.04	0.31	0.86	0
P-030	CONDUIT	136.96	0	10:21	3.77	1.44	0.95	42
P-032	CONDUIT	82.49	0	10:17	6.94	0.98	1.00	0
P-033	CONDUIT	7.19	0	18:31	2.03	0.07	0.26	0
P-103	CONDUIT	3.56	0	10:14	3.35	0.25	0.52	0
P-106	CONDUIT	12.72	0	12:09	4.14	0.35	0.61	0
P-109	CONDUIT	181.54	0	10:16	4.54	0.40	0.83	0
P-123	CONDUIT	39.33	0	00:00	5.63	0.05	0.20	0
P-125	CONDUIT	57.94	0	10:17	7.05	0.10	0.35	0
P-127	CONDUIT	106.68	0	10:18	7.06	0.14	0.57	0
P-400	CONDUIT	1.51	1	14:32	7.69	9.98	1.00	3616
PX-1	CONDUIT	113.55	0	10:19	5.48	1.98	0.99	47
WW-01	CONDUIT	11758.04	0	00:00	17.31	4.16	0.64	5397
WW-02	CONDUIT	4499.97	0	00:33	7.16	1.01	0.52	5386
WW-03	CONDUIT	4499.96	0	00:33	22.07	0.28	0.77	0
WW-04	CONDUIT	4503.99	0	11:18	9.42	2.21	0.80	5391
WW-05	CONDUIT	4512.22	0	11:21	5.42	1.73	0.76	5388

WW-06	CONDUIT	4858.49	0	10:57	6.80	2.00	0.72	5388
WW-07	CONDUIT	4857.62	0	11:01	7.06	1.74	0.58	5376
WW-08	CONDUIT	8238.56	0	00:00	27.86	0.30	0.79	0
WW-09	CONDUIT	8931.20	0	00:01	8.77	2.14	0.82	5351
WW-10	CONDUIT	4852.35	0	11:12	6.17	1.74	0.68	5369
WW-11	CONDUIT	16133.91	0	00:00	16.60	1.73	0.53	2
PX-3	CONDUIT	14.20	0	10:57	4.27	1.45	0.64	2878
P-316	CONDUIT	4.47	0	03:45	5.83	1.26	0.94	385
P-315	CONDUIT	20.61	0	10:47	4.49	0.30	0.33	0
P-401	CONDUIT	3.87	0	11:56	3.90	0.27	0.35	0
P-130	CONDUIT	152.60	0	10:19	2.63	1.14	0.90	20
P-031	CONDUIT	382.59	0	10:36	5.64	1.89	0.74	121
P-011	CONDUIT	256.11	0	10:34	5.51	0.40	0.75	0
RXP-01	PUMP	83.56	0	00:00		1.00		1
RP-03A	PUMP	1.78	0	09:15		1.00		3938
RP-04	PUMP	1.60	0	07:06		1.00		2896
RP-06	PUMP	2.70	0	07:15		1.00		2899
RP-15	PUMP	3.90	0	07:43		1.00		3073
RP-19	PUMP	3.90	0	07:12		1.00		3014
RXP-3	PUMP	6.40	0	06:19		1.00		2928
RP-33A	PUMP	82.49	0	10:17		0.92		0
RP-400	PUMP	1.78	0	00:00		1.00		2008
RP-03B	PUMP	1.78	0	09:15		1.00		3915
RP-EX	PUMP	83.56	0	00:00		1.00		1
RP-301	PUMP	6.24	0	00:00		1.00		225
RP-402	PUMP	28.13	0	08:49		0.56		0
OR-1	DUMMY	4500.00	0	00:00				
OR-33	DUMMY	7.19	0	17:31				
OR-301	DUMMY	23.61	0	18:33				
OR-401	DUMMY	3.87	0	11:50				
OR-132	DUMMY	373.29	0	10:45				

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
OP-1	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.33	0.0000
P-001	1.00	0.05	0.00	0.00	0.68	0.00	0.00	0.26	0.04	0.0000
P-002	1.00	0.05	0.00	0.00	0.68	0.00	0.00	0.26	0.04	0.0000
P-003	1.00	0.07	0.00	0.00	0.19	0.00	0.00	0.73	0.65	0.0000
P-004	1.00	0.07	0.00	0.00	0.92	0.00	0.00	0.00	0.10	0.0000
P-004A	1.00	0.05	0.00	0.00	0.44	0.00	0.00	0.51	0.05	0.0000
P-005	1.00	0.04	0.00	0.00	0.42	0.00	0.00	0.54	0.06	0.0000
P-006	1.00	0.00	0.08	0.00	0.92	0.00	0.00	0.00	0.63	0.0000
P-007	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.04	0.0000
P-008	1.00	0.00	0.00	0.00	0.77	0.00	0.00	0.23	0.43	0.0000
P-009	1.00	0.00	0.00	0.00	0.56	0.00	0.00	0.43	0.33	0.0000
P-010	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.19	0.0000
P-012	1.00	0.32	0.21	0.00	0.47	0.00	0.00	0.00	0.11	0.0000
P-013	1.00	0.05	0.26	0.00	0.68	0.00	0.00	0.00	0.06	0.0000
P-014	1.00	0.05	0.55	0.00	0.35	0.04	0.00	0.00	0.08	0.0000
P-015	1.00	0.08	0.01	0.00	0.92	0.00	0.00	0.00	0.22	0.0000
P-016	1.00	0.05	0.00	0.00	0.00	0.00	0.00	0.95	0.25	0.0000
P-017	1.00	0.05	0.15	0.00	0.79	0.00	0.00	0.00	0.04	0.0000
P-018	1.00	0.05	0.00	0.00	0.30	0.00	0.00	0.65	0.13	0.0000
P-019	1.00	0.08	0.00	0.00	0.92	0.00	0.00	0.00	0.41	0.0000
P-020	1.00	0.04	0.51	0.00	0.46	0.00	0.00	0.00	0.06	0.0000
P-021	1.00	0.07	0.01	0.00	0.56	0.00	0.00	0.36	0.29	0.0000
P-022	1.00	0.04	0.00	0.00	0.40	0.00	0.00	0.56	0.08	0.0000
P-024	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.06	0.0000
P-025	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.42	0.0000
P-026	1.00	0.00	0.52	0.00	0.48	0.00	0.00	0.00	0.07	0.0000
P-027	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.54	0.0000
P-028	1.00	0.00	0.37	0.00	0.63	0.00	0.00	0.00	0.03	0.0000
P-029	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.0000
P-030	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.07	0.0000
P-032	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.18	0.0002
P-033	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.19	0.0000
P-103	1.00	0.07	0.00	0.00	0.00	0.00	0.00	0.93	0.86	0.0000
P-106	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.84	0.0000
P-109	1.00	0.01	0.00	0.00	0.85	0.00	0.00	0.14	0.39	0.0000
P-123	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.49	0.0000

P-125	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.43	0.0000
P-127	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.25	0.0000
P-400	1.00	0.00	0.00	0.00	0.40	0.60	0.00	0.00	0.98	0.0001
PX-1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.38	0.0000
WW-01	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.31	0.0001
WW-02	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.0000
WW-03	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.08	0.0000
WW-04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.22	0.0000
WW-05	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.24	0.0001
WW-06	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.27	0.0001
WW-07	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.46	0.0000
WW-08	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.28	0.0000
WW-09	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.22	0.0000
WW-10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.0000
WW-11	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.94	0.0000
PX-3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.41	0.0000
P-316	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.42	0.0000
P-315	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.0000
P-401	1.00	0.07	0.00	0.00	0.00	0.00	0.00	0.93	0.50	0.0000
P-130	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.07	0.0000
P-031	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.12	0.0003
P-011	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.25	0.0000

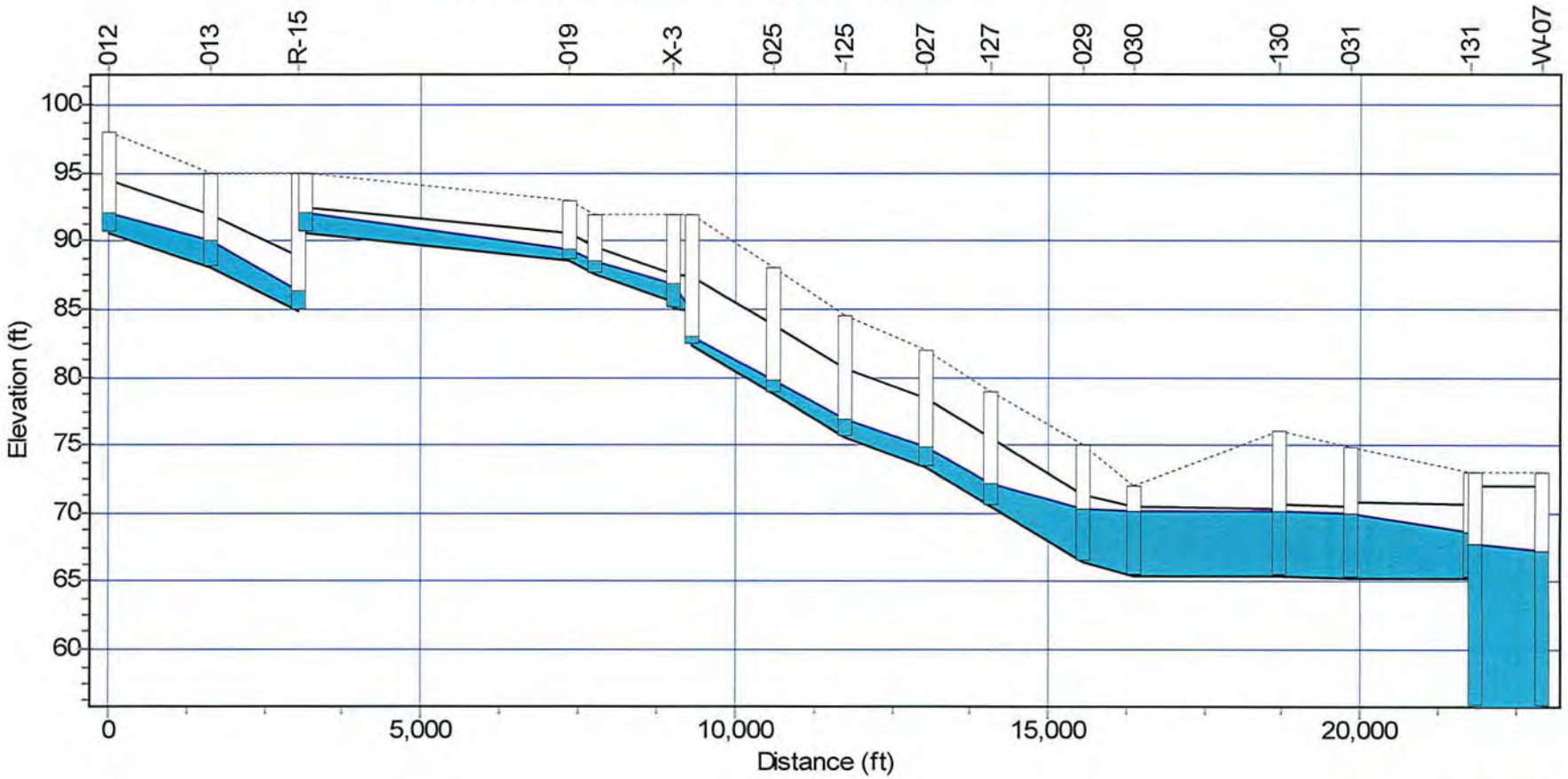
****
Highest Continuity Errors
****
Node 131 (-7.08%)
Node Existing (-1.29%)
Node R-03A (-0.60%)
Node R-03B (-0.55%)
Node 031 (0.54%)

****
Time-Step Critical Elements
****
Link WW-11 (100.00%)
Node 011 (0.00%)

****
Routing Time Step Summary
****
Minimum Time Step : 1.12 sec
Average Time Step : 1.58 sec
Maximum Time Step : 2.04 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.79

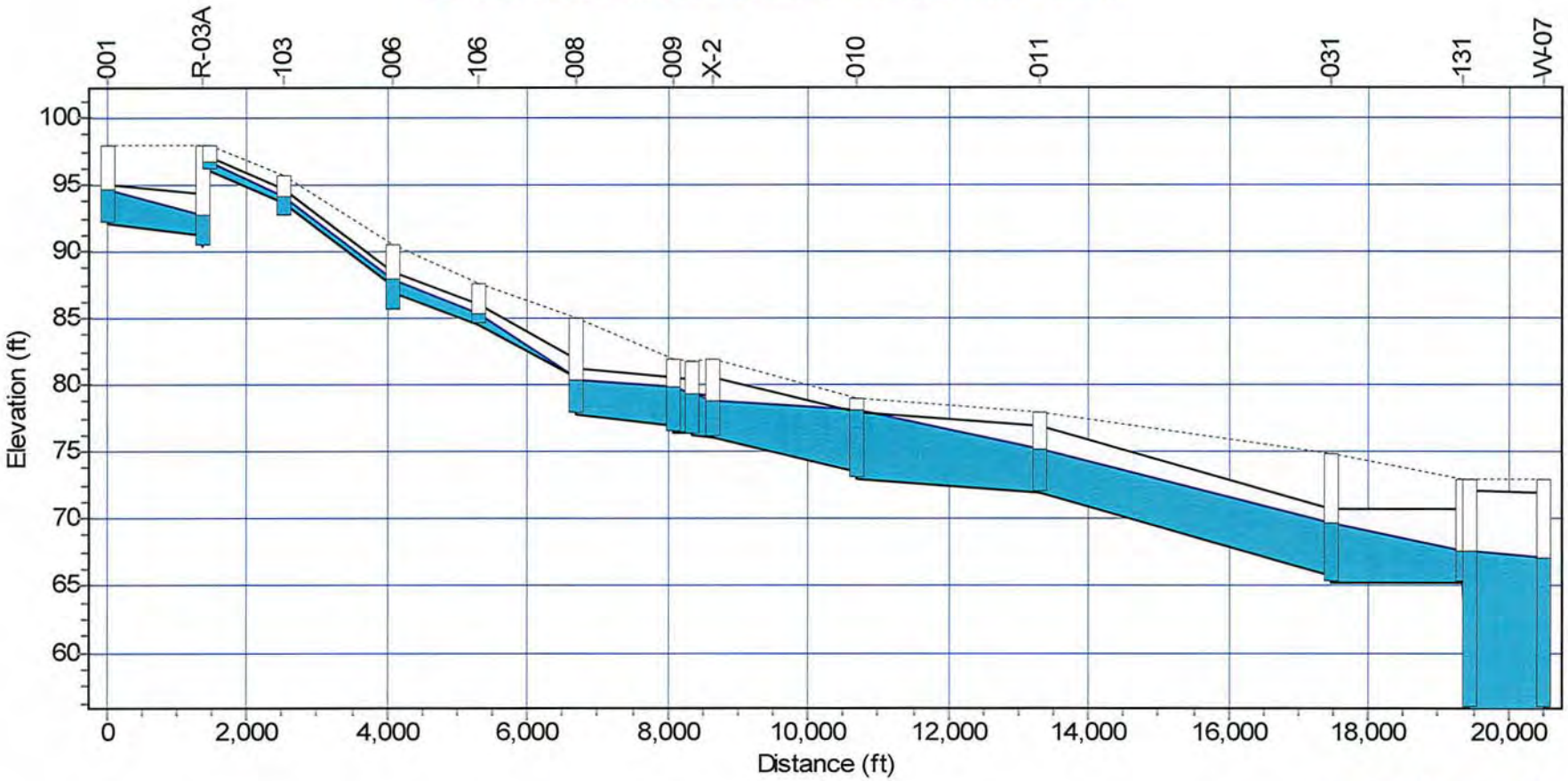
Analysis begun on: Thu Dec 13 10:23:02 2007
Total elapsed time: 00:01:15

Water Elevation Profile: Node 012 - W-07



01/01/2007 10:40:00

Water Elevation Profile: Node 001 - W-07



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D-1
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D-3
D-4
D-5
EX-1
EX-2
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E-1
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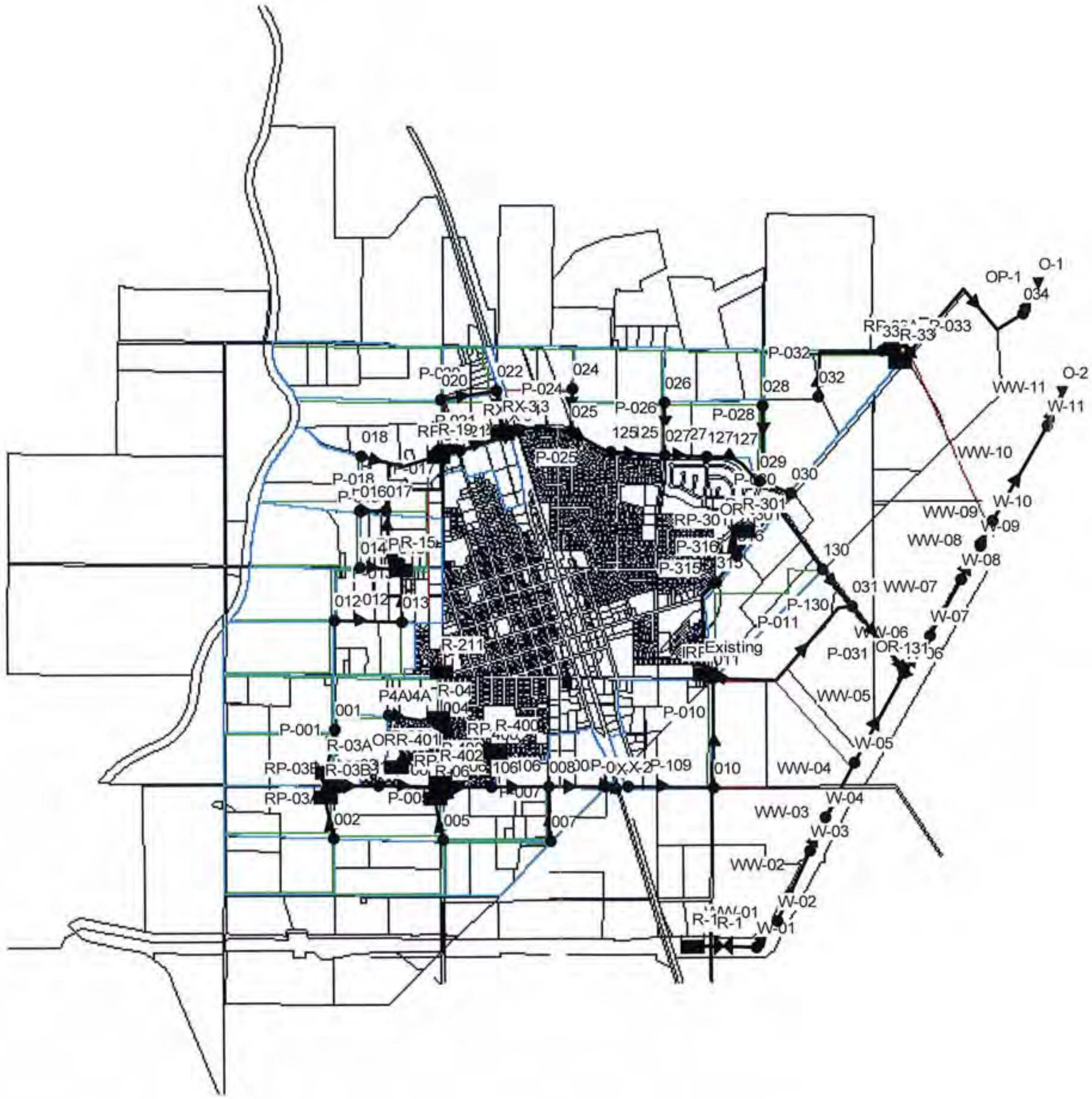
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028
026
024
022
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P-028
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029
030
130
031
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P-011
Existing
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P-109
010
018
P-018
P-025
P-315
P-316
R-301
R-211
014
012
013
001
P-001
R-03A
R-03B
RP-03B
RP-03A
002
005
007
P-007
R-402
R-400
R-401
106
008

Appendix C

NORTHSIDE DRAIN - DIRECT DISCHARGE - PIPES

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	36" CIPP	991	L.F.	$ 105	$ 104,055		
		48" CCIP	1,630	L.F.	$ 140	$ 228,200		
		66" CCIP	1,415	L.F.	$ 200	$ 283,000		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
		66" CULVERTS	1	EACH	$ 19,200	$ 19,200		
							$ 680,243	
4	PIPELINE	36" CIPP	2,594	L.F.	$ 105	$ 272,370		
		72" CIPP	2,416	L.F.	$ 220	$ 531,520		
		MANHOLES	13	EACH	$ 4,163	$ 54,113		
		72" CULVERTS	1	EACH	$ 20,000	$ 20,000		
							$ 878,003	
3	PIPELINE	36" CIPP	2,357	L.F.	$ 105	$ 247,485		
		72" CIPP	1,672	L.F.	$ 220	$ 367,840		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
		72" CULVERTS	1	EACH	$ 20,000	$ 20,000		
							$ 681,113	
	HY 33 AND RAILROAD	72" CROSSING	1	EACH	$ 255,000	$ 255,000		
							$ 255,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$ 105	$ 239,925		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		36" CULVERTS	2	EACH	$ 15,000	$ 30,000		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 334,900	
1	PIPELINE	36" CIPP	1,784	L.F.	$ 105	$ 187,320		
		MANHOLES	4	EACH	$ 4,163	$ 16,650		
		36" CULVERTS	1	EACH	$ 15,000	$ 15,000		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
		LINING RISE	5360	SQ.FT	$ 3.0	$ 16,080		
							$ 255,050	
OFFSITE	OPEN CHANNEL	EARTHWORK	33,933	C.Y.	$ 3.5	$ 118,766		
		LANDSCAPE	29,257	SQ.FT	$ 2.3	$ 68,168		
		LINING	147,949	SQ.FT	$ 3.0	$ 443,847		
							$ 630,782	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$ 2.3	$ 121,626		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$ 3.5	$ 109,620		
							$ 231,246	
	ROAD CROSSING	TWIN 72" CULVERTS	2	EACH	$ 240,000	$ 480,000		
							$ 480,000	
		Total estimated Construction Cost						$ 4,426,335
		Construction Contingency @ 30 %				$ 1,327,900		
		Subtotal					$ 5,754,235	
		Engineering, Legal and Admin. @ 15 %				$ 863,135		
		Subtotal					$ 6,617,370	
		CANALS RIGHT-OF-WAY	5.6	ACRES	$ 20,000	$ 112,131		
		ESTIMATED TOTAL PROJECT COST						**$ 6,729,502**

NORTHSIDE DRAIN - DIRECT DISCHARGE - OPEN CHANNEL

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	36" CIPP	991	L.F.	$ 105	$ 104,055		
		48" CCIP	1,630	L.F.	$ 140	$ 228,200		
		66" CCIP	1,415	L.F.	$ 200	$ 283,000		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
		66" CULVERTS	1	EACH	$ 19,200	$ 19,200		
							$ 680,243	
4	PIPELINE	36" CIPP	2,594	L.F.	$ 105	$ 272,370		
		72" CCIP	2,416	L.F.	$ 220	$ 531,520		
		MANHOLES	13	EACH	$ 4,163	$ 54,113		
		72" CULVERTS	1	EACH	$ 20,000	$ 20,000		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
							$ 898,003	
3	PIPELINE	36" CIPP	2,357	L.F.	$ 105	$ 247,485		
		MANHOLES	7	EACH	$ 4,163	$ 29,138		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 316,623	
	OPEN CHANNEL	EARTHWORK	12,583	C.Y.	$ 3.5	$ 44,039		
		LANDSCAPE	21,614	SQ.FT	$ 2.3	$ 50,361		
		LINING	53,224	SQ.FT	$ 3.0	$ 159,673		
		72" CULVERTS	1	EACH	$ 120,000	$ 120,000		
							$ 374,073	
	GREEN BELT	LANDSCAPE	25,080	SQ.FT	$ 2.3	$ 58,436		
		CONCRETE SIDEWALK / BIKE PATH	15,048	SQ.FT	$ 3.5	$ 52,668		
							$ 111,104	
	HY 33 AND RAILROAD	72" CROSSING	1	EACH	$ 255,000	$ 255,000		
							$ 255,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$ 105	$ 239,925		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		36" CULVERTS	2	EACH	$ 15,000	$ 30,000		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 334,900	
1	PIPELINE	36" CIPP	1,784	L.F.	$ 105	$ 187,320		
		MANHOLES	4	EACH	$ 4,163	$ 16,650		
		36" CULVERTS	1	EACH	$ 15,000	$ 15,000		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
		LINING RISE	5,360	SQ.FT	$ 3	$ 16,080		
							$ 255,050	
OFFSITE	OPEN CHANNEL	EARTHWORK	43,492	C.Y.	$ 3.5	$ 152,221		
		LANDSCAPE	51,814	SQ.FT	$ 2.3	$ 120,726		
		LINING	147,949	SQ.FT	$ 3.0	$ 443,847		
							$ 716,795	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$ 2.3	$ 121,626		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$ 3.5	$ 109,620		
							$ 231,246	
	ROAD CROSSING	TWIN 72" CULVERTS	2	EACH	$ 240,000	$ 480,000		
							$ 480,000	
		Total estimated Construction Cost						$ 4,653,035
		Construction Contingency @ 30 %				$ 1,395,911		
		Subtotal					$ 6,048,946	
		Engineering, Legal and Admin. @ 15 %				$ 907,342		
		Subtotal					$ 6,956,288	
		CANALS RIGHT-OF-WAY	11.5	ACRES	$ 20,000	$ 230,375		
		ESTIMATED TOTAL PROJECT COST						**$ 7,186,663**

NORTHSIDE DRAIN - DETENTION BASIN - PIPE

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	18" CIPP	991	L.F.	$ 50	$ 49,550		
		48" CCIP	3,045	L.F.	$ 140	$ 426,300		
		48" CULVERTS	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
							$ 538,338	
	DETENTION BASIN	BASIN EARTHWORK	51,523	C.Y.	$ 3	$ 154,570		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 284,570	
4	PIPELINE	24" CIPP	4,199	L.F.	$ 61	$ 255,579		
		30" CIPP	1,918	L.F.	$ 85	$ 163,030		
		36" CIPP	676	L.F.	$ 105	$ 70,980		
		48" CIPP	2,652	L.F.	$ 140	$ 371,280		
		48" CULVERTS	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	23	EACH	$ 4,163	$ 95,738		
							$ 973,307	
	DETENTION BASIN	BASIN EARTHWORK	42,659	C.Y.	$ 3	$ 127,977		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 257,977	
3	PIPELINE	24" CIPP	429	L.F.	$ 61	$ 26,112		
		30" CIPP	1,243	L.F.	$ 85	$ 105,655		
		48" CIPP	1,360	L.F.	$ 140	$ 190,400		
		60" CIPP	997	L.F.	$ 160	$ 159,520		
		30" CULVERTS	1	EACH	$ 14,200	$ 14,200		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
							$ 541,674	
	DETENTION BASIN	BASIN EARTHWORK	64,415	C.Y.	$ 3	$ 193,244		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 323,244	
	HY 33 AND RAILROAD	36" CROSSING	1	EACH	$ 155,000	$ 155,000		
							$ 155,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$ 105	$ 239,925		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		36" CULVERTS	1	EACH	$ 15,000	$ 15,000		
							$ 279,900	
	DETENTION BASIN	BASIN EARTHWORK	37,607	C.Y.	$ 3	$ 112,821		
		INLET STRUCTURE	1.0	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 242,821	
1	PIPELINE	36" CIPP	1,784	L.F.	$ 105	$ 187,320		
		MANHOLES	4	EACH	$ 4,163	$ 16,650		
		36" CULVERTS	1	EACH	$ 15,000	$ 15,000		
							$ 218,970	
	DETENTION BASIN	BASIN EARTHWORK	33,371	C.Y.	$ 3	$ 100,112		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 230,112	
9	DETENTION BASIN	BASIN EARTHWORK	31,792	C.Y.	$ 5	$ 158,960		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 288,960	
OFFSITE	OPEN CHANNEL	EARTHWORK	28,473	C.Y.	$ 3.5	$ 99,655		
		LANDSCAPE	62,215	SQ.FT	$ 2.3	$ 144,961		
		LINING	97,780	SQ.FT	$ 3.0	$ 293,340		
							$ 537,956	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$ 2.3	$ 121,626		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$ 3.5	$ 109,620		
							$ 231,246	
	ROAD CROSSING	48" RCP CULVERT	2	EACH	$ 56,700	$ 113,400		
							$ 113,400	
		Total estimated Construction Cost						$ 5,217,475
		Construction Contingency @ 30 %				$ 1,565,242		
		Subtotal					$ 6,782,717	
		Engineering, Legal and Admin. @ 15 %				$ 1,017,408		
		Subtotal					$ 7,800,125	
		BASIN RIGHT-OF-WAY	54	ACRE	$ 20,000	$ 1,080,000		
		CANAL RIGHT-OF-WAY	5.2	ACRE	$ 20,000	$ 104,895		
		ESTIMATED TOTAL PROJECT COST						$ 8,985,019

NORTHSIDE DRAIN -DETENTION BASIN - OPEN CHANNEL

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	18" CIPP	991	L.F.	$ 50	$ 49,550		
		48" CCIP	3,045	L.F.	$ 140	$ 426,300		
		48" CULVERT	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
							$ 538,338	
	DETENTION BASIN	BASIN EARTHWORK	51,523	C.Y.	$ 3	$ 154,570		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 284,570	
4	PIPELINE	24" CIPP	4,199	L.F.	$ 61	$ 255,579		
		30" CIPP	1,918	L.F.	$ 85	$ 163,030		
		36" CIPP	676	L.F.	$ 105	$ 70,980		
		48" CIPP	2,652	L.F.	$ 140	$ 371,280		
		48" CULVERT	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	23	EACH	$ 4,163	$ 95,738		
							$ 973,307	
	DETENTION BASIN	BASIN EARTHWORK	42,659	C.Y.	$ 3	$ 127,977		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 257,977	
3	PIPELINE	48" CIPP	1,360	L.F.	$ 140	$ 190,400		
		60" CIPP	997	L.F.	$ 180	$ 179,460		
		MANHOLES	7	EACH	$ 4,163	$ 29,138		
							$ 398,998	
	OPEN CHANNEL	EARTHWORK	4,168	C.Y.	$ 3.5	$ 14,587		
		LINING	24,104	SQ.FT	$ 3.0	$ 72,313		
		LANDSCAPE	18,165	SQ.FT	$ 2.3	$ 42,324		
		36" CULVERT	1	EACH	$ 55,000	$ 55,000		
							$ 184,224	
	GREEN BELT	LANDSCAPE	25,080	SQ.FT	$ 2.3	$ 58,436		
		CONCRETE SIDEWALK / BIKE PATH	15,048	SQ.FT	$ 3.5	$ 52,668		
							$ 111,104	
	DETENTION BASIN	BASIN EARTHWORK	64,415	C.Y.	$ 3	$ 193,244		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 323,244	
	HY 33 AND RAILROAD	36" CROSSING	1	EACH	$ 175,000	$ 175,000		
							$ 175,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$ 105	$ 239,925		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		36" CULVERT	1	EACH	$ 15,000	$ 15,000		
							$ 279,900	
	DETENTION BASIN	BASIN EARTHWORK	37,607	C.Y.	$ 3	$ 112,821		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 242,821	
1	PIPELINE	36" CIPP	1,784	L.F.	$ 105	$ 187,320		
		MANHOLES	4	EACH	$ 4,163	$ 16,650		
		36" CULVERT	1	EACH	$ 15,000	$ 15,000		
							$ 218,970	
	DETENTION BASIN	BASIN EARTHWORK	33,371	C.Y.	$ 3.0	$ 100,112		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 230,112	
9	DETENTION BASIN	BASIN EARTHWORK	31,792	C.Y.	$ 5.0	$ 158,960		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 288,960	
OFFSITE	OPEN CHANNEL	EARTHWORK	28,463	C.Y.	$ 3.5	$ 99,622		
		LANDSCAPE	62,189	SQ.FT	$ 2.3	$ 144,901		
		LINING	97,780	SQ.FT	$ 3.0	$ 293,340		
							$ 537,863	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$ 2.3	$ 121,626		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$ 3.5	$ 109,620		
							$ 231,246	
	ROAD CROSSING	48" CULVERTS	2	EACH	$ 56,700	$ 113,400		
							$ 113,400	
		Total estimated Construction Cost						$ 5,390,034
		Construction Contingency @ 30 %				$ 1,617,010		
		Subtotal					$ 7,007,044	
		Engineering, Legal and Admin. @ 15 %				$ 1,051,057		
		Subtotal					$ 8,058,100	
		BASIN RIGHT-OF-WAY	54	ACRE	$ 20,000	$ 1,080,000		
		CANAL RIGHT-OF-WAY	7.0	ACRE	$ 20,000	$ 140,748		
		ESTIMATED TOTAL PROJECT COST						$ 9,278,848

NORTHSIDE DRAIN - WESTERN DETENTION BASIN-EASTERN DIRECT DISCHARGE - PIPES

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	18" CIPP	991	L.F.	$ 50	$ 49,550		
		48" CCIP	3,045	L.F.	$ 140	$ 426,300		
		48" CULVERT	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
							$ 538,338	
	DETENTION BASIN	BASIN EARTHWORK	51,523	C.Y.	$ 3	$ 154,570		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 284,570	
4	PIPELINE	24" CIPP	4,199	L.F.	$ 61	$ 255,579		
		30" CIPP	1,918	L.F.	$ 85	$ 163,030		
		36" CIPP	676	L.F.	$ 105	$ 70,980		
		48" CIPP	2,652	L.F.	$ 140	$ 371,280		
		48" CULVERTS	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	23	EACH	$ 4,163	$ 95,738		
							$ 973,307	
	DETENTION BASIN	BASIN EARTHWORK	42,659	C.Y.	$ 3	$ 127,977		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 257,977	
3	PIPELINE	24" CIPP	429	L.F.	$ 61	$ 26,112		
		30" CIPP	1,243	L.F.	$ 85	$ 105,655		
		48" CIPP	1,360	L.F.	$ 140	$ 190,400		
		60" CIPP	997	L.F.	$ 160	$ 159,520		
		30" CULVERTS	1	EACH	$ 14,200	$ 14,200		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
							$ 541,674	
	DETENTION BASIN	BASIN EARTHWORK	64,415	C.Y.	$ 3	$ 193,244		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 323,244	
	HY 33 AND RAILROAD	36" CROSSING	1	EACH	$ 155,000	$ 155,000		
							$ 155,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$ 105	$ 239,925		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		36" CULVERT	2	EACH	$ 15,000	$ 30,000		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 334,900	
1	PIPELINE	36" CIPP	1,784	L.F.	$ 105	$ 187,320		
		MANHOLES	4	EACH	$ 4,163	$ 16,650		
		36" CULVERT	1	EACH	$ 15,000	$ 15,000		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
							$ 238,970	
OFFSITE	OPEN CHANNEL	EARTHWORK	28,473	C.Y.	$ 3.5	$ 99,655		
		LANDSCAPE	46,652	SQ.FT	$ 2.3	$ 108,699		
		LINING	113,343	SQ.FT	$ 3.0	$ 340,029		
							$ 548,383	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$ 2.3	$ 121,626		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$ 3.5	$ 109,620		
							$ 231,246	
	ROAD CROSSING	72" CULVERTS	2	EACH	$ 120,000	$ 240,000		
							$ 240,000	
		Total estimated Construction Cost						$ 4,667,608
		Construction Contingency @ 30 %				$ 1,400,283		
		Subtotal					$ 6,067,891	
		Engineering, Legal and Admin. @ 15 %				$ 910,184		
		Subtotal					$ 6,978,075	
		BASIN RIGHT-OF-WAY	33	ACRE	$ 20,000	$ 654,000		
		CANAL RIGHT-OF-WAY	5.2	ACRE	$ 20,000	$ 104,895		
		ESTIMATED TOTAL PROJECT COST						$ 7,736,969

NORTHSIDE DRAIN - WESTERN DETENTION BASIN-EASTERN DIRECT DISCHARGE - OPEN CHANNEL

SUBAREA NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
5	PIPELINE	18" CIPP	991	L.F.	$ 50	$ 49,550		
		48" CCIP	3,045	L.F.	$ 140	$ 426,300		
		48" CULVERT	1	EACH	$ 16,700	$ 16,700		
		MANHOLES	11	EACH	$ 4,163	$ 45,788		
							$ 538,338	
	DETENTION BASIN	BASIN EARTHWORK	51,523	C.Y.	$ 3	$ 154,570		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 284,570	
4	PIPELINE	24" CIPP	4,199	L.F.	$ 61	$ 255,579		
		30" CIPP	1,918	L.F.	$ 85	$ 163,030		
		36" CIPP	676	L.F.	$ 105	$ 70,980		
		48" CIPP	2,652	L.F.	$ 140	$ 371,280		
		24" CULVERT	1	EACH	$ 13,500	$ 13,500		
		MANHOLES	23	EACH	$ 4,163	$ 95,738		
							$ 970,107	
	DETENTION BASIN	BASIN EARTHWORK	42,659	C.Y.	$ 3	$ 127,977		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 257,977	
3	PIPELINE	48" CIPP	1,360	L.F.	$ 140	$ 190,400		
		60" CIPP	997	L.F.	$ 180	$ 179,460		
		MANHOLES	7	EACH	$ 4,163	$ 29,138		
							$ 398,998	
	OPEN CHANNEL	EARTHWORK	4,168	C.Y.	$ 3.5	$ 14,587		
		LINING	24,104	SQ.FT	$ 3.0	$ 72,313		
		LANDSCAPE	2,878	SQ.FT	$ 2.3	$ 6,705		
		24" CULVERT	1	EACH	$ 53,500	$ 53,500		
							$ 147,105	
	GREEN BELT	LANDSCAPE	6,435	SQ.FT	$ 2.3	$ 14,994		
		CONCRETE SIDEWALK / BIKE PATH	3,861	SQ.FT	$ 3.5	$ 13,514		
							$ 28,507	
	DETENTION BASIN	BASIN EARTHWORK	64,415	C.Y.	$ 3.0	$ 193,244		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 323,244	
	HY 33 AND RAILROAD	30" CROSSING	1	EACH	$ 175,000	$ 175,000		
							$ 175,000	
2	PIPELINE	36" CIPP	2,285	L.F.	$ 105	$ 239,925		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		36" CULVERT	2	EACH	$ 15,000	$ 30,000		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 334,900	
1	PIPELINE	48" CIPP	1,784	L.F.	$ 140	$ 249,760		
		MANHOLES	4	EACH	$ 4,163	$ 16,650		
		48" CULVERT	1	EACH	$ 16,700	$ 16,700		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
							$ 303,110	
OFFSITE	OPEN CHANNEL	EARTHWORK	28,437	C.Y.	$ 3.5	$ 99,528		
		LANDSCAPE	46,720	SQ.FT	$ 2.3	$ 108,858		
		LINING	113,208	SQ.FT	$ 3.0	$ 339,623		
							$ 548,009	
	GREEN BELT	LANDSCAPE	52,200	SQ.FT	$ 2.3	$ 121,626		
		CONCRETE SIDEWALK / BIKE PATH	31,320	SQ.FT	$ 3.5	$ 109,620		
							$ 231,246	
	ROAD CROSSING	72" CULVERTS	2	EACH	$ 120,000	$ 240,000		
							$ 240,000	
		Total Estimated Construction Cost						$ 4,781,110
		Construction Contingency @ 30 %				$ 1,434,333		
		Subtotal					$ 6,215,443	
		Engineering, Legal and Admin. @ 15 %				$ 932,316		
		Subtotal					$ 7,147,759	
		BASIN RIGHT-OF-WAY	33	ACRE	$ 20,000	$ 654,000		
		CANAL RIGHT-OF-WAY	7.0	ACRE	$ 20,000	$ 140,786		
		ESTIMATED TOTAL PROJECT COST						**$ 7,942,546**

SOUTHSIDE DRAIN - DIRECT DISCHARGE - PIPE

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED	COST SUBTOTAL	COST TOTAL
6	PIPELINE	36" CIPP	2,767	L.F.	$ 105	$ 290,535		
		48" CIPP (UPPER ROAD)	1,455	L.F.	$ 418	$ 607,463		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
							$ 947,948	
7	PIPELINE	36" CIPP	2,552	L.F.	$ 105	$ 267,960		
		60" CIPP	2,583	L.F.	$ 180	$ 464,940		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
		60" CULVERTS	1	EACH	$ 18,400	$ 18,400		
							$ 801,250	
8	PIPELINE	48" CIPP	1,291	L.F.	$ 140	$ 180,740		
		66" CIPP	2,639	L.F.	$ 200	$ 527,800		
		72" CIPP	1,386	L.F.	$ 220	$ 304,920		
		MANHOLES	13	EACH	$ 4,163	$ 54,113		
		72" RCP CULVERTS	1	EACH	$ 20,000	$ 20,000		
							$ 1,087,573	
	HY33 AND RAIL ROAD	72" CROSSING	1	EACH	$ 255,000	$ 255,000		
							$ 255,000	
OFFSITE	OPEN CHANNEL	EARTHWORK	78,930	C.Y.	$ 5.0	$ 394,649		
		LANDSCAPE	17,781	SQ.FT	$ 2.3	$ 41,430		
		LINING	445,542	SQ.FT	$ 3.0	$ 1,336,626		
							$ 1,772,705	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$ 2.3	$ 316,997		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$ 3.5	$ 285,705		
							$ 602,702	
	ROAD CROSSING	THREE 66" CULVERT	1	EACH	$ 357,600	$ 357,600		
		FOUR 60" CULVERT	1	EACH	$ 473,600	$ 473,600		
		FOUR 72" CULVERT	1	EACH	$ 480,000	$ 480,000		
							$ 1,311,200	
	DISCHARGE STRUCTURE		1	EACH	$ 600,000	$ 600,000		
							$ 600,000	
		Total estimated Construction Cost						$ 7,378,377
		Construction Contingency @ 30 %				$ 2,213,513		
		Subtotal					$ 9,591,890	
		Engineering, Legal and Admin. @ 15 %				$ 1,438,784		
		Subtotal					$ 11,030,674	
		CANALS RIGHT-OF-WAY	13.2	ACRE	$ 20,000	$ 263,221		
		ESTIMATED TOTAL PROJECT COST						**$ 11,293,894**

SOUTHSIDE DRAIN - DIRECT DISCHARGE - OPEN CHANNEL

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED	COST SUBTOTAL	COST TOTAL
6	PIPELINE	36" CIPP	2,767	L.F.	$ 105	$ 290,535		
		48" CIPP (UPPER ROAD)	1,455	L.F.	$ 418	$ 607,463		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 987,948	
7	PIPELINE	36" CIPP	1,250	L.F.	$ 105	$ 131,250		
		48" CIPP	1,302	L.F.	$ 140	$ 182,280		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
		INLET STRUCTURE	2	EACH	$ 20,000	$ 40,000		
							$ 378,505	
	OPEN CHANNEL	EARTHWORK	9,704	C.Y.	$ 3.5	$ 33,965		
		LANDSCAPE	27,724	SQ.FT	$ 2.3	$ 64,596		
		LINING	53,955	SQ.FT	$ 3.0	$ 161,865		
		60" CULVERTS (+ INLET/OUTLET)	1	EACH	$ 118,400	$ 118,400		
							$ 378,827	
	GREEN BELT	LANDSCAPE	38,745	SQ.FT	$ 2.3	$ 90,276		
		CONCRETE SIDEWALK / BIKE PATH	23,247	SQ.FT	$ 3.5	$ 81,365		
							$ 171,640	
8	PIPELINE	48" CIPP	1,291	L.F.	$ 140	$ 180,740		
		MANHOLES	3	EACH	$ 4,163	$ 12,488		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
							$ 213,228	
	OPEN CHANNEL	EARTHWORK	16,070	C.Y.	$ 3.5	$ 56,246		
		LANDSCAPE	25,052	SQ.FT	$ 2.3	$ 58,371		
		LINING	106,102	SQ.FT	$ 3.0	$ 318,305		
		72" CULVERTS (+ INLET/OUTLET)	1	EACH	$ 120,000	$ 120,000		
							$ 552,922	
	GREEN BELT	LANDSCAPE	60,375	SQ.FT	$ 2.3	$ 140,674		
		CONCRETE SIDEWALK / BIKE PATH	36,225	SQ.FT	$ 3.5	$ 126,788		
							$ 267,461	
	HY33 AND RAIL ROAD	72" CROSSING	1	EACH	$ 305,000	$ 305,000		
							$ 305,000	
OFFSITE	OPEN CHANNEL	EARTHWORK	82,250	C.Y.	$ 5	$ 411,251		
		LANDSCAPE	20,008	SQ.FT	$ 2	$ 46,619		
		LINING	455,956	SQ.FT	$ 3	$ 1,367,867		
							$ 1,825,737	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$ 2.3	$ 316,997		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$ 3.5	$ 285,705		
							$ 602,702	
	ROAD CROSSING	THREE 66" CULVERT	1	EACH	$ 357,600	$ 357,600		
		FOUR 72" CULVERT	1	EACH	$ 480,000	$ 480,000		
		FIVE 72" CULVERT	1	EACH	$ 600,000	$ 600,000		
							$ 1,437,600	
	DISCHARGE STRUCTURE		1	EACH	$ 600,000	$ 600,000		
							$ 600,000	
		Total estimated Construction Cost						$ 7,721,569
		Construction Contingency @ 30 %				$ 2,316,471		
		Subtotal					$ 10,038,040	
		Engineering, Legal and Admin. @ 15 %				$ 1,505,706		
		Subtotal					$ 11,543,745	
		CANALS RIGHT-OF-WAY	26.5	ACRES	$ 20,000	$ 530,317		
		ESTIMATED TOTAL PROJECT COST						**$ 12,074,063**

SOUTHSIDE DRAIN - DETENTION BASIN - PIPE

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED	COST SUBTOTAL	COST TOTAL
6	PIPELINE	18" CIPP (UPPER ROAD)	1,455	L.F.	$ 313	$ 454,688		
		30" CIPP	1,397	L.F.	$ 85	$ 118,745		
		36" CCIP	1,370	L.F.	$ 105	$ 143,850		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
							$ 767,233	
	DETENTION BASIN	BASIN EARTHWORK	26,461	C.Y.	$ 3.0	$ 79,384		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 209,384	
	DETENTION BASIN	BASIN EARTHWORK	20,695	C.Y.	$ 3.0	$ 62,085		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMP	1	EACH	$ 100,000	$ 100,000		
							$ 192,085	
7	PIPELINE	18" CIPP	2,583	L.F.	$ 50	$ 129,150		
		36" CIPP	2,552	L.F.	$ 105	$ 267,960		
		36" CULVERTS	1	EACH	$ 15,000	$ 15,000		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
							$ 462,060	
	DETENTION BASIN	BASIN EARTHWORK	26,475	C.Y.	$ 3.0	$ 79,425		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 209,425	
	DETENTION BASIN	BASIN EARTHWORK	29,533	C.Y.	$ 3.0	$ 88,598		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 218,598	
8	PIPELINE	24" CIPP	2,639	L.F.	$ 61	$ 160,627		
		30" CIPP	1,386	L.F.	$ 85	$ 117,810		
		48" CIPP	1,291	L.F.	$ 140	$ 180,740		
		MANHOLES	13	EACH	$ 4,163	$ 54,113		
		30" CULVERTS	1	EACH	$ 14,200	$ 14,200		
							$ 527,490	
	DETENTION BASIN	BASIN EARTHWORK	33,977	C.Y.	$ 5	$ 169,884		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 299,884	
	DETENTION BASIN	BASIN EARTHWORK	13,872	C.Y.	$ 5	$ 69,361		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 199,361	
	HY33 AND RAIL ROAD	36" CROSSING	1	EACH	$ 155,000	$ 155,000		
							$ 155,000	
11	DETENTION BASIN	BASIN EARTHWORK	33,772	C.Y.	$ 5	$ 168,859		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 298,859	
OFFSITE	OPEN CHANNEL	EARTHWORK	39,780	C.Y.	$ 5	$ 198,899		
		LANDSCAPE	35,514	SQ.FT	$ 2.3	$ 82,747		
		LINING	257,815	SQ.FT	$ 3.0	$ 773,446		
							$ 1,055,091	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$ 2.3	$ 316,997		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$ 3.5	$ 285,705		
							$ 602,702	
	ROAD CROSSING	60" CULVERTS	1	EACH	$ 118,400	$ 118,400		
		TWIN 60" CULVERTS	1	EACH	$ 236,800	$ 236,800		
		TWIN 48" CULVERTS	1	EACH	$ 113,400	$ 113,400		
							$ 468,600	
	DISCHARGE STRUCTURE		1	EACH	$ 200,000	$ 200,000		
							$ 200,000	
		Total estimated Construction Cost						$ 5,865,772
		Construction Contingency @ 30 %				$ 1,759,732		
		Subtotal					$ 7,625,503	
		Engineering, Legal and Admin. @ 15 %				$ 1,143,825		
		Subtotal					$ 8,769,329	
		BASIN RIGHT-OF-WAY	38	ACRE	$ 20,000	$ 766,000		
		CANALS RIGHT-OF-WAY	12.8	ACRE	$ 20,000	$ 255,173		
		ESTIMATED TOTAL PROJECT COST						**$ 9,790,502**

SOUTHSIDE DRAIN - DETENTION BASIN - OPEN CHANNEL

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED	COST SUBTOTAL	COST TOTAL
6	PIPELINE	24" CIPP (UPPER ROAD)	1,455	L.F.	$ 338	$ 491,063		
		30" CIPP	1,397	L.F.	$ 85	$ 118,745		
		36" CCIP	1,370	L.F.	$ 105	$ 143,850		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
							$ 803,608	
	DETENTION BASIN	BASIN EARTHWORK	26,461	C.Y.	$ 3.0	$ 79,384		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 209,384	
	DETENTION BASIN	BASIN EARTHWORK	20,695	C.Y.	$ 3.0	$ 62,085		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 192,085	
7	PIPELINE	36" CIPP	2,552	L.F.	$ 105	$ 267,960		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
							$ 292,935	
	OPEN CHANNEL	EARTHWORK	1,196	C.Y.	$ 3.5	$ 4,185		
		LANDSCAPE	2,888	SQ.FT	$ 2.3	$ 6,729		
		LINING	25,686	SQ.FT	$ 3.0	$ 77,058		
		36" CULVERTS	1	EACH	$ 55,000	$ 55,000		
							$ 142,972	
	GREEN BELT	LANDSCAPE	38,745	SQ.FT	$ 2.3	$ 90,276		
		CONCRETE SIDEWALK / BIKE PATH	23,247	SQ.FT	$ 3.5	$ 81,365		
							$ 171,640	
	DETENTION BASIN	BASIN EARTHWORK	26,475	C.Y.	$ 3.0	$ 79,425		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 209,425	
	DETENTION BASIN	BASIN EARTHWORK	29,533	C.Y.	$ 3	$ 88,598		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 218,598	
8	PIPELINE	48" CIPP	1,291	L.F.	$ 140	$ 180,740		
		MANHOLES	3	EACH	$ 4,163	$ 12,488		
							$ 193,228	
	OPEN CHANNEL	EARTHWORK	3,126	C.Y.	$ 3.5	$ 10,940		
		LANDSCAPE	2,950	SQ.FT	$ 2.3	$ 6,875		
		LINING	54,831	SQ.FT	$ 3.0	$ 164,492		
		30" CULVERTS	1	EACH	$ 54,200	$ 54,200		
							$ 236,506	
	GREEN BELT	LANDSCAPE	60,375	SQ.FT	$ 2.3	$ 140,674		
		CONCRETE SIDEWALK / BIKE PATH	36,225	SQ.FT	$ 3.5	$ 126,788		
							$ 267,461	
	DETENTION BASIN	BASIN EARTHWORK	33,977	C.Y.	$ 5	$ 169,884		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 299,884	
	DETENTION BASIN	BASIN EARTHWORK	13,872	C.Y.	$ 5	$ 69,361		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 199,361	
	HY33 AND RAIL ROAD	36" CROSSING	1	EACH	$ 175,000	$ 175,000		
							$ 175,000	
11	DETENTION BASIN	BASIN EARTHWORK	33,772	C.Y.	$ 5	$ 168,859		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 298,859	
OFFSITE	OPEN CHANNEL	EARTHWORK	35,425	C.Y.	$ 5.0	$ 177,123		
		LANDSCAPE	24,505	SQ.FT	$ 2.3	$ 57,097		
		LINING	258,494	SQ.FT	$ 3.0	$ 775,481		
							$ 1,009,701	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$ 2.3	$ 316,997		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$ 2.3	$ 190,198		
							$ 507,194	
	ROAD CROSSONG	60" CULVERTS	1	EACH	$ 118,400	$ 118,400		
		TWIN 60" CULVERTS	1	EACH	$ 236,800	$ 236,800		
		TWIN 48" CULVERTS	1	EACH	$ 113,400	$ 113,400		
							$ 468,600	
	DISCHARGE STRUCTURE		1	EACH	$ 200,000	$ 200,000		
							$ 200,000	
		Total estimated Construction Cost						$ 6,096,443
		Construction Contingency @ 30 %				$ 1,828,933		
		Subtotal					$ 7,925,376	
		Engineering, Legal and Admin. @ 15 %				$ 1,188,806		
		Subtotal					$ 9,114,183	
		BASIN RIGHT-OF-WAY	38	ACRE	$ 20,000	$ 766,000		
		CANALS RIGHT-OF-WAY	17.6	ACRE	$ 20,000	$ 352,659		
		ESTIMATED TOTAL PROJECT COST						**$ 10,232,842**

SOUTHSIDE DRAIN - WESTERN DETENTION BASIN - EASTERN DIRECT DISCHARGE - OPEN CHANNEL

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED	COST SUBTOTAL	COST TOTAL
6	PIPELINE	18" CIPP (UPPER ROAD)	1,455	L.F.	$ 338	$ 491,063		
		30" CIPP	1,397	L.F.	$ 85	$ 118,745		
		36" CCIP	1,370	L.F.	$ 105	$ 143,850		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
							$ 803,608	
	DETENTION BASINS	BASIN EARTHWORK	47,157	C.Y.	$ 3.0	$ 141,470		
		INLET STRUCTURES	2	EACH	$ 30,000	$ 60,000		
		DISCHARGE STRUCTURES WITH PUMPS	2	EACH	$ 100,000	$ 200,000		
							$ 401,470	
7	PIPELINE	36" CIPP	2,552	L.F.	$ 105	$ 267,960		
		MANHOLES	6	EACH	$ 4,163	$ 24,975		
							$ 292,935	
	OPEN CHANNEL	EARTHWORK	1,798	C.Y.	$ 3.5	$ 6,294		
		LINING	25,686	SQ.FT	$ 3.0	$ 77,058		
		LANDSCAPE	9,237	SQ.FT	$ 2.3	$ 21,523		
		18" CULVERTS (3.6 cfs)	1	EACH	$ 52,500	$ 52,500		
							$ 157,374	
	GREEN BELT	LANDSCAPE	38,745	SQ.FT	$ 2.3	$ 90,276		
		CONCRETE SIDEWALK / BIKE PATH	23,247	SQ.FT	$ 3.5	$ 81,365		
							$ 171,640	
	DETENTION BASINS	BASIN EARTHWORK	56,008	C.Y.	$ 3.0	$ 168,023		
		INLET STRUCTURES	2	EACH	$ 30,000	$ 60,000		
		DISCHARGE STRUCTURES WITH PUMPS	2	EACH	$ 100,000	$ 200,000		
							$ 428,023	
8	PIPELINE	42" CIPP	1,291	L.F.	$ 130	$ 167,880		
		MANHOLES	3	EACH	$ 4,163	$ 12,488		
		INLET STRUCTURE	1	EACH	$ 20,000	$ 20,000		
							$ 200,367	
	OPEN CHANNEL	EARTHWORK	10,837	C.Y.	$ 3.5	$ 37,929		
		LINING	66,207	SQ.FT	$ 3.0	$ 198,621		
		LANDSCAPE	36,434	SQ.FT	$ 2.3	$ 84,891		
		60" CULVERTS	1	EACH	$ 118,400	$ 118,400		
							$ 439,841	
	GREEN BELT	LANDSCAPE	60,375	SQ.FT	$ 2.3	$ 140,674		
		CONCRETE SIDEWALK / BIKE PATH	36,225	SQ.FT	$ 3.5	$ 126,788		
							$ 267,461	
	HY33 AND RAIL ROAD	TWIN 48" CROSSING	1	EACH	$ 390,000	$ 390,000		
							$ 390,000	
OFFSITE	OPEN CHANNEL	EARTHWORK	52,900	C.Y.	$ 5.0	$ 264,499		
		LANDSCAPE	13,817	SQ.FT	$ 2.3	$ 32,194		
		LINING	299,988	SQ.FT	$ 3.0	$ 899,965		
							$ 1,196,659	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$ 2.3	$ 316,997		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$ 3.5	$ 285,705		
							$ 602,702	
	ROAD CROSSING	72" CULVERTS	1	EACH	$ 120,000	$ 120,000		
		TWIN 72" CULVERTS	1	EACH	$ 240,000	$ 240,000		
		THREE 72" CULVERTS	1	EACH	$ 360,000	$ 360,000		
							$ 720,000	
	DISCHARGE STRUCTURE		1	EACH	$ 500,000	$ 500,000		
							$ 500,000	
		Total Estimated Construction Cost						$ 6,572,080
		Construction Contingency @ 30 %				$ 1,971,624		
		Subtotal					$ 8,543,703	
		Engineering, Legal and Admin. @ 15 %				$ 1,281,556		
		Subtotal					$ 9,825,259	
		BASIN RIGHT-OF-WAY	21	ACRE	$ 20,000	$ 428,000		
		CANALS RIGHT-OF-WAY	21	ACRE	$ 20,000	$ 427,273.52		
		ESTIMATED TOTAL PROJECT COST						**$ 10,680,533**

SOUTHSIDE DRAIN - WESTERN DETENTION BASIN - EASTERN DIRECT DISCHARGE - PIPES

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED	COST SUBTOTAL	COST TOTAL
6	PIPELINE	18" CIPP (UPPER ROAD)	1,455	L.F.	$ 313	$ 454,688		
		30" CIPP	1,397	L.F.	$ 85	$ 118,745		
		36" CCIP	1,370	L.F.	$ 105	$ 143,850		
		MANHOLES	12	EACH	$ 4,163	$ 49,950		
							$ 767,233	
	DETENTION BASIN	BASIN EARTHWORK	26,461	C.Y.	$ 3	$ 79,384		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 209,384	
	DETENTION BASIN	BASIN EARTHWORK	20,695	C.Y.	$ 3	$ 62,085		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 192,085	
7	PIPELINE	18" CIPP	2,583	L.F.	$ 50	$ 129,150		
		36" CIPP	2,552	L.F.	$ 105	$ 267,960		
		36" CULVERTS	1	L.F.	$ 15,000	$ 15,000		
		MANHOLES	12	L.F.	$ 4,163	$ 49,950		
							$ 462,060	
	DETENTION BASIN	BASIN EARTHWORK	26,475	C.Y.	$ 3.0	$ 79,425		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 209,425	
	DETENTION BASIN	BASIN EARTHWORK	29,533	C.Y.	$ 3.0	$ 88,598		
		INLET STRUCTURE	1	EACH	$ 30,000	$ 30,000		
		DISCHARGE STRUCTURE WITH PUMPS	1	EACH	$ 100,000	$ 100,000		
							$ 218,598	
8	PIPELINE	24" CIPP	2,639	L.F.	$ 61	$ 160,627		
		48" CIPP	1,291	L.F.	$ 140	$ 180,740		
		60" CIPP	1,386	L.F.	$ 160	$ 221,760		
		MANHOLES	13	EACH	$ 4,163	$ 54,113		
		60" CULVERTS	1	EACH	$ 18,400	$ 18,400		
							$ 635,640	
	HY33 AND RAIL ROAD	60" CROSSING	1	EACH	$ 225,000	$ 225,000		
							$ 225,000	
OFFSITE	OPEN CHANNEL	EARTHWORK	53,122	C.Y.	$ 5	$ 265,611		
		LANDSCAPE	23,285	SQ.FT	$ 2	$ 54,253		
		LINING	342,677	SQ.FT	$ 3	$ 1,028,031		
							$ 1,347,895	
	GREEN BELT	LANDSCAPE	136,050	SQ.FT	$ 2.3	$ 316,997		
		CONCRETE SIDEWALK / BIKE PATH	81,630	SQ.FT	$ 3.5	$ 285,705		
							$ 602,702	
	ROAD CROSSING	72" CULVERTS	1	EACH	$ 120,000	$ 120,000		
		TWIN 72" CULVERTS	1	EACH	$ 240,000	$ 240,000		
		THREE 72" CULVERTS	1	EACH	$ 360,000	$ 360,000		
							$ 720,000	
	DISCHARGE STRUCTURE		1	EACH	$ 500,000	$ 500,000		
							$ 500,000	
		Total estimated Construction Cost						$ 6,090,021
		Construction Contingency @ 30 %				$ 1,827,006		
		Subtotal					$ 7,917,027	
		Engineering, Legal and Admin. @ 15 %				$ 1,187,554		
		Subtotal					$ 9,104,582	
		BASIN RIGHT-OF-WAY	21	ACRE	$ 20,000	$ 428,000		
		CANALS RIGHT-OF-WAY	14.2	ACRE	$ 20,000	$ 283,105		
		ESTIMATED TOTAL PROJECT COST						**$ 9,815,686**

NORTHEAST INDUSTRIAL - DETENTION BASIN

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
10	PIPELINE	66" CIPP	3,190	L.F.	$ 200	$ 638,000		
		MANHOLES	8	EACH	$ 4,163	$ 33,300		
		24" CULVERTS	1	EACH	$ 33,500	$ 33,500		
							$ 704,800	
	DETENTION BASIN	BASIN EARTHWORK	43,690	C.Y.	$ 5	$ 218,448		
		INLET STRUCTURE WITH PUMPS	1	EACH	$ 250,000	$ 250,000		
		DISCHARGE STRUCTURE	1	EACH	$ 30,000	$ 30,000		
							$ 498,448	
		Total estimated Construction Cost						$ 1,203,248
		Construction Contingency @ 30 %				$ 360,974		
		Subtotal					$ 1,564,222	
		Engineering, Legal and Admin. @ 15 %				$ 234,633		
		Subtotal					$ 1,798,855	
		BASIN RIGHT-OF-WAY	9.0	ACRES	$ 20,000	$ 180,000		
		ESTIMATED TOTAL PROJECT COST						$ 1,978,855

NORTHEAST INDUSTRIAL - DIRECT DISCHARGE

SUBBASIN NO.	FEATURE	DESCRIPTION	QUANTITY	UNITS	INSTALLED UNIT COST	TOTAL INSTALLED COST	COST SUBTOTAL	COST TOTAL
10	PIPELINE	66" CIPP	3,190	L.F.	$ 200	$ 638,000		
		MANHOLES	8	EACH	$ 4,163	$ 33,300		
		66" CULVERTS	1	EACH	$ 69,200	$ 69,200		
							$ 740,500	
	OPEN CHANNEL	EARTHWORK	17,197	C.Y.	$ 5	$ 85,986		
	DISCHARGE	PUMP STATION UPGRADE	1	EACH	$ 250,000	$ 250,000		
							$ 335,986	
		Total estimated Construction Cost						$ 1,076,486
		Construction Contingency @ 30 %				$ 322,946		
		Subtotal					$ 1,399,432	
		Engineering, Legal and Admin. @ 15 %				$ 209,915		
		Subtotal					$ 1,609,347	
		CANALS RIGHT-OF-WAY	4.9	ACRES	$ 20,000	$ 98,829		
		ESTIMATED TOTAL PROJECT COST						**$ 1,708,176**