CITY OF OROVILLE

TECHNICAL MEMORANDUM

CORRIDOR STUDY FOR OROVILLE DAM BOULEVARD RELIEF SEWER

FINAL
July 2012

CITY OF OROVILLE

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TECHNICAL MEMORANDUM

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1.0 PURPOSE

This Technical Memorandum (TM) summarizes the findings and recommendations from the utility investigations and alignment analysis for the Corridor Study for Oroville Dam Boulevard Relief Sewer (Project). The Project includes Project 1A and Project 1A-ALT and 2A ALT, as identified in the Sanitary Sewer Master Plan (SSMP).

This TM identifies the recommended project alignment, including any challenges or design requirements based on the findings from the utilities research, site walk, and geotechnical assessment information based on readily available data from geotechnical evaluations in the area.

2.0 BACKGROUND

In April 2012, Carollo Engineers (Carollo) finalized the SSMP for the City of Oroville (City) to document existing system deficiencies and plan capital projects to address these deficiencies and serve future growth. The recommended improvements identified in the SSMP as necessary to meet the build-out General Plan were separated into 33 projects. These projects were delineated into three categories: Element 1 projects identified current capacity deficiencies; Element 2 projects identified future capacity deficiencies within the existing collection system, and Element 3 projects identified future capacity needs to support growth.

The SSMP identified existing capacity deficiencies in pipelines within Sewer Basins 7, 8, and 9. The SSMP identified Element 1 projects to provide capacity augmentation for the basin sewer pipelines. Specifically, Project 1A was developed to address capacity deficiencies in the Mitchell Avenue parallel sewers and the existing downstream sewer of Oroville Dam Boulevard. Project 1A consists of 10,108 linear feet (LF) of 8-inch through 21-inch gravity sewer pipeline and is routed within Oroville Dam Boulevard. Project 1A extends from Manhole JJ1 (southwest of the intersection of Oroville Dam Boulevard and Stanford Avenue) down to Manhole 12 (near the intersection of Oroville Dam Boulevard and 5th Street). However, realizing the complexities of permitting and constructing a pipeline within Caltrans right-of-way (ROW) and identifying certain portions of the alignment that may require deep placement of the proposed pipeline, the SSMP identified an alternative project consisting of Project 1A-ALT and Project 2A-ALT, which remains outside of Caltrans ROW as much as possible and would additionally limit the depth of the proposed sewer improvement. Projects 1A-ALT and 2A-ALT consists of approximately 12,325 LF of 12 through 24-inch gravity sewer pipeline. The proposed improvements are between the same manholes as Project 1A (JJ1 and 12), except the route follows the existing sewer alignment

down Boynton Avenue, Mitchell Avenue, Lincoln Street, Washington Avenue, and Oroville Dam Boulevard. Because the entire alternative project is not necessary to manage current capacity deficiencies, the project was split into two components. Project 1A-ALT addresses only those reaches that have a current capacity deficiency, while Project 2A-ALT could be deferred until a later date when additional capacity is required. For the purpose of this routing study, the projects were considered for their impact as a single improvement, as the build-out improvement would rely on both components to meet the future need.

For simplicity, Project 1A will be referred to as Project No. 1 and Projects 1A-ALT and 2A-ALT will be referred to as Project No. 2 through the remainder of this TM.

Figure 1 illustrates the proposed alignment of Project No. 1. Figure 2 presents the proposed alignment of Project No. 2.

3.0 FIELD INVESTIGATIONS

Field investigations included an alignment walk to visually identify any potential utility conflicts or constraints that may pose challenges during the design and construction of either Project. A summary of the collected information for each project is provided below.

3.1 Project No. 1

Oroville Dam Boulevard is also part of California Highway 162 extending from Highway 70 to the intersection of Washington Avenue and falls under Caltrans ROW encroachment permit requirements. During the site walk, it was noted that Oroville Dam Boulevard was a major thoroughfare from Highway 70 to the Highway 162 turnoff at Washington Avenue. This section of Oroville Dam Boulevard travels underneath the Union Pacific railroad overcrossing and includes numerous stormwater drainage culvert crossings. From the intersection of 5th Avenue to Stanford Avenue, the roadway narrows from a five-lane roadway down to a two-lane roadway and consists of a change in elevation of approximately 110 feet. Included in this section are multiple hills creating high and low spots along Oroville Dam Boulevard. Minimal overhead power and communication was noted along the route.

Butte Regional Transit (B-Line) provides transportation services for the City. The B-Line has bus stops along the proposed alignment. Coordination with B-Line will be required to maintain access to the bus stops during any construction activities.

Additionally, Oroville Hospital is located near the intersection of Oroville Dam Boulevard and State Route 162. Access to the hospital is via either by Oroville Dam Boulevard or State Route 162. If construction in Oroville Dam Boulevard is pursued, access to the hospital will have required to be maintained at all times during construction.

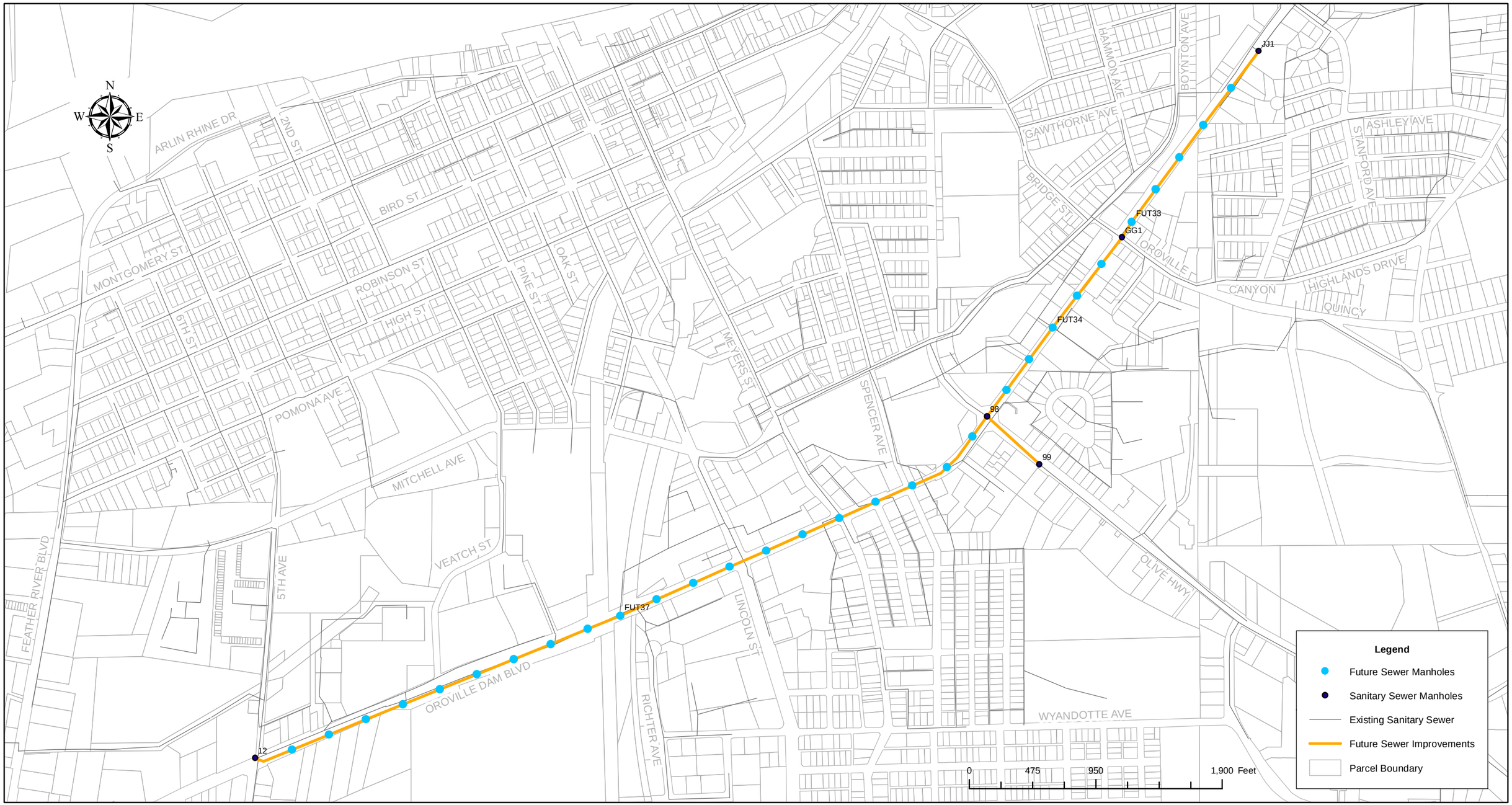

Figure 1
PROJECT NO. 1 (PROJECT 1A)
CORRIDOR STUDY FOR OROVILLE DAM BLVD RELIEF SEWER
CITY OF OROVILLE

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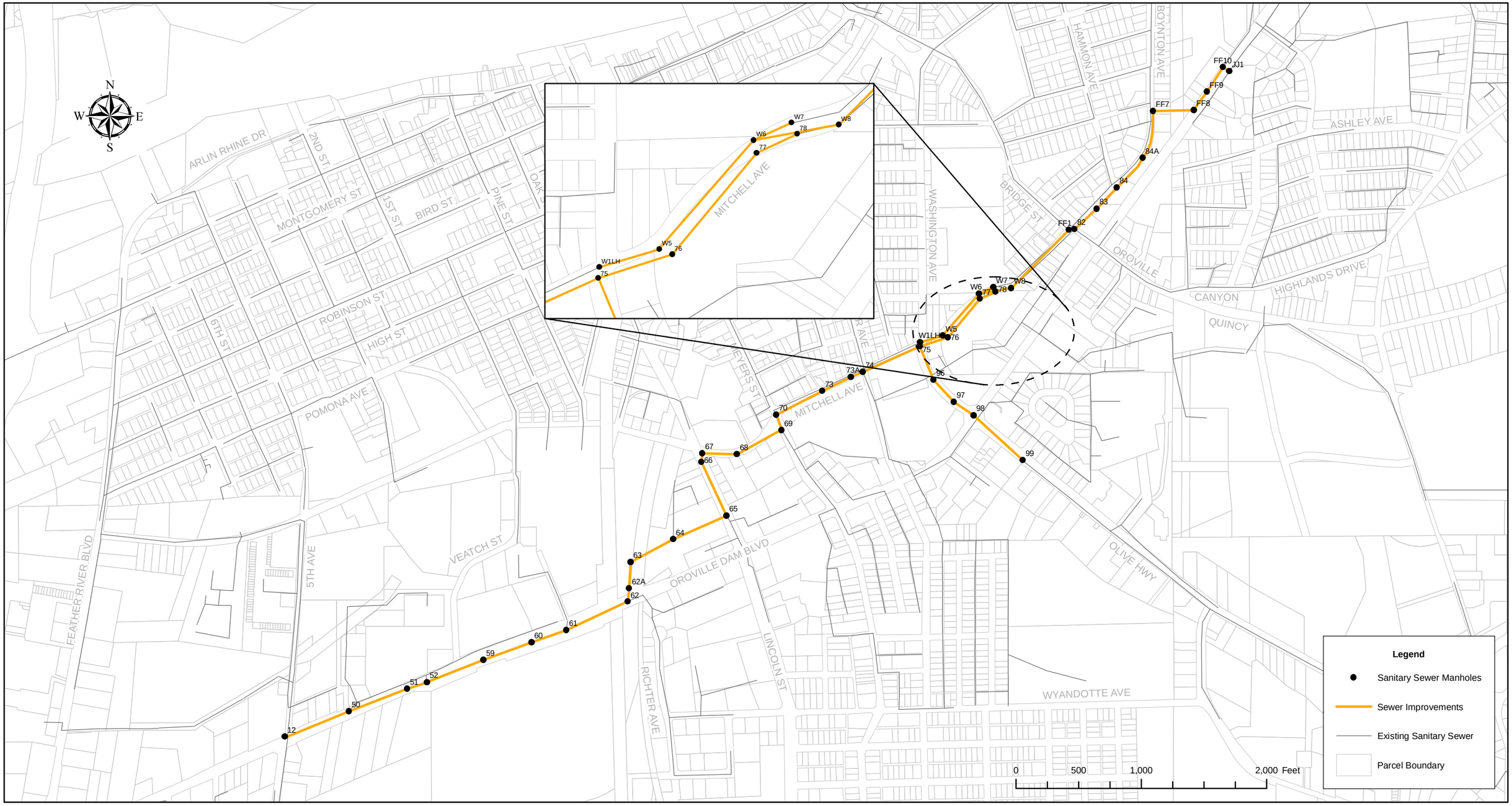

Figure 2
PROJECT NO. 2 (PROJECT 1A-ALT AND 2A-ALT)
CORRIDOR STUDY FOR OROVILLE DAM BLVD RELIEF SEWER
CITY OF OROVILLE

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June 2012

3.2 Project No. 2

Project No. 2's alignment includes Boynton Avenue, Mitchell Avenue, Lincoln Street, and Oroville Dam Boulevard. The majority of the proposed alignment is within residential neighborhoods on residential two-lane roadways. The roads are narrow and winding with power and communication facilities mounted overhead on power poles.

The existing 10-inch sewer pipe between MH FF8 and MH FF7 crosses a stormwater drainage culvert and lies between two residential structures, which limits access for upsizing the existing pipeline using conventional dig and replace methods. Additionally, there is a significant grade change from Oroville Dam Boulevard to Boynton Avenue.

B-Line provides transportation services for the City. The B-Line has bus stops along the proposed alignment. Coordination with B-Line will be required to maintain access to the bus stops during any construction activities.

Challenge Charter High School is located on Mitchell Avenue, between Bridge Street and Washington Avenue. The existing sewer alignment is in front of the main parking lot for the high school. Coordination will be required with the Oroville Union High School District.

4.0 PERMITTING

Permitting of the projects requires close coordination with a number of regulatory agencies. This section indentifies the regulatory agency and provides a brief description of the agency requirements.

4.1 Union Pacific Railroad Crossing

Oroville Dam Boulevard crosses underneath the Union Pacific Railroad (UPRR) between Veatch Street and Lincoln Street. In order to cross UPRR property, an encroachment permit is required along with a license fee. Based on preliminary discussions with UPRR, fees can range from $7,000 to $10,000 per pipeline project.

4.2 Caltrans

To work within Oroville Dam Boulevard, which is also part of State Route 162, a Caltrans Encroachment permit is required to work within its ROW. In addition to an encroachment permit, Caltrans requires construction along the State Route 162 portion to occur at night between the hours of 10 pm and 6 am. Additional costs accrue when working in Caltrans ROW due to encroachment permit fees, acceptable construction methods, traffic controls, and work hour restrictions.

Caltrans requires a 60-day review time for encroachment permits when working within its ROW. At the time the encroachment permit is submitted, numerous documents are required. A list of the main items includes:

- Environmental documents
- Scaled drawings with utilities and accurate ROW shown
- Geotechnical report
- Stormwater management requirements
- Letter of explanation for the proposed route

During the review of the encroachment permit, Caltrans will identify and request the required fees for review and inspection during construction.

Both projects require work within Caltrans ROW.

5.0 UTILITIES RESEARCH

This section summarizes the findings of the utility investigation. Each of the utility entities listed below were contacted and provided information to Carollo. The exact utility locations could not be identified in all cases since the maps provided by the different utilities were diagrammatic. To determine the exact utility locations, additional investigation work is required, including but not limited to contacting Underground Service Alert (U.S.A.), potholing, and hiring a survey company. Note that these additional services were outside the scope of work for this report.

5.1 Storm Drains

The City has a combination of piped storm drains, open drainage channels, and enclosed drainage culverts along the two alignments. Underneath the railroad crossing exists a large box culvert where one of the stormwater drainage culverts travels underneath the railroad tracks and across Oroville Dam Boulevard. The box culvert starts on the north side of Oroville Dam Boulevard, and runs parallel to the roadway, crosses at a 45-degree angle on the east side of the railroad bridge to the south side of the roadway, and parallels the roadway until daylighting on the downstream end. The overall culvert length is approximately 2,100 LF in length.

5.2 Pacific Gas and Electric

Pacific Gas and Electric (PG&E) provides power and natural gas service to Oroville businesses and residences along the two proposed alignments. Power consists of overhead and buried electrical facilities. The majority of electric utilities are buried along Oroville Dam Boulevard, and the majority of electric utilities along the existing sewer alignment are mounted overhead on power poles.

Natural gas mains are located on both routes with the largest being 8 inches in diameter.

5.3 AT&T

AT&T provides communication service for the City. The majority of AT&T's utilities are buried along Oroville Dam Boulevard, and the majority of its utilities along the existing sewer alignment are mounted overhead.

5.4 California Water Service Company

California Water Service Company (Calwater) is one of the two potable water suppliers along the alignment routes. Based on information received from Calwater, 6-inch and 8-inch potable water mains are located in Oroville Dam Boulevard with the majority of the mains located on the northwest side of the street with cross connects at each cross street. Along the existing sewer route, 6-, 8-, and 12-inch potable water mains serve this area.

5.5 South Feather Water and Power Authority

The second water provider in the area is South Feather Water and Power Authority. Based on information received from the South Feather Water and Power, the only utility in the area is a 12-inch potable water main on the southeast side of Oroville Dam Boulevard, between Stanford Avenue and Bridge Street.

5.6 Summary of Utility Investigation

A summary of the major utility constraints and requirements along the alignments identified in this preliminary study are broken out between the two projects. Due to the overall length of each alignment; each section was broken down by major intersections.

5.6.1 <u>Project No. 1</u>

5.6.1.1 Existing Manhole JJ-1 (near Stanford Avenue) to Bridge Street/Oroville Quincy Highway

This segment of the proposed new gravity sewer begins at an existing manhole structure (JJ1) on the south side of Oroville Dam Boulevard approximately 440 feet from Stanford Avenue. This portion of the Oroville Dam Boulevard is two lanes with a combination of developed and undeveloped shoulders and is located outside of the Caltrans ROW. This segment of sewer pipeline is 15 inches in diameter. The major utility constraints and requirements for this segment of the alignment include:

- Parallel 2-inch plastic gas line located on the southeast side of Oroville Dam Boulevard.
- Crossing underneath a 2-inch plastic gas line at Bridge Street/Oroville Quincy Highway.

- Overhead PG&E 12kV power parallel and crossing Oroville Dam Boulevard, crossing underneath a buried power to housing across from McKenzie Animal Clinic.
- Crossing under a 10-inch, 18-inch, and 36-inch reinforced concrete pipe (RCP) storm drain.
- Parallel trenching near 48-inch RCP storm drain.
- Parallel 18-inch storm drain.
- Parallel sanitary sewer line near MH JJ-1 and intersection of Bridge Street/Olive Highway.
- Crossing 8-inch sanitary sewer at the intersection of Bridge Street/Olive Highway.
- Parallel 6-inch potable water main (South Feather Water and Power) near MH JJ-1.
- Two crossings and parallel 8-inch potable water main (Calwater).
- Crossing various service laterals for water and sewer.
- City's signal traffic sensor to be replaced.

5.6.1.2 Bridge Street/Oroville Quincy Highway to Washington Avenue/Olive Highway

This segment of the proposed new gravity sewer consists of a combination of 15-inch and 18-inch pipeline between Bridge Street and Washington Avenue. This portion of the Oroville Dam Boulevard is two lanes wide with a combination of developed and undeveloped shoulders and is located outside of the Caltrans ROW until reaching the intersection of Washington Avenue. The major utility constraints and requirements for this segment of the alignment include:

- Parallel 2-inch plastic gas line located on the southeast side of Oroville Dam Boulevard.
- Crossing underneath a 2-inch plastic gas line at Alma Dr. and intersection of Washington Boulevard/Olive Highway.
- Overhead PG&E 12kV power parallel to Oroville Dam Boulevard on the southeast side.
- Crossing PG&E buried 12kV conduits near Washington Avenue/Olive Highway.
- Crossing under a 60-inch RCP storm drain.
- Parallel sanitary sewer near Gilmore Lane, southeast side of Oroville Dam Boulevard.
- Crossing 12-inch sanitary sewer at Gilmore Lane and 15-inch sanitary sewer at the intersection of Washington Avenue.
- Crossing three potable water mains (Calwater).

- Parallel 8-inch potable water main (Calwater).
- Crossing various service laterals for water and sewer.
- Caltrans' traffic signal sensor to be replaced at Washington Avenue.

5.6.1.3 Washington Avenue/Olive Highway to Lincoln Street

This segment of the proposed new gravity sewer consists of an 18-inch diameter pipeline between Washington Avenue and Lincoln Street. This portion of the Oroville Dam Boulevard consists of a turn lane, four lanes of travel, and two bike lanes. This portion of roadway is located in the Caltrans ROW. The major utility constraints and requirements in this segment of the alignment include:

- Parallel 2-inch and 4-inch gas line located on the northwest side of Oroville Dam Boulevard.
- Crossing underneath a 3/4-inch and 2-inch plastic gas line at Spencer Avenue, 2-inch and 4-inch at Meyers Street, and 6-inch at the intersection of Lincoln Avenue and Washington Avenue.
- Buried PG&E 12kV power parallel to Oroville Dam Boulevard on the northwest side between Washington Avenue and Meyers Street and on the southeast side between Meyers Street and Lincoln Avenue.
- Multiple crossing under overhead PG&E power.
- Crossing under a 72-inch storm drain.
- Crossing sanitary sewer at Spencer Avenue, Brown Avenue, and Lincoln Street and two near Meyers Street.
- Three crossings and parallel 8-inch potable water main (Calwater).
- Parallel 6-inch potable water main (Calwater).
- Crossing under five potable water mains (Calwater).
- Crossing various service laterals for water and sewer.
- Caltrans traffic signal sensor at Lincoln Street.

5.6.1.4 Lincoln Street to 5th Street

This segment of the proposed new gravity sewer pipeline consists of an 18-inch pipeline between Lincoln Street and 5th Street. This portion of Oroville Dam Boulevard consists of a turn lane, four lanes of travel, and two bike lanes. The roadway is located in the Caltrans ROW. The major utility constraints and requirements in this segment of the alignment include:

- Parallel 3-inch and 8-inch gas lines located on the northwest side of Oroville Dam Boulevard.
- Crossing underneath two 2-inch plastic gas lines and a 3/4-inch gas line.

- Multiple crossings and parallel PG&E buried power on both sides of Oroville Dam Boulevard.
- Crossing under a 12-inch, 18-inch, 30-inch, and 10-foot by 6-foot box culvert storm drain.
- Parallel 8-inch potable water main (Calwater).
- Crossing under two potable water mains (Calwater).
- Parallel PG&E 12kV buried conduits.
- Crossing underneath PG&E conduits.
- Crossing various service laterals for water and sewer.
- Caltrans traffic signal sensor at 5th Street.

5.6.2 Project No. 2

5.6.2.1 Existing Manhole JJ-1 (near Stanford Avenue) to Existing Manhole FF7

This segment of the proposed new gravity sewer begins at an existing manhole structure (JJ1) on the south side of Oroville Dam Boulevard approximately 440 feet from Stanford Avenue. This portion of Oroville Dam Boulevard is two lanes with a combination of developed and undeveloped shoulders and is located outside of the Caltrans ROW. This section of sewer pipeline is anticipated to be 18 inches in diameter. The major utility constraints and requirements in this section of the alignment include:

- Parallel 2-inch plastic gas line located on the southeast side of Oroville Dam Boulevard.
- Parallel trenching near 48-inch RCP storm drain.
- Crossing of an open-channel stormwater culvert.
- Crossing of a 60-inch RCP storm drain. The existing 10-inch sewer is cast/grouted into the top of the 60-inch storm drain.
- Crossing various service laterals for water and sewer.

5.6.2.2 Existing Manhole FF7 (Boynton Avenue) to Bridge Street

This section of the proposed new gravity sewer begins at an existing manhole structure (FF10) on the north side of Oroville Dam Boulevard approximately 440 feet from Stanford Avenue. This portion of Oroville Dam Boulevard is two lanes with a combination of developed and undeveloped shoulders. From Oroville Dam Boulevard, the sewer pipeline alignment is routed across the road and over to Boynton Avenue. Boynton Avenue is two lanes with developed shoulders. All work is outside of the Caltrans ROW in this section. This portion of sewer is 15 inches in diameter. The major utility constraints and requirements in this section of the alignment include:

- Parallel 2-inch and 3-inch plastic gas line located on the northwest side of Boynton Avenue.
- Crossing underneath a 3-inch plastic gas line at Bridge Street.
- Overhead PG&E 12kV power parallel to Boynton Avenue with multiple overhead crossings.
- Parallel stormwater open channel drainage parallel to sewer on the southeast side of Boynton Avenue.
- Parallel 8-inch sanitary sewer on the northwest side of Boynton Avenue.
- Parallel 6-inch and 8-inch potable water mains (Calwater).
- Crossing three potable water mains (Calwater).

5.6.2.3 Bridge Street to Washington Avenue

This segment of the proposed new gravity sewer consists of a 12-inch pipeline between Bridge Street and Washington Avenue. The segment within Mitchell Avenue is located in a residential neighborhood within a two-lane road with developed sidewalks on the north side and undeveloped or no shoulder on the south side. Work in this area is located outside of the Caltrans ROW. The major utility constraints and requirements in this section of the alignment include:

- Parallel gas line and multiple crossings in front of Challenge Charter High School.
- Overhead PG&E 12kV power parallel to Mitchell Avenue with multiple overhead crossings.
- Crossing under an 18-inch storm drain at Washington Avenue and Bridge Street intersection.
- Parallel 8-inch sanitary sewer on the northwest side of Boynton Avenue.
- Parallel 12-inch potable water main (Calwater).
- Crossing two potable water mains (Calwater).
- City's traffic signal sensor at Washington Avenue.

5.6.2.4 Washington Avenue to Lincoln Street

This section of the proposed new gravity sewer consists of a combination of 18-inch and 21-inch pipeline between Washington Avenue and Lincoln Street. This portion of the Mitchell Avenue alignment is located in a residential neighborhood in a two-lane road with developed sidewalks on both sides. Work in this area is located outside of the Caltrans ROW. The major utility constraints and requirements in this section of the alignment include:

- Parallel gas line and multiple crossings of gas lines.

- Overhead PG&E 12kV power parallel with multiple overhead crossings.
- Buried PG&E 12kV conduit on the west side of Lincoln Street.
- Crossing under a 15-inch storm drain at Meyer Street intersection and 12-inch storm drain at Lincoln Street intersection and Washington Avenue.
- Parallel sanitary sewer on the northwest side of Boynton Avenue.
- Parallel 6-inch and 8-inch potable water mains (Calwater).
- Crossing five potable water mains (Calwater).
- City's traffic signal sensor at Myers Street and Lincoln Street.

5.6.2.5 Lincoln Street to 5th Street

The constraints within this section of the alignment are similar to Project No. 1.

5.6.2.6 Washington Avenue from Michelle Avenue to Fay Way

As part of Project 2A-ALT, additional upsizing of the sewer is required on Washington Avenue between Mitchell Avenue and Fay Way. The proposed sewer is 18 inches in diameter. This portion of Washington Avenue has a turn lane and two lanes of travel with sidewalks. The intersection of Oroville Dam Boulevard is within Caltrans ROW. The major utility constraints and requirements in this section of the alignment include:

- Parallel 4-inch plastic gas line located on the southwest side of Washington Avenue.
- Parallel PG&E 12kV conduits along the southwest side of Washington Avenue.
- Crossing PG&E buried conduits.
- Crossing under a 96-inch storm drain.
- Parallel 8-inch potable water main (Calwater).
- Crossing three potable water mains (Calwater).
- Caltrans' traffic signal sensor at Oroville Dam Boulevard intersection.

6.0 GEOTECHNICAL CONCERNS

6.1 Soils

Insufficient soils information was available at the time of this analysis to accurately describe the soils within the project area. To utilize trenchless technologies, accurate geotechnical soils reports are required. The recommendations in the geotechnical report will help determine if the soils are favorable for pipe bursting of the existing pipe or installing new pipe utilizing microtunneling processes - these are defined in section 8.2.

However, based on conversations with the Caltrans field engineer who has worked in this area for over 20 years, the lower section of Oroville Dam Boulevard was constructed on top

of dredge tailings and cobbles. On past construction projects, trenchless technology has proven to be unreliable for installation of utilities in the existing soil material underneath the roadway. Equipment has gotten stuck and open-cut methods were required in order to retrieve the equipment and finish installation of the utility. Additionally, due to the poor soils, control low strength material (CLSM) has been used for backfill. These poor soils may require additional time and specialized equipment to work in this area.

Slide shoring has proven to be adequate in areas where cohesionless soils and material are found; however, this type of shoring is more expensive than traditional shoring and requires additional labor to install. Additional geotechnical investigations will be required to verify existing soil conditions and provide recommendations for shoring.

6.2 Groundwater

Due to the proximity of Oroville Dam Boulevard to the Feather River, groundwater elevations are of concern for the construction of deep pipelines. The exact groundwater elevation along the proposed alignments is currently unknown. Based on the Oroville Walmart Project Draft Environmental Impact Report (EIR) dated February 11, 2010, groundwater was located three to seven feet below ground surface in the exploratory soil borings conducted. Based on these groundwater elevations, groundwater is estimated to be at an elevation of 149.0(±), which may affect the lower portion of both projects. Further geotechnical investigations will be required to verify groundwater elevation along both alignments.

7.0 BYPASS PUMPING

Bypass pumping will be required for both projects. Project No. 1 will require bypass pumping for the lower sections between 5th Street and the railroad crossing and at the tie-in to the following existing manholes: MH JJ1, MH GG1, MH 98, and MH 99. Project No. 2 will require bypass pumping for each segment of pipeline, since each segment is replacing the existing sewer with new within the same alignment.

8.0 CONSTRUCTION TECHNIQUES

The two techniques that were assumed to be applicable for this project are conventional and trenchless construction.

8.1 Conventional Construction

Conventional construction is typically open cut, or commonly referred to as “dig and replace.” Within an existing alignment, this construction technique involves constructing the replacement sewer pipeline by excavating the entire length of the undersized existing sewer pipeline and replacing it with an equal or larger size pipeline or constructing a new pipeline in a new alignment to provide the required additional capacity.

8.2 Trenchless Construction

Trenchless sewer construction techniques provide an alternative to conventional construction methods. These techniques often times require less surface restoration and less disturbance to the surrounding area. The methods that may be applicable to this project are microtunneling and pipe bursting. However, additional soils investigations will be required to verify that the soils can accommodate the implementation of these technologies.

8.2.1 Microtunneling

Microtunneling is used as a general term to describe remotely controlled mechanical tunneling systems where spoils are removed from the cutting head within the new pipeline alignment while the pipeline is advanced by jacking. In North America, the definition of microtunneling has expanded to include all remote-controlled bore and jack operations.

Since the only excavation required for microtunneling is for the launching and receiving pits, this method is used extensively for work where surface disruption must be minimized. Spoils may be removed from the cutting face by an auger running through the newly installed pipeline. Alternatively, water or bentonite may be used to convert the soil to slurry. The slurry is then pumped to the surface where the solids are separated before disposal. Both systems provide tunnel face support by mechanical earth pressure balance. Slurry pressure at the face can also be used to combat ground water issues, which in turn reduces the costs of dewatering typically required for conventional construction techniques.

The main difference in the design of pipe materials for jacking applications, compared to conventional open-cut methods, is that the pipe must be designed to withstand the axial forces applied to the pipe during installation. These axial jacking forces can be substantial, approaching 1,000 tons or more for larger pipes, and may be the controlling load case in design of the pipe. Jacking pipes typically used in microtunneling methods include:

- Glass-fiber reinforced thermosetting resin pipe (fiberglass pipe)
- RCP
- Vendor Control Panel (VCP)
- Steel casings

Steel casings are used when required by local highway or railroad agencies or in situations where the carrier pipe cannot be installed directly by jacking. The advantages and disadvantages of microtunneling are summarized as follows:

Advantages

- Close control of line and grade
- Minimal surface disruption

Disadvantages

- Higher initial capital costs
- Limited to certain types of soils

8.2.2 Pipe Bursting

Pipe bursting utilizes the existing pipe as the guide for inserting a bursting head. The bursting head is typically pulled from a launching pit by a cable and winch to a receiving pit or existing manhole in some cases. Pipe bursting increases the area available for a new pipe by pushing the existing pipe radically outward until it cracks. It is suitable for replacing pipes made of fracturable material such as VCP, unreinforced concrete, asbestos cement, some polyvinyl chloride (PVC), and cast iron pipe.

The bursting head then pulls the new pipeline into place along the alignment. During the pipe bursting process, the rehabilitated pipe segment must be taken out of service by rerouting flows around it. After the pipe bursting is completed, pits must be dug at each service lateral to connect the lateral to the newly installed pipe. The advantages and disadvantages of pipe bursting are summarized as follows:

Advantages

- Speed of installation
- Minimal surface disruption
- Reduces inflow/infiltration (I/I) and can increase capacity

Disadvantages

- Suitable only for fracturable pipe materials
- Subsurface conditions may create uneven forces on bursting head resulting in uneven pipe installation
- Will not correct sags or grade problems
- Limited to two pipe size upsizing in most cases (e.g., 8 inches to 12 inches)
- Some trenching is required to reconnect service laterals

9.0 SUMMARY

9.1 Project No. 1

Project No. 1 provides the most direct route of the two alternates. Both conventional and trenchless technologies may be employed for Project No. 1. The major utility crossings where trenchless technology will be required include three large storm drain culverts. The majority of the main utilities are parallel to the alignment with some crossing requirements.

Encroachment permits from Caltrans and UPRR will be necessary to install the new sewer in Oroville Dam Boulevard and, based on Caltrans, work must take place at night. Other potential challenges are poor soils and dredge tailings on the lower sections of the alignment.

Conventional installation methods were assumed for the installation of the majority of the new sewer in Oroville Dam Boulevard; however, additional geotechnical information is required to verify acceptable installation methods.

The total estimated construction cost for Project No. 1 is $3.82 million (in 2009 dollars to match SSMP).

Estimated cost assumes the following:

- 7 percent general conditions
- 15 percent contingency
- 10 percent contractor overhead, profit, and risk
- 7.25 percent sales tax
- Caltrans encroachment and inspection fees not included

9.2 Project No. 2

Project No. 2 requires replacing existing sewer pipelines with new larger diameter pipelines. Dig and replace and/or pipe bursting are possible methods to upsize these mains; however, portions of the sewer main along Boynton Avenue and Mitchell Avenue already include a parallel pipeline arrangement. The proximity of the two sewers may make it impossible to utilize pipe bursting through these sections due to the potential damage to the parallel sewer and other utilities. Additional investigations should be conducted to eliminate this potential challenge.

The International Pipe Bursting Association, a division of National Association of Sewer Service Companies, utilizes a “rule of thumb” recommendation that the potential impact zone as a result of pipe bursting be calculated by subtracting the inner diameter of the existing pipe from the outside diameter of the expander head and then multiplying this number by 10. Note that these values may change dependent on the specific soils condition; but this provides an approximate potential impact zone in which other utilities may be affected by the soil displacement. For example, if an existing 10-inch interior diameter pipeline is being upsized to a 12-inch diameter pipeline, the potential impact area maybe 40 inches wide.

Trenchless technology will be required to install the new sewer between MH FF8 and MH FF7 due to the existing line located between two residential properties and dense

vegetation separating the two manholes. In addition, point replacement/repair will be required where the sewer is cast/grouted into the 60-inch storm drain. This challenge, along with a substantial grade change, limits access for traditional excavation equipment.

Bypass pumping will be required for the majority of Project No. 2 because the existing sewer pipeline is to be replaced with a new larger sewer.

The total estimated construction cost for Project No. 2 is $4.25 million (in 2009 dollars to match SSMP). The same assumptions from Project No. 1 were applied to the total construction cost.

10.0 RECOMMENDED ALIGNMENT

Due to narrow street constraints, bypass pumping requirements, parallel sewer design, additional pipe length, and numerous utility crossings to connect the residential homes of Project No. 2, the recommended alignment is Project No. 1. Project No. 1 requires installation of a new gravity sewer pipeline along Oroville Dam Boulevard from MH JJ1 to MH 12 as shown in Figure 1. It was assumed that the new gravity pipeline will be installed in the centerline of the road due to the existing utilities located near the shoulders. It is estimated that the depth of pipe will vary between 8 feet and 16 feet below ground surface with varying slope due to the 110-foot elevation change between the beginning and end of the alignment.

Due to the diagrammatic nature of the utility reference documents, the alignment may need to be adjusted during the preliminary design phase when additional data becomes available.

Additional coordination with Caltrans will be required throughout the design process. Items to be discussed include traffic control requirements, installation method (conventional and trenchless), inspection requirements, temporary road repairs, CLSM backfill in cobbles and cohesionless soils, trench plate requirements, lane overlay requirements, and other items that Caltrans will require during construction.

11.0 PRELIMINARY DESIGN COORDINATION

Due to the varying coordinate systems, age of past projects, and schematic nature between the different utilities and entities within the proposed project boundaries, potholing and survey will be required to identify exact location of utilities for the preliminary design. In particular, additional information where the gravity sewer will need to cross the 10-foot by 6-foot storm box culvert on Oroville Dam Boulevard just west of the Union Pacific Railroad bridge. Caltrans as-built and GIS data has conflicting elevations and this discrepancy will either require the sewer to be installed over or under the culvert and may require the gravity sewer to be upsized to accommodate the same flow at a lower slope.

In addition to potholing and survey, a geotechnical engineering firm will be required to conduct boring and identify soil conditions along the sewer route. This will help establish the exact soil conditions and help determine if the assumptions made in this report are able to be completed.

Appendix A

CALTRANS RIGHT-OF-WAY MAPS

PTN. SEC. 9, T.19N., R.4E. M.D.B.&M.

33-39

11

49

AVENUE

ORANGE

BLVD.

EAST

ROAD

AVENUE

BLVD.

23

13-06

13-08

13-09

STANFORD

GROVELE

CHARLENE AVE.

AVENUE

AVENUE

ASHLEY

44

45

26

47

HIGHLANDS PORTL UNIT 21, 24 M.O.R.
PLUMAS VALLEY TRACT 7 M.O.R. 75

Butte County Assessor's Map
Book 33, Page 39

Derived by the Butte County Assessor's Office

S-759(2)

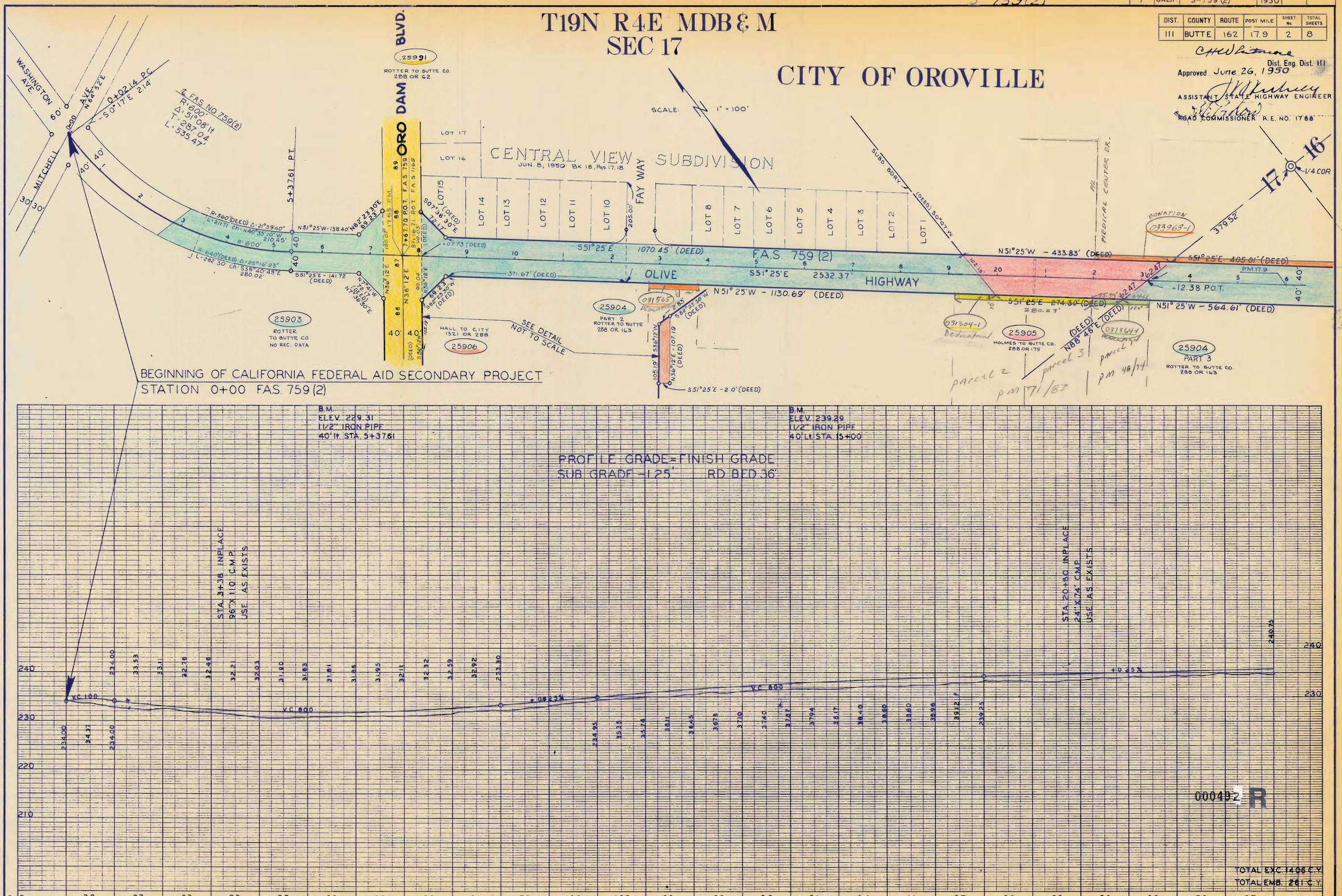
PRA DIV. No.	STATE	FEDERAL PROJECT No.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
7	CALIF.	S-759 (2)	1950		

DIST.	COUNTY	ROUTE	POST MILE	SHEET No.	TOTAL SHEETS
III	BUTTE	162	17.9	2	8

T19N R4E MDB & M
SEC 17

CITY OF OROVILLE

C.H. Whitmore
Dist. Eng. Dist. III
Approved June 26, 1950
J.H. Kashiwy
ASSISTANT STATE HIGHWAY ENGINEER
E. Wilcox
ROAD COMMISSIONER R.E. NO. 1788



Cu. Exc.	28	27	63	23	20	53	50	60	81	79	136	132	93	56	30	31	54	41	37	36	25	39	53	72	87
Yds Emb.	25	57	22	68	26	0								0	6	9	3	3	2	17	17	3	3	0	0
Sta.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

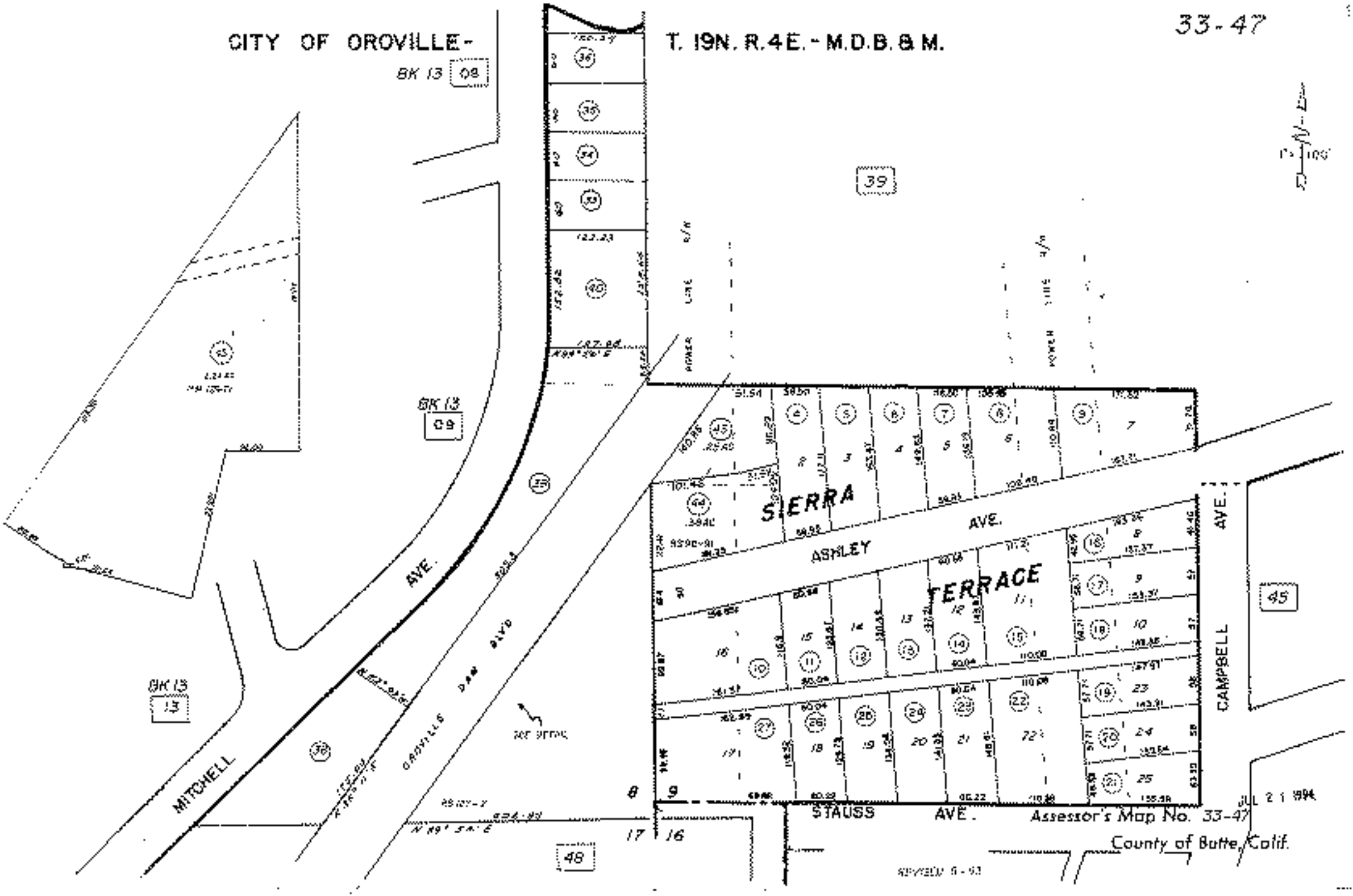
TOTAL EXC. 1406 C.Y.
TOTAL EMB. 261 C.Y.

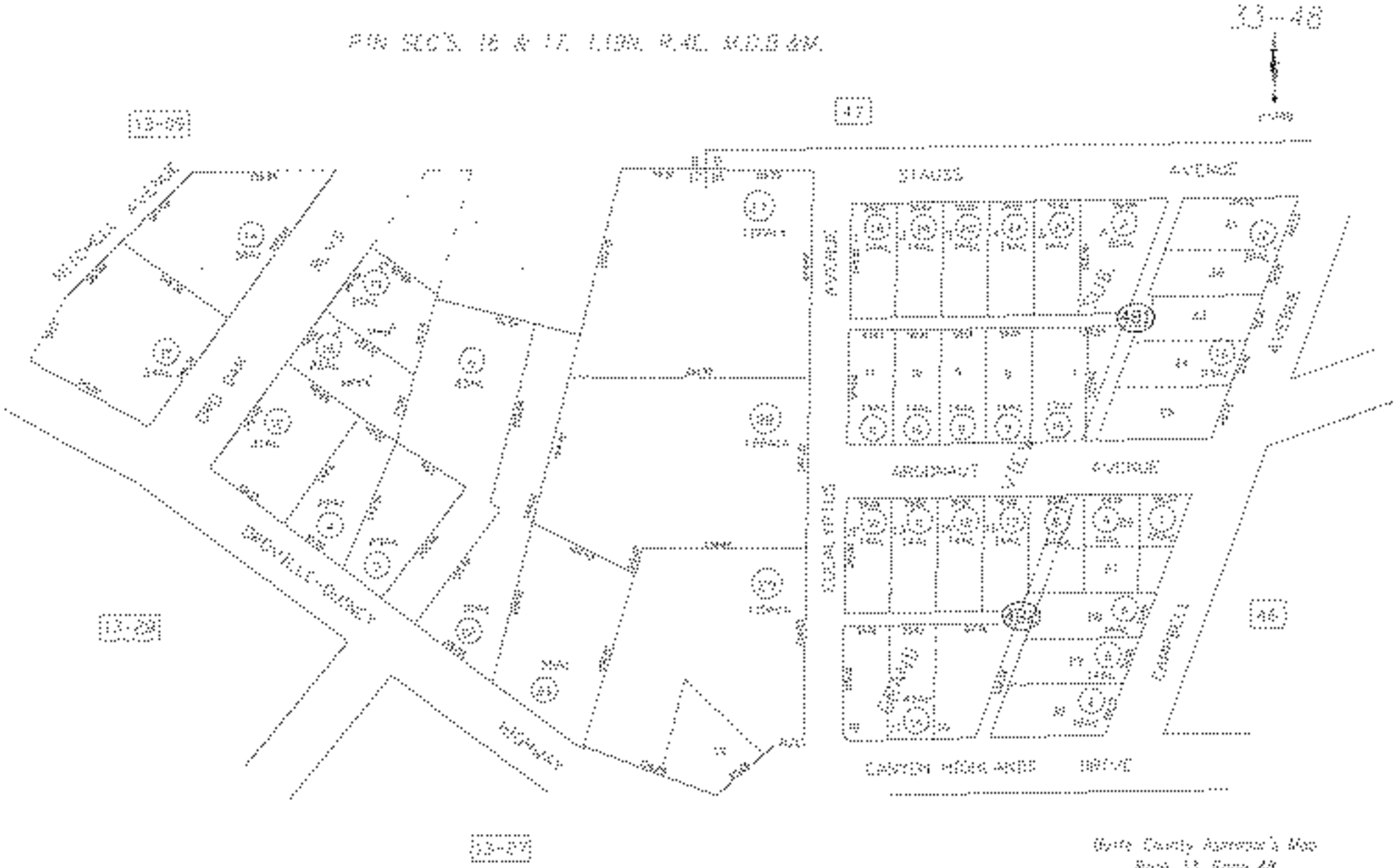
000432 R

ACQUISITION DATA FOR RECORD MAP OF DATED

PARCEL NO.	GRANTOR	INSTR.	TYPE ACQ.	ACCESS CLAUSE	REC. DATE	VOL.	PAGE	MINERAL RIGHTS	REMARKS
25903									
25904									
25905									
25906									
031304-1	JODY SETTLES	DED			6/15/95	95-20165			
031304-1	CLIVE A. PUSEY, THOMAS G. KENNEDY	DED.			6/7/95	95-018542			
031565	RAINTREE CAR CASH	DED			7/25/96	96-027845			
035263-1	GREVILLE MEDICAL COMPLEX	G.D.	FEE		APR. 30, 2003	2003-0082464			DONATION

000492 A


CITY OF OROVILLE-
T. 19N. R.4E. - M.D.B.& M.
33-47
BK 13 08
BK 13 09
BK 13 13
39
45
48
SIERRA
ASHLEY
AVE.
TERRACE
CAMPBELL
AVE.
MITCHELL
AVE.
OROVILLE DAM BLVD
STAUSS
AVE.
Assessor's Map No. 33-47
County of Butte, Calif.
JUL 21 1994

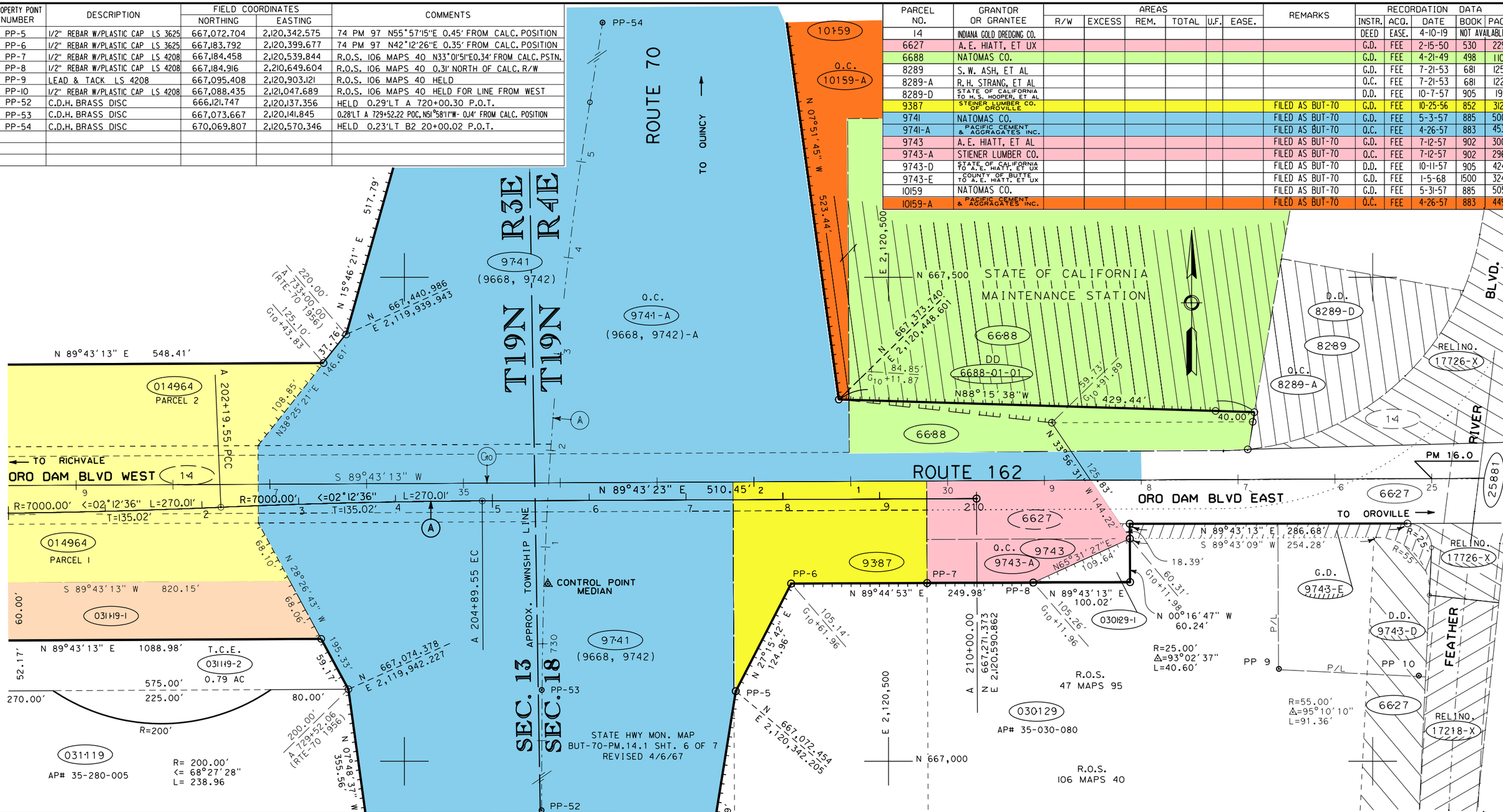


Butte County Assessor's Map
Book 33, Page 48

All dimensions shall be verified by the county assessor before their use in establishing boundaries. No liability is assumed for the accuracy of the information shown on this map.

PROPERTY POINT NUMBER	DESCRIPTION	FIELD COORDINATES NORTHING	FIELD COORDINATES EASTING	COMMENTS
PP-5	1/2" REBAR W/PLASTIC CAP LS 3625	667,072.704	2,120,342.575	74 PM 97 N55°57'15"E 0.45' FROM CALC. POSITION
PP-6	1/2" REBAR W/PLASTIC CAP LS 3625	667,183.792	2,120,399.677	74 PM 97 N42°12'26"E 0.35' FROM CALC. POSITION
PP-7	1/2" REBAR W/PLASTIC CAP LS 4208	667,184.458	2,120,539.844	R.O.S. 106 MAPS 40 N33°01'51"E0.34' FROM CALC. PSTN.
PP-8	1/2" REBAR W/PLASTIC CAP LS 4208	667,184.916	2,210,649.604	R.O.S. 106 MAPS 40 0.31' NORTH OF CALC. R/W
PP-9	LEAD & TACK LS 4208	667,095.408	2,120,903.121	R.O.S. 106 MAPS 40 HELD
PP-10	1/2" REBAR W/PLASTIC CAP LS 4208	667,088.435	2,121,047.689	R.O.S. 106 MAPS 40 HELD FOR LINE FROM WEST
PP-52	C.D.H. BRASS DISC	666,121.747	2,120,137.356	HELD 0.29'LT A 720+00.30 P.O.T.
PP-53	C.D.H. BRASS DISC	667,073.667	2,120,141.845	0.28'LT A 729+52.22 POC, N51°58'11"W- 0.14' FROM CALC. POSITION
PP-54	C.D.H. BRASS DISC	670,069.807	2,120,570.346	HELD 0.23'LT B2 20+00.02 P.O.T.

PARCEL NO.	GRANTOR OR GRANTEE	AREAS R/W	EXCESS	REM.	TOTAL	U.F.	EASE.	REMARKS	RECORDATION DATA INSTR.	ACO.	DATE	BOOK	PAGE
14	INDIANA GOLD DREDGING CO.								DEED	EASE.	4-10-19	NOT AVAILABLE	
6627	A. E. HIATT, ET UX								G.D.	FEE	2-15-50	530	229
6688	NATOMAS CO.								G.D.	FEE	4-21-49	498	110
8289	S. W. ASH, ET AL								G.D.	FEE	7-21-53	681	125
8289-A	R. H. STRANG, ET AL								O.C.	FEE	7-21-53	681	122
8289-D	STATE OF CALIFORNIA TO H. S. HOOPER, ET AL								D.D.	FEE	10-7-57	905	19
9387	STEINER LUMBER CO. OF OROVILLE							FILED AS BUT-70	G.D.	FEE	10-25-56	852	312
9741	NATOMAS CO.							FILED AS BUT-70	G.D.	FEE	5-3-57	885	500
9741-A	PACIFIC CEMENT & AGGRAGATES INC.							FILED AS BUT-70	O.C.	FEE	4-26-57	883	453
9743	A. E. HIATT, ET AL							FILED AS BUT-70	G.D.	FEE	7-12-57	902	300
9743-A	STIENER LUMBER CO.							FILED AS BUT-70	O.C.	FEE	7-12-57	902	296
9743-D	STATE OF CALIFORNIA TO A. E. HIATT, ET UX							FILED AS BUT-70	D.D.	FEE	10-11-57	905	424
9743-E	COUNTY OF BUTTE TO A. E. HIATT, ET UX							FILED AS BUT-70	G.D.	FEE	1-5-68	1500	324
10159	NATOMAS CO.							FILED AS BUT-70	G.D.	FEE	5-31-57	885	505
10159-A	PACIFIC CEMENT & AGGRAGATES INC.							FILED AS BUT-70	O.C.	FEE	4-26-57	883	449



PARCEL NO.	GRANTOR OR GRANTEE	AREAS R/W	EXCESS	REM.	TOTAL	U.F.	EASE.	REMARKS	RECORDATION DATA INSTR.	ACO.	DATE	BOOK	PAGE
14964	PACIFIC CEMENT & AGGRAGATES INC.					Y			G.D.	FEE	6-29-61	1124	117
17218-X	STATE OF CALIFORNIA TO COUNTY OF BUTTE							FILED AS BUT-70	RELINQ.	FEE & EASE.	12-10-62	1215	680
17726-X	STATE OF CALIFORNIA TO COUNTY OF BUTTE							FILED AS BUT-70	RELINQ.	FEE	2-28-64	1299	98
25881	A. E. HAITT, ET UX TO COUNTY OF BUTTE								G.D.	FEE	1-10-68	1500	321
031119-1	CALIFORNIA DEPT. OF FISH AND GAME	0.94 AC		LARGE	LARGE	Y							
030129-1	WAL-MART STORES INC	0.05 AC		9.97 AC	10.00 AC	N							
DD-006688-01-01 (10159)	STATE OF CALIFORNIA TO SPENCER DRESS IRREVOCABLE TRUST NO. 606								G.D.	FEE	1-20-2000	2000-0002365	

NOTE:

BEARINGS, DISTANCES AND COORDINATES SHOWN ARE ON THE COORDINATE GRID OF THE CALIFORNIA STATE COORDINATE SYSTEM OF 1927 , ZONE 2. MULTIPLY DISTANCES SHOWN BY 1.00007 TO OBTAIN GROUND DISTANCES.

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 3
RIGHT OF WAY ENGINEERING

RIGHT OF WAY MAP

PROFESSIONAL LAND SURVEYOR

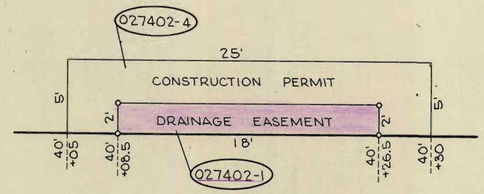
PROFESSIONAL LAND SURVEYOR GLEN E. PELLETT No. 6836 Exp. 9-30-96 STATE OF CALIFORNIA

DATE

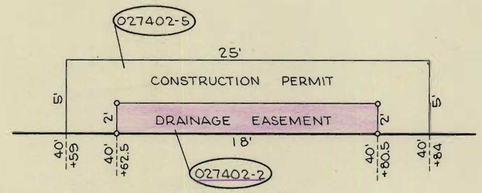
CO.	RTE.	P.M.	DRAWING NUMBER
BUT	162	16.0	R-37580R12

DATE	REVISIONS
3-15-95	REVISED ROUTE 162's A LINE AND ADDED ROUTE 70's A LINE FROM 6-4-56.
3-08-04	POSTED DD-006688-01-01 AND REVISED ACCESS CONTROL LINE PER DD DEED

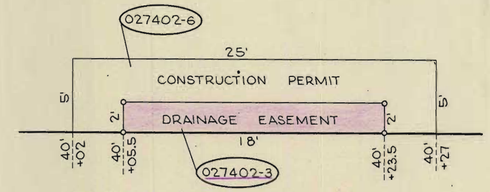
FILE NAME R37580R12.dgn
MICROFILMED



DETAIL "A"
NO SCALE

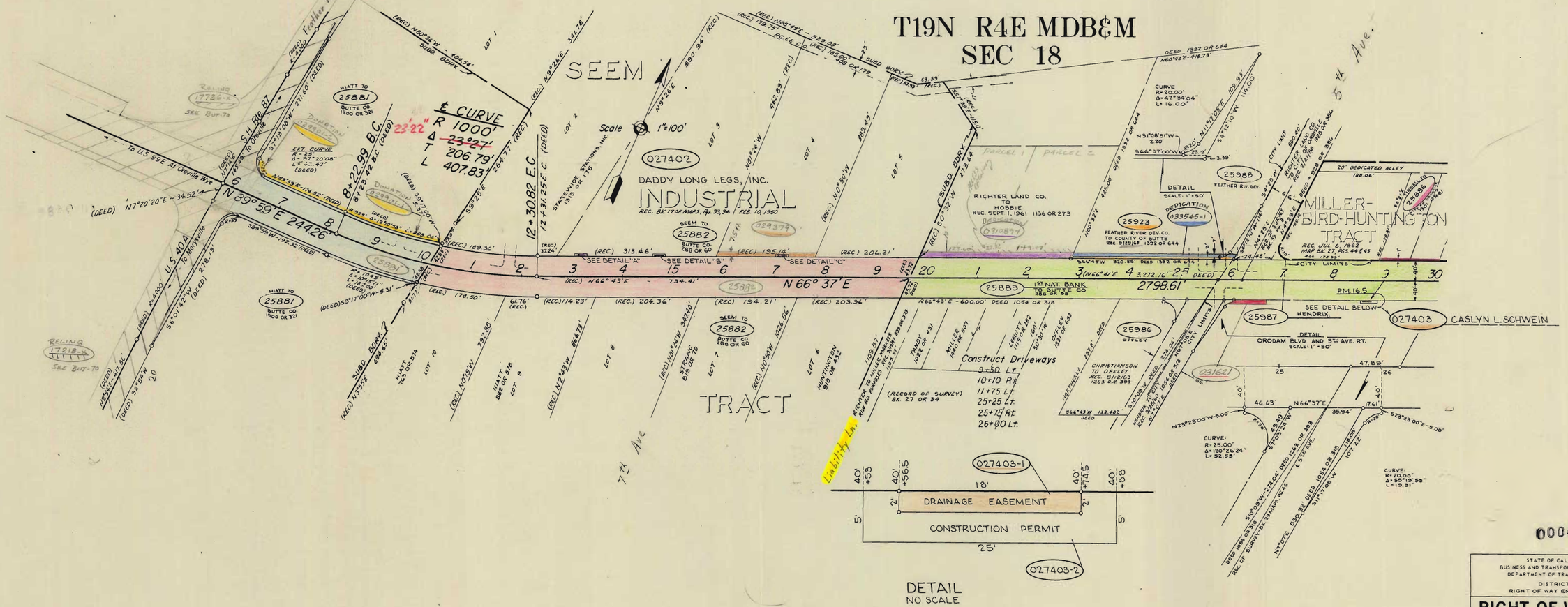


DETAIL "B"
NO SCALE



DETAIL "C"
NO SCALE

T19N R4E MDB&M
SEC 18



DETAIL
NO SCALE

MAP BASE:
BUT. CO. MAPS (BUT 11/69 - SET OF 14)
SUBD. MAPS
ASSESSOR'S RATS
REC. OF SURVEYS
CITY OF OROVILLE MAPS - 1 of 1 DATED 11/10/65

000486 R

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 3
RIGHT OF WAY ENGINEERING

RIGHT OF WAY MAP

DISTRICT R/W ENGINEER

APPROVED _____

100 0 100 200

CO.	RTE	P.M.	DRAWING NUMBER
BUT	162	16.5	A-206600.1

ACCESS PROHIBITED .....

ACQUISITION DATA FOR RECORD MAP OF DATED

PARCEL NO.	GRANTOR	INSTR.	TYPE ACQ.	ACCESS CLAUSE	REC. DATE	VOL.	PAGE	MINERAL RIGHTS	REMARKS
25881	TO BUTTE Co.					1500	321		
25882	TO BUTTE Co.					288	60		
25883	TO BUTTE Co.					288	58		
25886	TO CITY of OROVILLE					1301	81		
25923	TO BUTTE Co.				SEPT. 9, 1965	1392	644		
027402	DADDY LONG LEGS, INC	EASE	EASE		MAR 23, 1978	2267	566		DRAINAGE ESMT.
027403	ESTATE OF C.L. SCHWEIN	EASE	EASE		MAR 29, 1978	2269	430		DRAINAGE ESMT.
029379	LARRY J. SMITH	GRANT	FEE		FEB. 23, 1988	88-05	864		
029901-1	ATLANTIC RICHFIELD Co	GRANT	FEE	YES	MAY 17, 1990	90-02	0116		SEE DONATION BOOK 2 CASE #1
029901-2	ATLANTIC RICHFIELD Co	DEED	ESMT		MAY 17, 1990	90-02	0115		SEE DONATION BOOK 2 CASE #1
17218-X	STATE TO BUTTE Co	RELINQ			DEC 10, 1962	1215	680		SEE BUT-70
17726-X	STATE TO BUTTE Co	RELINQ			JAN 4, 1963	1219	625		SEE BUT-70
031089-1	PETER D. GILB, ET UX	DEDICATION			MAR. 2, 1994	94-09533			
031621-1	J.P. HENDRIX	G.D.			FEB 3, 1997	97-00	3451		SEE DONATION BOOK 11 CASE #2
033545-1	TOM'S SIERRA COMPANY	G.D.	FEE		AUG. 27, 2003	2003-0058	312		DEDICATION

★

000486 A

T 19 N R 4 E MDM

CITY OF OROVILLE

SEC 18

*AT COORDINATES
N 668,000
E 2,124,000

Geodetic
Grid
0°00'16.37"

E 2,124,500
N 669,000

P.L.

VEATCH ST.

DONALD G. HOBBIE, Jr., et ux

PP 804 3/4" I.P.
PP 803 3/4" I.P.
A 31+34.65 P.O.T.
PP 802 3/4" I.P.
7.5' 2305 OR 619 CITY OF OROVILLE
PP 827 Pk Nail
PP 818 "A" 1/2" I.P.
PP 818 1/2" I.P.
25884 CITY OF OROVILLE TO BUTTE CO. 288 OR 177
N 66°20'14"E 894.50'
R=4000'
N 70°54'58"E 409.30'
PM 16.8
25883 ~~CITY OF OROVILLE~~ TO BUTTE CO. 288 OR 58
1st Nat. Bank
S 66°21'00"W 9.96'
PP 808 1/2" I.P.
42.70' Rt. A+15.00
90.34'
028120 -1
DRAINAGE EASEMENT
S 19°35'49"W
S 52°59'22"E 47.12'
25.00'
S 33°25'43"W 62.82'
N 66°20'14"E 62.82'
75.00' Rt. A+62.82
75.00' Rt. A+00.00
N 33°22'26"E 83.31'
PP 809 1/2" I.P.
92.05' Rt. A+02.77
R=3955'
Δ=02°06'24" L=145.42'
S 21°12'24"E 25.00'
72.75' Rt. A+01.53
S 70°54'00"W 102.92'
PP 822 1/2" Rebar
N 19°06'00"W 25.00'
PP 823 1/2" Rebar
N 70°17'06"E 247.40'
72.69' Rt. A+51.62
028121 -1
A 40+29.15 B.C.
A 43+48.82 E.C.
A LINE
R=4000'
Δ=04°34'44"
T=159.92'
L=319.67'
028137
CLATTON L. BARTEL, et ux
DONALD E. MURPHY
CARL F. CARLSON, et ux
E 2,124,000
N 668,000
028120
RICHARD O. ULDAHL, et al
028242 DRAINAGE EASEMENT
Existing 80' Road Easement
Existing 60' Railroad R/W Easement
028121
LAS PLUMAS LUMBER CO.
Section Line
PP 810 1/2" I.P.

SEC 17

000487 R

NOTE:
BEARINGS AND COORDINATES SHOWN ARE ON THE COORDINATE GRID OF THE CALIFORNIA STATE COORDINATE SYSTEM, ZONE 2. DISTANCES SHOWN ARE GROUND DISTANCES. MULTIPLY DISTANCES SHOWN BY 0.99999 TO OBTAIN GRID DISTANCES.

NOTE:
BEARINGS, DISTANCES AND COORDINATES SHOWN ARE ON THE COORDINATE GRID OF THE CALIFORNIA COORDINATE SYSTEM OF 1927, ZONE 2. MULTIPLY DISTANCES SHOWN BY TO OBTAIN GROUND DISTANCES.

ACCESS PROHIBITED

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 3
RIGHT OF WAY ENGINEERING

RIGHT OF WAY MAP

DISTRICT R/W ENGINEER
APPROVED

50 0 50 100

CO.	RTE.	P.M.	DRAWING NUMBER
BUT	162	16.8	A-25480.1

ACQUISITION DATA FOR RECORD MAP OF DATED

PARCEL NO.	GRANTOR	INSTR.	TYPE ACQ.	ACCESS CLAUSE	REC. DATE	VOL.	PAGE	MINERAL RIGHTS	REMARKS PM 16.8
028135-1,2	CARL F. CARLSON, etux	EASE	TEMP EASE		APR 15, 1983	2814	689		TEMP CONST ESMT - EXPIRES 11/1/85
028136	GERALD W. FAUNCE, etux	EASE	TEMP EASE		MAY 13, 1983	2824	538		TEMP CONST ESMT - EXPIRES 11/1/85
028122	DONALD G. HOBBIE, JR., etal	EASE	TEMP EASE		MAY 10, 1983	2823	372		TEMP. CONST ESMT - EXPIRES 11/1/85
028120-1	MAX J. KUHL, etal	EASE	EASE		JUN 3, 1983	2830	635		DRAINAGE ESMT
028120-2	" " " "	ESMT	TEMP EASE		JUN 3, 1983	2830	638		TEMP CONST ESMT - EXPIRES 11/1/85
028242	RICHARD D. ULDAHL	EASE	EASE		FEB 21, 1984	2911	487		DRAINAGE ESMT
028121-1	DG SHELTER PRODUCTS	GRANT	FEE		APR 30, 1984	2937	592		
028121-2	DG SHELTER PRODUCTS	EASE	TEMP EASE		APR 30, 1984	2937	589		TEMP CONST EASE - EXPIRES 11-1-85
25883	TO BUTTE Co.					288	58		
25884	TO BUTTE Co					288	177		

★

000487A

T19N R4E MDM
SEC 17

CITY OF OROVILLE

DONALD G. HOBBIE, Jr. et ux

ROBERT L. DELLER, et al

PACIFIC COAST PRODUCERS

WESTERN PACIFIC RAILROAD

BOYD SEARS III, et al

SOUTHERN PAC. TRANSP. CO., et al

G. L. MEYER, et ux

CO. OF BUTTE

OROVILLE PLAZA CO.

NORMAN SPIVOCK, et al

LAS PLUMAS LUMBER CO.

W. P. R. R.

SOUTHERN PAC. TRANSP. CO

DETAIL No Scale

*AT COORDINATES N 669,000 E 2,126,000

WATERLINE EASEMENT

DRAINAGE EASEMENT

Existing 33' Road Ease

Section Line

ACCESS PROHIBITED

INSET Approx Scale 1" = 100'

FEATHER RIVER MOULDING CO., INC.

S. P. T. CO., et al

NOTE:

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NOTE:

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000488 R

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 3
RIGHT OF WAY ENGINEERING

RIGHT OF WAY MAP

DISTRICT R W ENGINEER

APPROVED

50 0 50 100

CO.	RTE.	P.M.	DRAWING NUMBER
BUT	162	17.0	A-25480.2

ACQUISITION DATA FOR RECORD MAP OF DATED

PARCEL NO.	GRANTOR	INSTR.	TYPE ACQ.	ACCESS CLAUSE	REC. DATE	VOL.	PAGE	MINERAL RIGHTS	REMARKS
028132	NORMAN SPIVOCK, et al	EASE	TEMP EASE	-	APR 18, 1983	2815	560	-	TEMP CONST. ESMT - EXPIRES 11/1/85
028126-1	CO OF BUTTE	GRANT	FEE	-	APR 28, 1983	2819	43	YES	
028126-2	CO OF BUTTE	EASE	EASE	-	APR 28, 1983	2819	46	-	DRAINAGE EASE.
028126-3	CO OF BUTTE	EASE	TEMP EASE	-	APR 28, 1983	2819	49	-	TEMP CONST ESMT - EXPIRES 11/1/85
028122	DONALD G. HOBBIE, Jr., et al	EASE	TEMP EASE	-	MAY 10, 1983	2823	372	-	TEMP CONST ESMT - EXPIRES 11/1/85
028127-1	G. L. MEYER, et ux	GRANT	FEE	-	APR 27, 1983	2818	384	YES	
028127-2	G. L. MEYER, et ux	EASE	EASE	-	APR 27, 1983	2818	386	-	DRAINAGE EASE.
028127-3,4	G. L. MEYER, et ux	EASE	TEMP EASE	-	APR 27, 1983	2818	388	-	TEMP CONST ESMT - EXPIRES 11/1/85
028123-1	WM L. OSTROM, et al	GRANT	FEE	-	MAY 20, 1983	2826	493	YES	
028123-2	WM L. OSTROM, et al	EASE	TEMP EASE	-	MAY 20, 1983	2826	495	-	TEMP CONST. ESMT - EXPIRES 11/1/85
028173	PAC. COAST PRODUCERS	EASE	TEMP EASE	-	JUL 5, 1983	2841	648	-	TEMP SPUR LINE ESMT - NO TERM. DATE
028130	OROVILLE PLAZA CO	EASE	TEMP EASE	-	NOT RECORDED			-	TEMP CONST. EASE - EXPIRES 11-1-85
028124-1	BOYD SEARS III, et al	GRANT	FEE	-	JUN 9, 1983	2833	116	YES	
028124-1-A	CITY OF OROVILLE	QC	FEE	-	AUG 30, 1983	2860	172	-	
028124-2	BOYD SEARS III, et al	EASE	TEMP EASE	-	JUN 9, 1983	2833	113	-	TEMP CONST EASE - EXPIRES 11-1-85
028125-1	PACIFIC COAST PRODUCERS	GRANT	FEE	-	JAN 11, 1984	2900	251	YES	
028125-2	PACIFIC COAST PRODUCERS	EASE	EASE	-	JAN 11, 1984	2900	254	-	DRAINAGE EASE
028125-3	PACIFIC COAST PRODUCERS	EASE	TEMP EASE	-	JAN 11, 1984	2900	256	-	TEMP CONST EASE - EXPIRES 11-1-85
028245	ROBT L. DELLER, et al	EASE	EASE	-	DEC 29, 1983	2897	100	-	WATERLINE EASE
028241	CO. OF BUTTE	GRANT	FEE	-	JAN 27, 1984	2905	283	YES	
028121-1	DG SHELTER PRODUCTS	GRANT	FEE		APR 30, 1984	2937	592	YES	
028121-2	DG SHELTER PRODUCTS	EASE	TEMP EASE		APR 30, 1984	2937	589		TEMP CONST. EASE - EXPIRES 11-1-85
DE-028245	STATE TO CALIF WATER SERVICE Co	DD.	EASE	-	JUN 12, 1984	2954	607	-	WATERLINE EASE
028140 (028141)	So. PAC. TRANSP. Co	INDENT.	EASE		APR ~~MAR~~ 18, 1985	Doc # 85-11228			
028142 (028143)	UNION PAC. R.R.	ESMT	ESMT		APR. 7, 1987	87-12594			

★

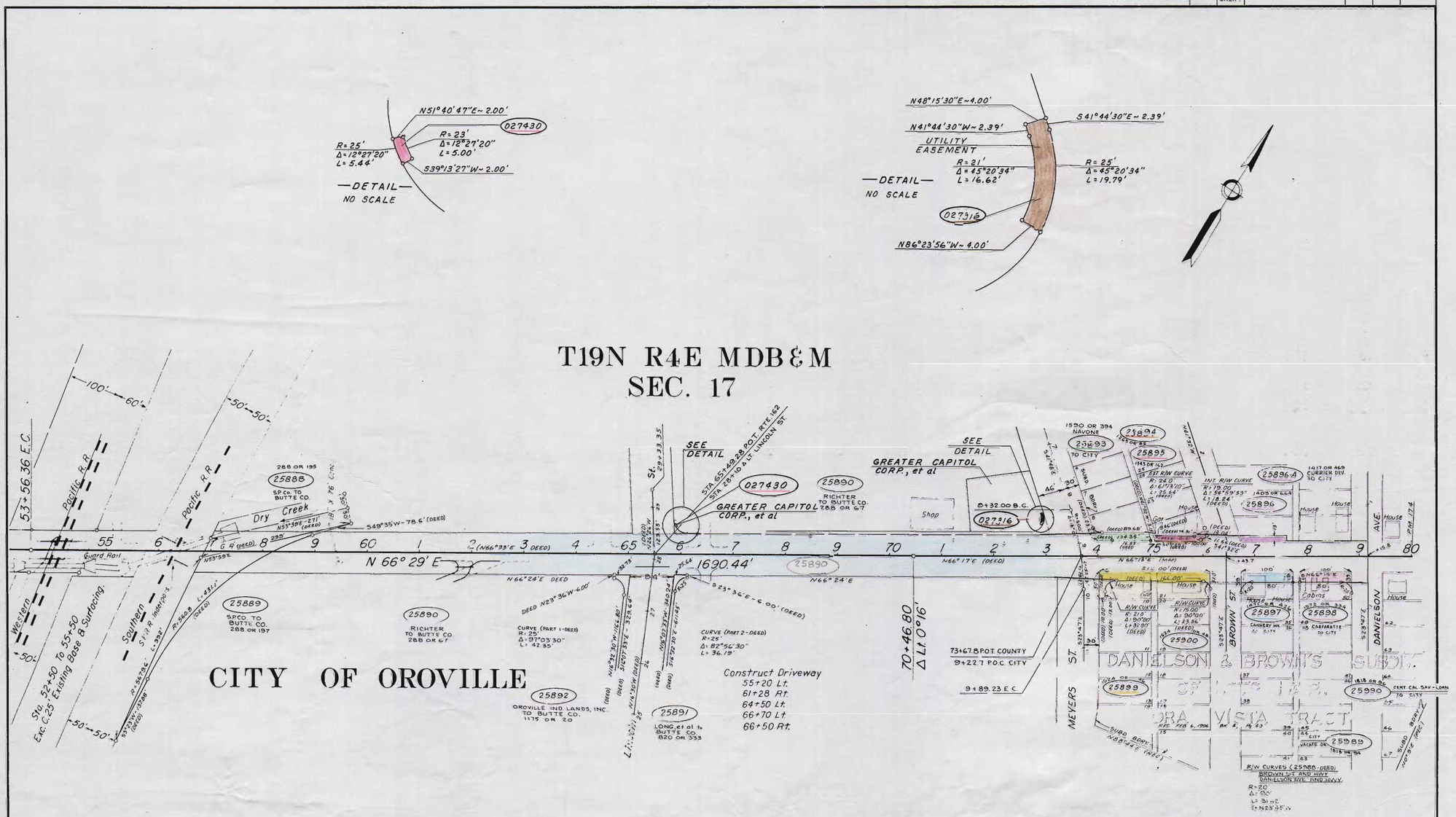
000488 A

ACQUISITION DATA FOR RECORD MAP OF DATED

PARCEL NO.	GRANTOR	INSTR.	TYPE ACQ	ACCESS CLAUSE	REC. DATE	VOL.	PAGE	MINERAL RIGHTS	REMARKS PM 170
25883	Ellbank To Butte Co					288	55		
25884	City of Oroville to Butte Co.					288	177		
25885	" " " "					288	271		
25886	Tidwell to City of Oroville					1361	81		
25887	WPRR to Butte Co					351	329		

000488 A

PRA DIV. No.	STATE	FEDERAL PROJECT No	FISCAL YEAR	SHEET No.	TOTAL SHEETS
	CALIF.				



000489 R

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 3
RIGHT OF WAY ENGINEERING

RIGHT OF WAY MAP

DISTRICT R/W ENGINEER

APPROVED

100 0 100 200

CO	RTE	P.M.	DRAWING NUMBER
BUT	162	17.4	A-19200.1

ACQUISITION DATA FOR RECORD MAP OF DATED

PARCEL NO.	GRANTOR	INSTR.	TYPE ACQ.	ACCESS CLAUSE	REC. DATE	VOL.	PAGE	MINERAL RIGHTS	REMARKS
25888	Co. of But								
25889	" " "								
25890									
25891									
25892									
25893									
25894									
25895									
25896									
25896-A									
25897									
25898									
25899									
25900									
027316	GREATER CAPITOL CORP	EASE	EASE		JUN 12, 1978	2292	644		
027430	GREATER CAPITOL CORP.	EASE	EASE		NOV 9, 1978	2342	537		

★

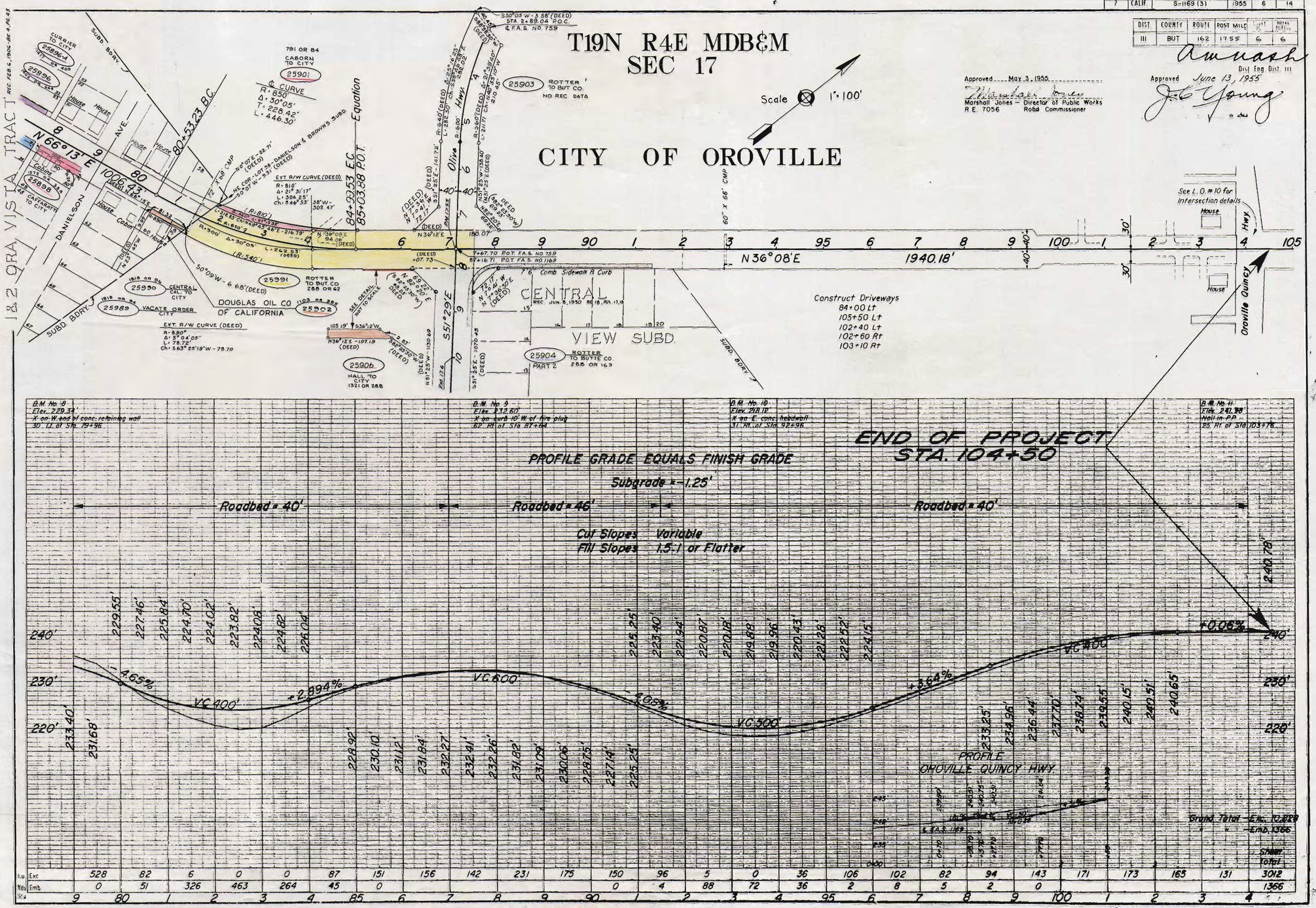
000489 A

STATE				
CALIF.	S-1169 (3)	1955	6	14

DIST.	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
III	BUT	162	17.55	6	6

Approved May 3, 1955
Marshall Jones — Director of Public Works
R.E. 7056 Road Commissioner

Approved June 13, 1955
Dist. Eng. Dist. III



000490 R

FORM WH-24

80-30U64-F D-530

ACQUISITION DATA FOR RECORD MAP OF DATED

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25896	Co. of Butte								
25896-A									
25901									
25902									
25903									
25904									
25906									
25991									

000490 A

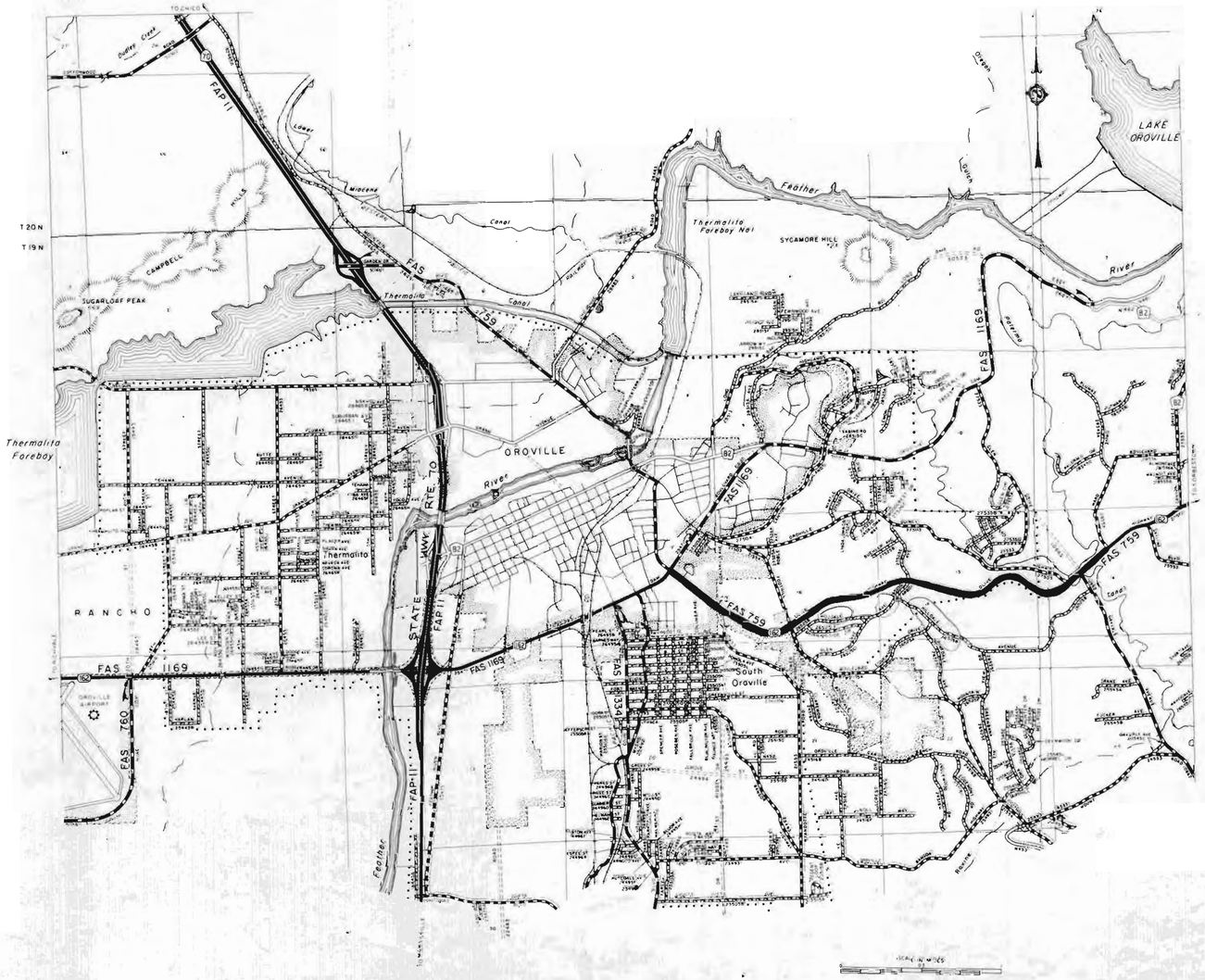
PRA DIV No	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

RIGHT OF WAY MAPS OF

STATE HIGHWAY

Oro Dam Blvd. to Ward Blvd.



000491 T

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS – DISTRICT 3
RIGHT OF WAY ENGINEERING

TITLE MAP

L. L. Hawks
DISTRICT R/W ENGINEER
APPROVED APRIL 13, 1973

CO	RTE	P.M.	DRAWING NUMBER
BUT	162	17.5/20.8	1 OF 8

Appendix B

CALTRANS AS-BUILT PLAN OF OROVILLE DAM BLVD @ UNION PACIFIC RAILROAD CROSSING AND 12’ BY 7’ STORM DRAIN CULVERT

03	But	162	16.5/17.0	4	71

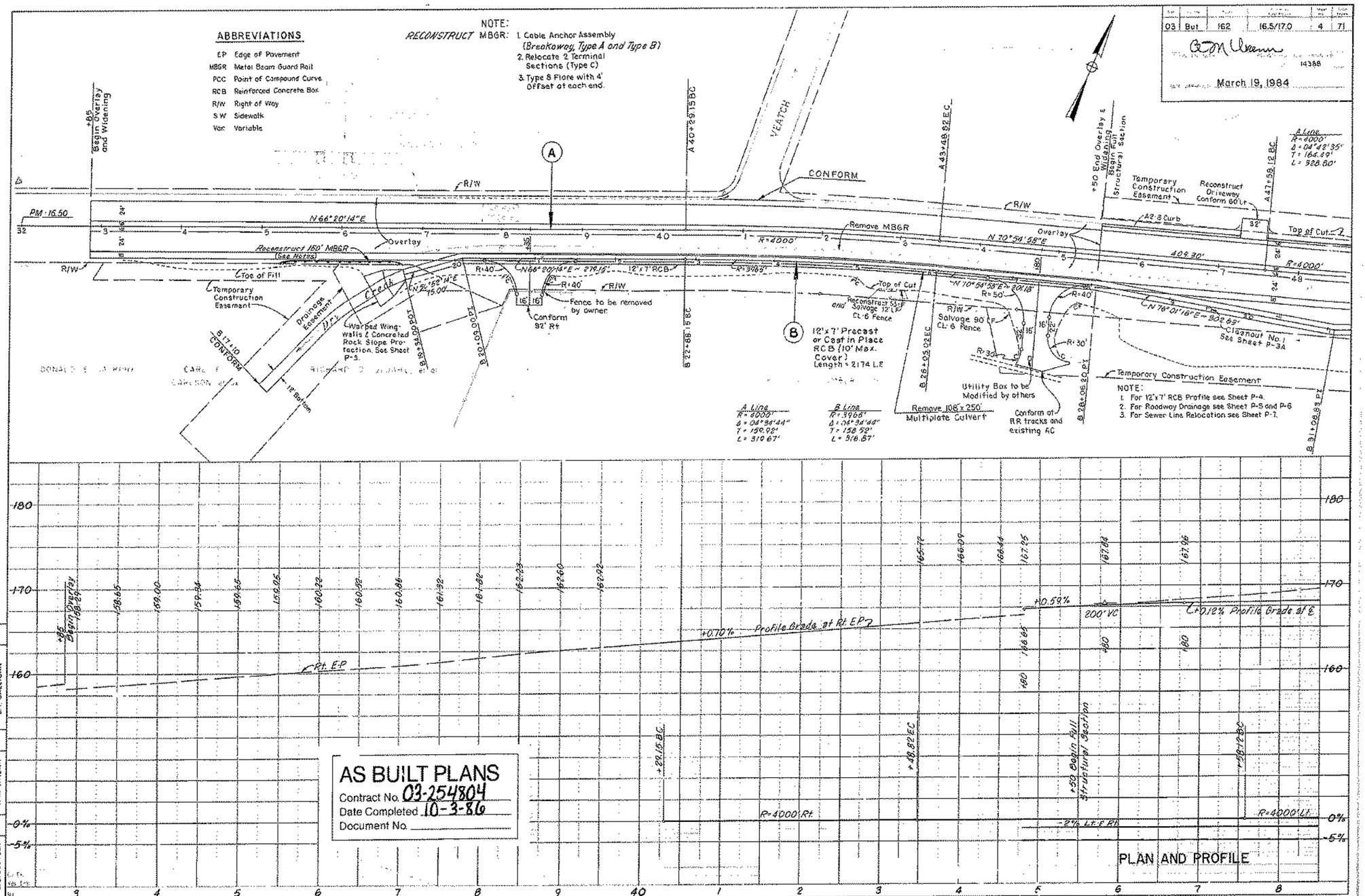
14388

March 19, 1984

ABBREVIATIONS

EP Edge of Pavement
MBGR Metal Beam Guard Rail
PCC Point of Compound Curve
RCB Reinforced Concrete Box
R/W Right of Way
S.W Sidewalk
Var Variable

NOTE:
RECONSTRUCT MBGR:
1. Cable Anchor Assembly (Breakaway, Type A and Type B)
2. Relocate 2 Terminal Sections (Type C)
3. Type 8 Flare with 4' Offset at each end.



AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No.

E. F. GALLIGAN
A. M. WRENN
G. S. BOGUSCH

03207 254801 P-1

4

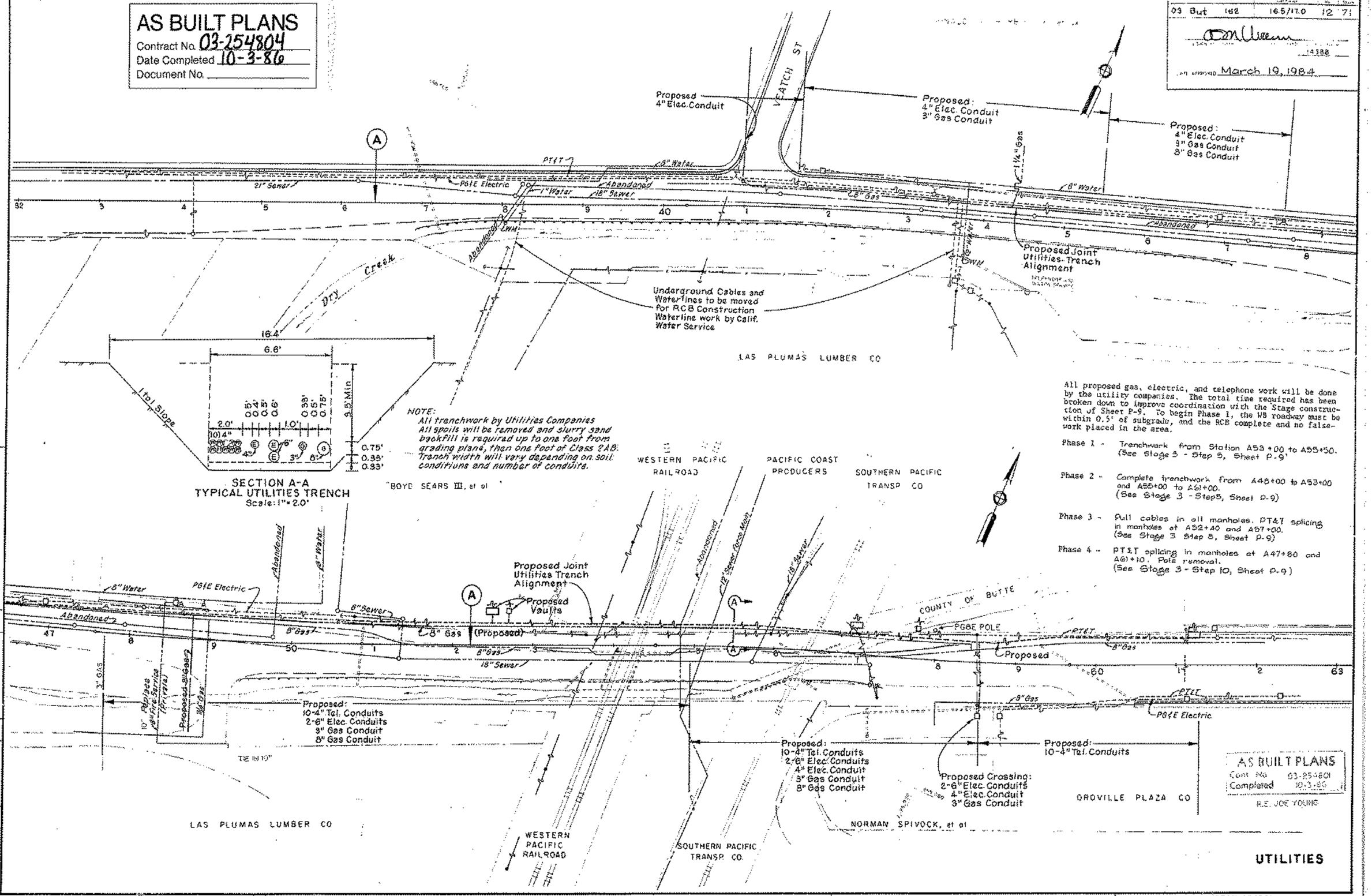
CERTIFICATE OF ACCURATE MICROFILM IMAGE
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
I hereby certify that this is a true and accurate image of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Transportation
SIGNATURE OF MICROFILM OPERATOR (SIGNATURE) Tony Bellisario DATE 4/9/92

30X

AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No.

03	But	162	16.5/17.0	12 71

14388
March 19, 1984



All proposed gas, electric, and telephone work will be done by the utility companies. The total time required has been broken down to improve coordination with the Stage construction of Sheet P-9. To begin Phase 1, the WB roadway must be within 0.5' of subgrade, and the RCB complete and no falsework placed in the area.

Phase 1 - Trenchwork from Station A53+00 to A55+50. (See Stage 3 - Step 5, Sheet P-9)

Phase 2 - Complete trenchwork from A48+00 to A53+00 and A55+00 to A61+00. (See Stage 3 - Step 5, Sheet P-9)

Phase 3 - Pull cables in all manholes. PT&T splicing in manholes at A52+40 and A57+00. (See Stage 3 Step 8, Sheet P-9)

Phase 4 - PT&T splicing in manholes at A47+80 and A61+10. Pole removal. (See Stage 3 - Step 10, Sheet P-9)

Approved Recommended By: E. F. GALLIGAN
Design Engineer: A. M. WRENN
Project Engineer: G. S. BOGUSCH

12

UTILITIES

03207-254801 P-8

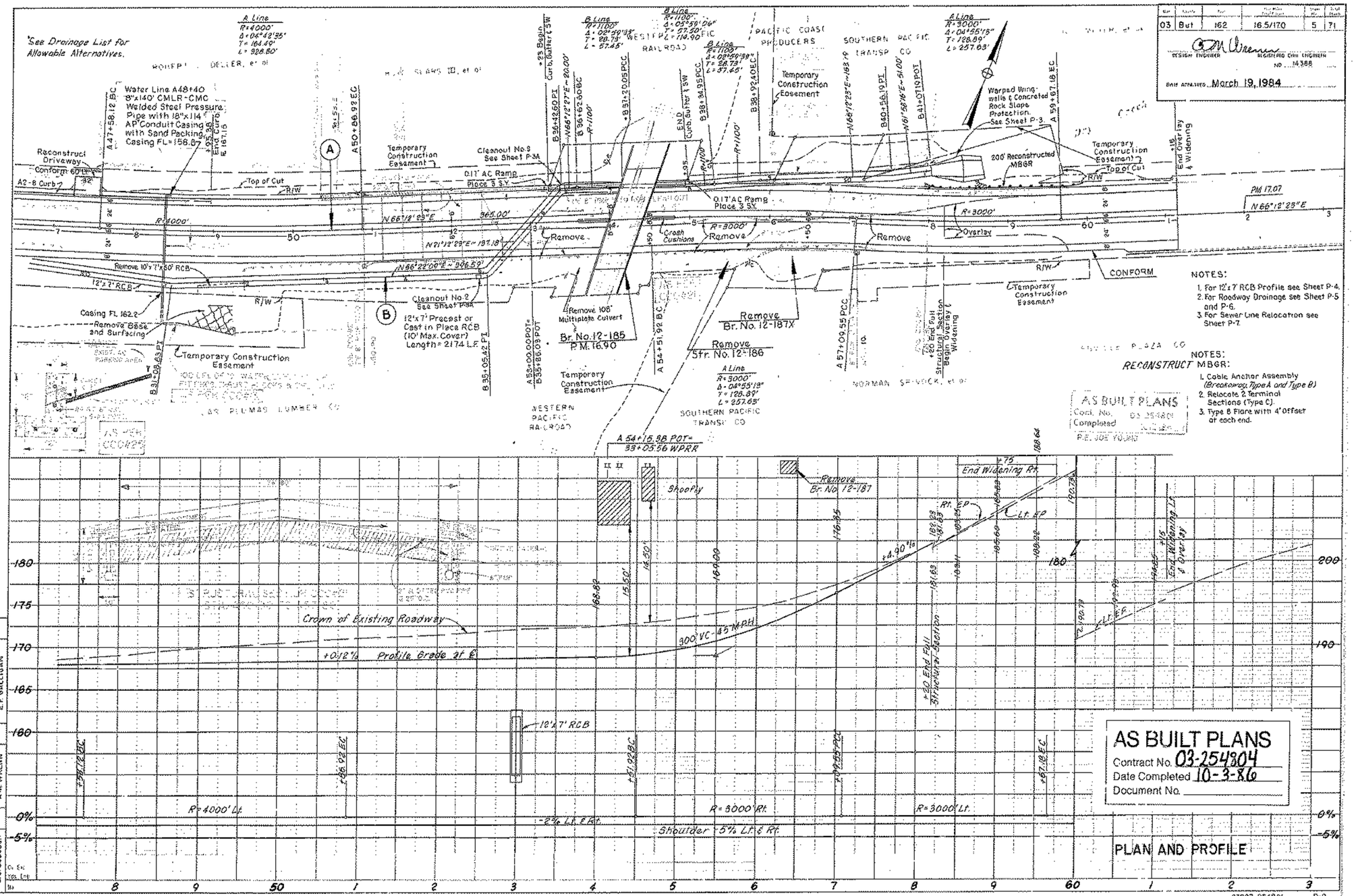
CERTIFICATE OF ACCURATE MICROFILM IMAGE
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
I hereby certify that this is a true and accurate image of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Transportation
Signature: Larry Bellner
Date: 4/9/92

30X

Dist.	County	Route	Post Mile Prefix	Sheet No.	Total Sheets
03	But	162	16.5/17.0	5	71

A.M. Wrenn
DESIGN ENGINEER — REGISTERED CIVIL ENGINEER NO. 14388

DATE APPROVED March 19, 1984



NOTES:

1. For 12'x7' RCB Profile see Sheet P-4.
2. For Roadway Drainage see Sheet P-5 and P-6.
3. For Sewer Line Relocation see Sheet P-7.

NOTES:
RECONSTRUCT MBGR:

1. Cable Anchor Assembly (Breakaway Type A and Type B)
2. Relocate 2 Terminal Sections (Type C).
3. Type B Flare with 4' Offset at each end.

AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No.

PLAN AND PROFILE

Project Engineer G.S. BOGUSCH
Design Engineer A.M. WRENN
Maintenance Representative E.F. GALLIGAN

03207 254804 P-2

5

D C B

CERTIFICATE OF ACCURATE MICROFILM IMAGE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
ADMIN 1250 (REV 3/80)

I hereby certify that this is true and accurate image of the above document taken under my direction and control on this date in Sacramento, California, pursuant to authorization by the Director of Transportation.

SIGNATURE OF MICROFILM OPERATOR
Gary Kellner
DATE 4/9/92

10 cm

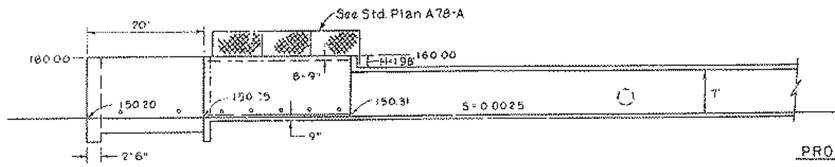
30X

B C D

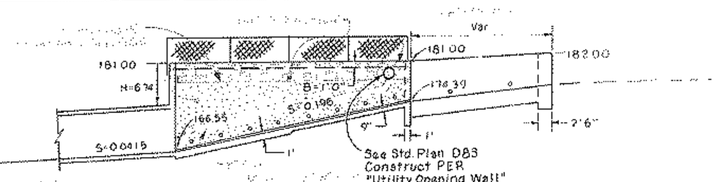
03	But	162	16.5/17.0	6	71

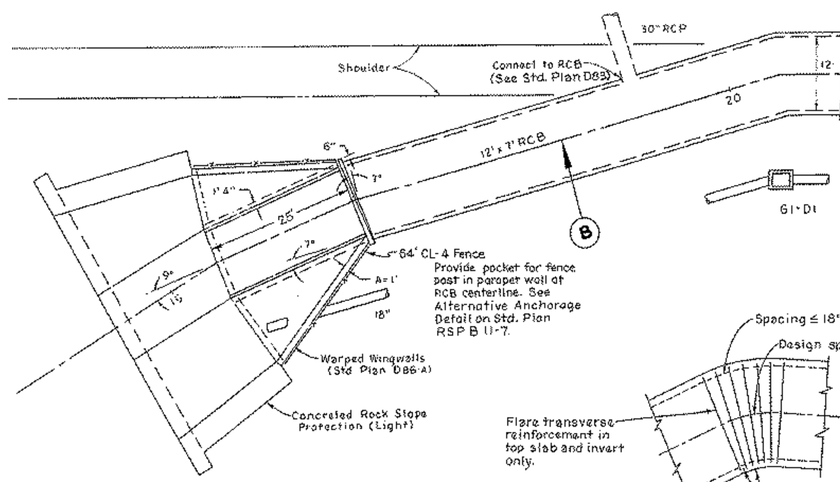
14388

March 19, 1984



PROFILE
Scale: 1" = 10'

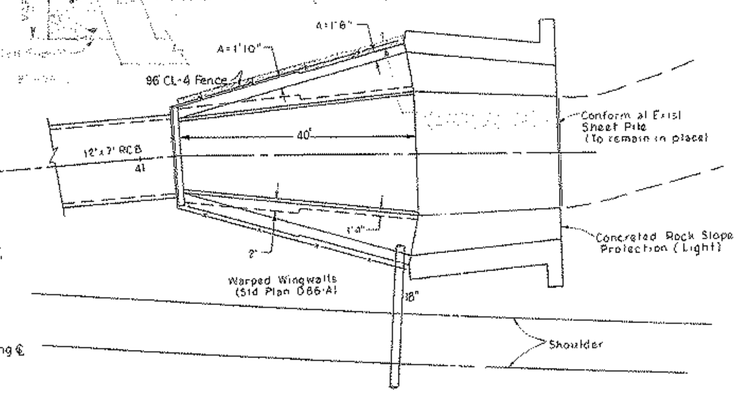




OUTLET STRUCTURE

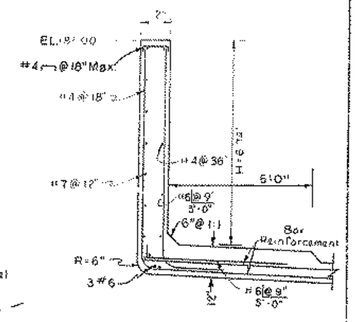
28 CY CLASS A CONCRETE (STRUCTURE)
4250# BAR REINFORCING STEEL

PLAN
Scale: 1" = 10'

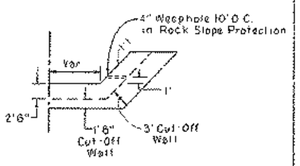


INLET STRUCTURE

52 CY CLASS A CONCRETE (STRUCTURE)
7660# BAR REINFORCING STEEL



INLET PARAPET
(Std. Plans D83)
Scale 1" = 2'



B 41+71±
END SLOPE PROTECTION
Scale: 1" = 10'

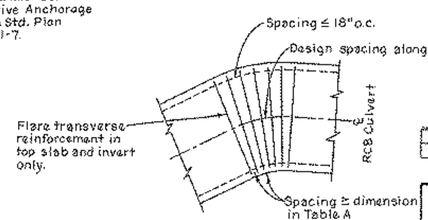
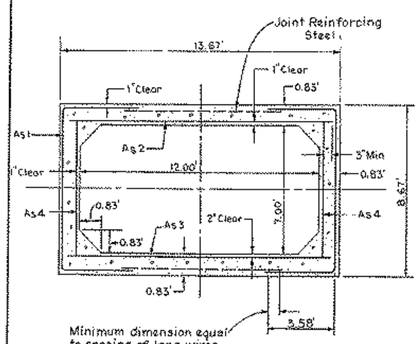


Table A

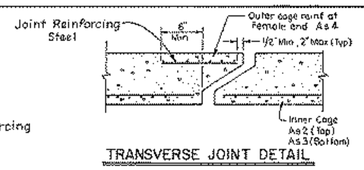
BAR #	4	5	6	7	8
MINIMUM SPACING	3 1/4"	3 7/8"	3 3/4"	4"	4 1/4"

TYPICAL RCB BEND
REINFORCEMENT FLARE DETAIL
No Scale

Transverse Steel Areas
Minimums (in²/LF)
As1 = 0.830 As3 = 0.837
As2 = 0.691 As4 = 0.240

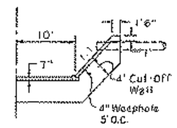


PRECAST BOX DETAILS
No Scale
(See Std. Plan D80 and D83 for cast in place 12'x7' with 10' maximum cover RCB Details)

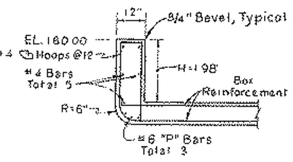


TRANSVERSE JOINT DETAIL

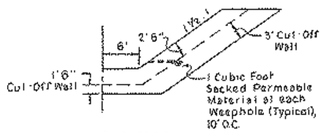
DESIGN NOTES:
Specifications - AASHTO dated 1977 with revisions and supplemented by Bridge Planning and Design Manual.
Load Factors = 1.5D + 1.5E + 2.5(L+I)
Capacity Reduction Factor included/ where D = Dead Load E = Earth Load L = Live Load I = Impact
Loading - Live Load = HS20-44 truck
Earth Loads for two conditions
A. 140 lb/cu.ft. vertical, 42 lb/cu.ft. horizontal
B. 140 lb/cu.ft. vertical, 140 lb/cu.ft. horizontal
Unit Stresses - fc = 5000psi fy = 65,000 psi n = 9
Steel Configuration - per ASTM C789, except clear cover at the invert was increased to 2 inches.



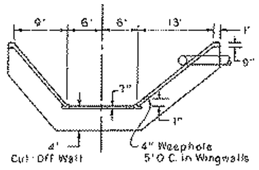
B 41+47.19
END WARPED WINGWALLS
Scale: 1" = 10'



OUTLET PARAPET
(Std. Plans D83)
Scale: 1" = 2'



B 18+89.00
BEGIN SLOPE PROTECTION
Scale: 1" = 10'



B 19+09.00
BEGIN WARPED WINGWALLS
Scale: 1" = 10'

AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No.

AS BUILT PLANS
Cont. No. 03-254804
Completed 10-3-86
RICHARD YOUNG

12'x7' RCB
INLET & OUTLET STRUCTURES
AND PRECAST BOX DETAILS

E. E. GALLIGAN
A. M. WRENN
G. S. BORUSCH

03207-254801 P-3

CERTIFICATE OF ACCURATE MICROFILM IMAGE
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
I hereby certify that this is a true and accurate image of the above document taken under my direction and control on this date, in Sacramento, California pursuant to authorization by the Director of Transportation.
SUPERVISOR OF MICROFILM OFFICE'S SIGNATURE: Larry Killian DATE: 4/9/92

30X

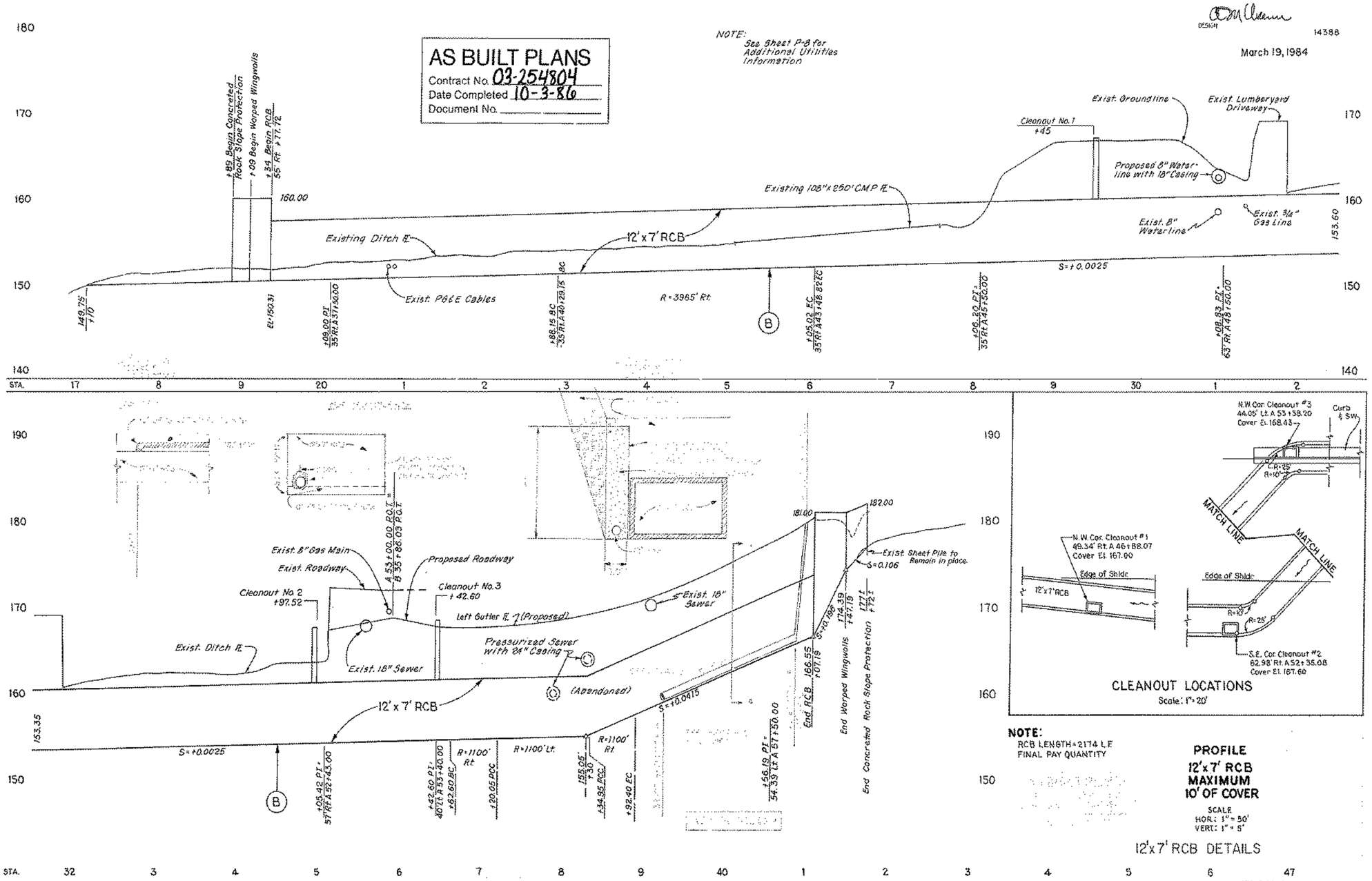
03 Sut 162 16.5/17.0 8 71

DESIGN 14388

March 19, 1984

AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No. _____

NOTE: See Sheet P-8 for Additional Utilities Information



CLEANOUT LOCATIONS
Scale: 1" = 20'

NOTE:
RCB LENGTH = 2174 L.F.
FINAL PAY QUANTITY

PROFILE
12'x7' RCB
MAXIMUM
10' OF COVER

SCALE
HOR.: 1" = 50'
VERT.: 1" = 5'

12'x7' RCB DETAILS

03207 254801

P-4

CERTIFICATE OF ACCURATE MICROFILM IMAGE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

I hereby certify that this is a true and accurate image of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Transportation.

SUPERVISOR OF OPERATIONS OF MICROFILMING DOCUMENT — DATE 4/9/92

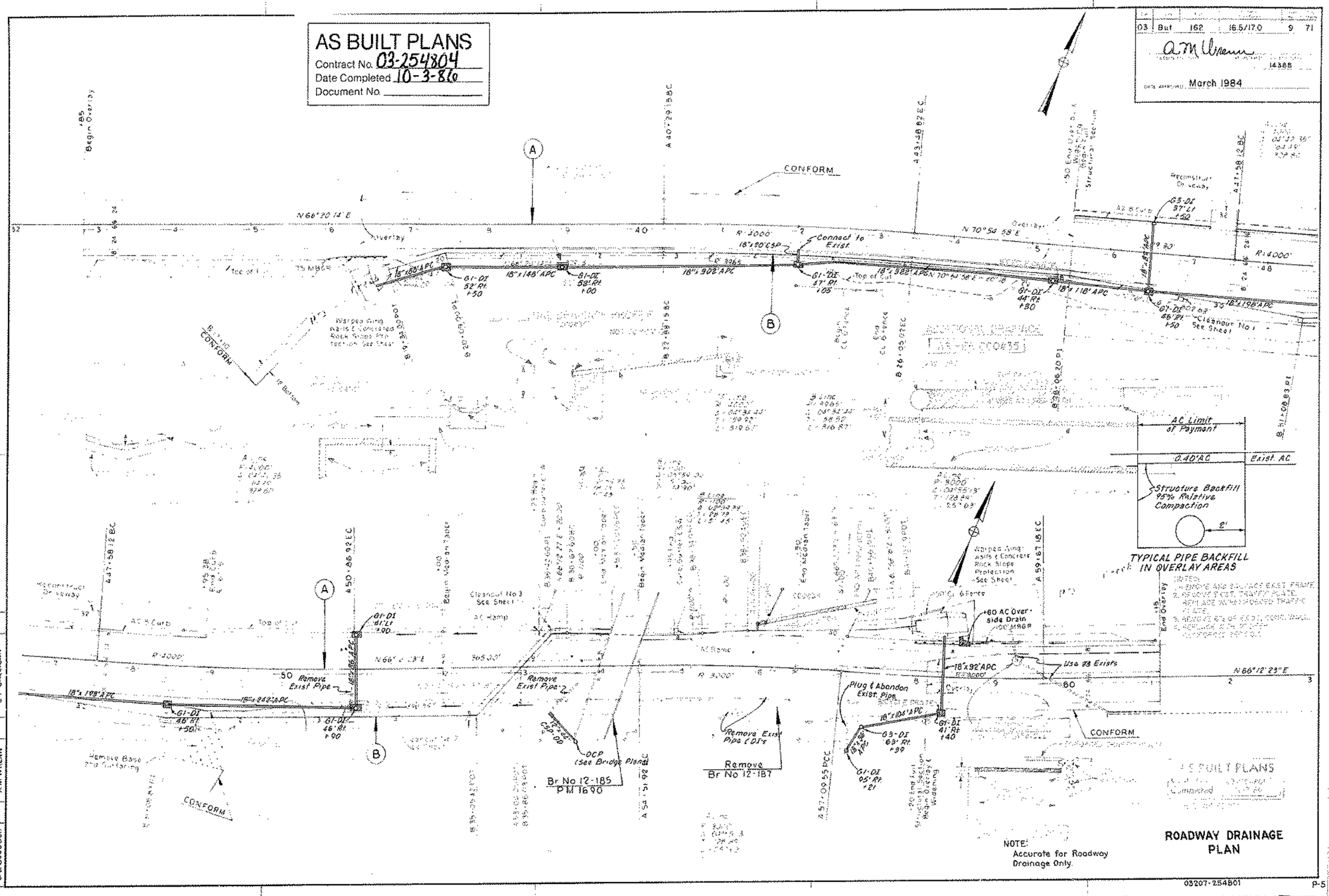
10 cm

30X

AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No.

03	But	162	16.5/17.0	9	71

A M Wrenn
14388
DATE APPROVED March 1984



NOTE:
Accurate for Roadway Drainage Only.

ROADWAY DRAINAGE PLAN

G.S. BUGUSCH | A M WRENN | E F GALLIGAN

03207-254801

P-5

9

CERTIFICATE OF ACCURATE MICROFILM IMAGE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
ADM-0247 (REV. 2/83)

I hereby certify that this is a true and accurate image of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Transportation.

SIGNATURE OF USERS CERTIFICATE OFFICER: Mary Rellison
DATE: 4/9/92

10 cm

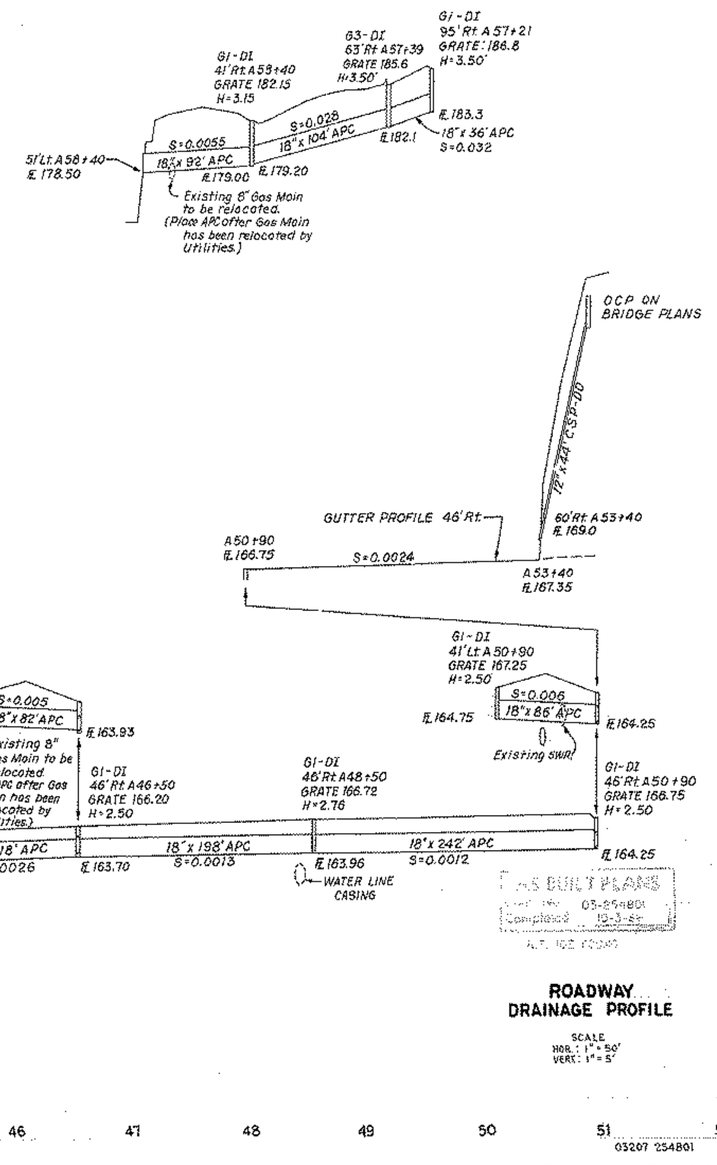
30X

03 Bu 162 16.5/17.0 10 71

DESIGN ENGINEER 14388

March 19, 1984

AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
Document No.



AS BUILT PLANS
Contract No. 03-254804
Date Completed 10-3-86
ALT. NO. 10

ROADWAY DRAINAGE PROFILE

SCALE
HOR.: 1" = 50'
VERT.: 1" = 5'

CERTIFICATE OF ACCURATE MICROFILM IMAGE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
ATM 0043 (REV. 3/82)

I hereby certify that this is a true and accurate image of the above document taken under my direction and control on this date in Sacramento, California pursuant to authorization by the Director of Transportation.

SIGNATURE OF MICROFILM SERVICES REPRESENTATIVE: Larry Bellucci DATE: 4/9/92

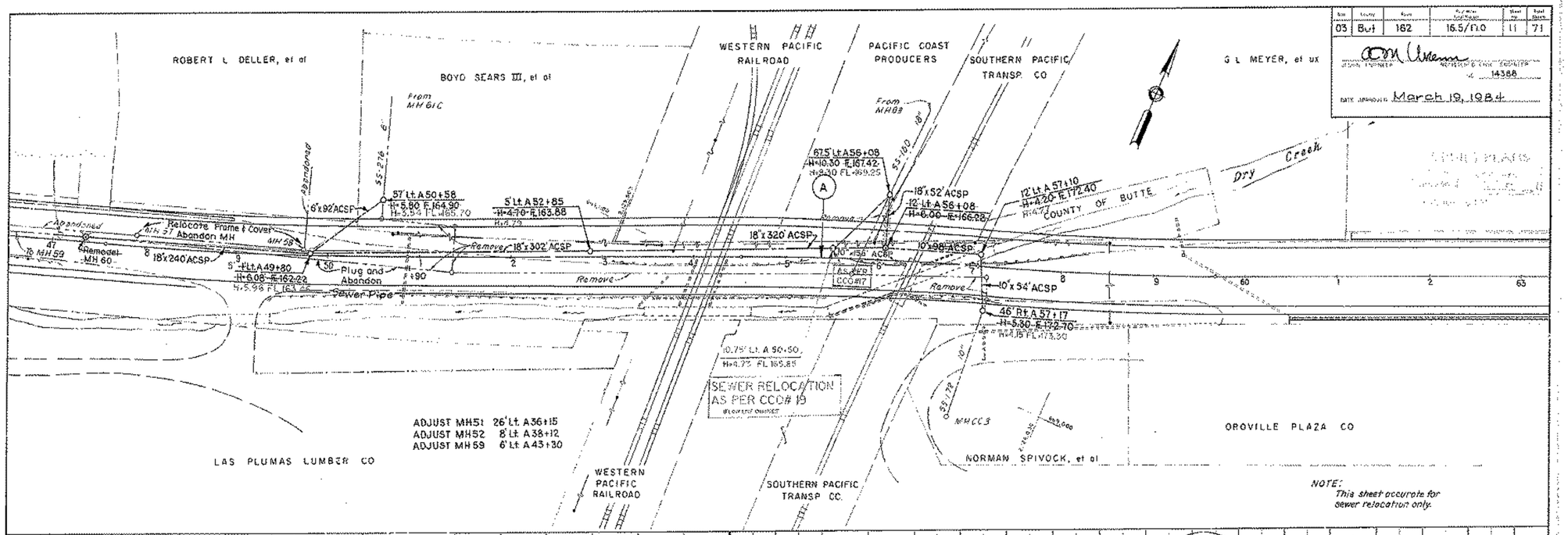
10 cm

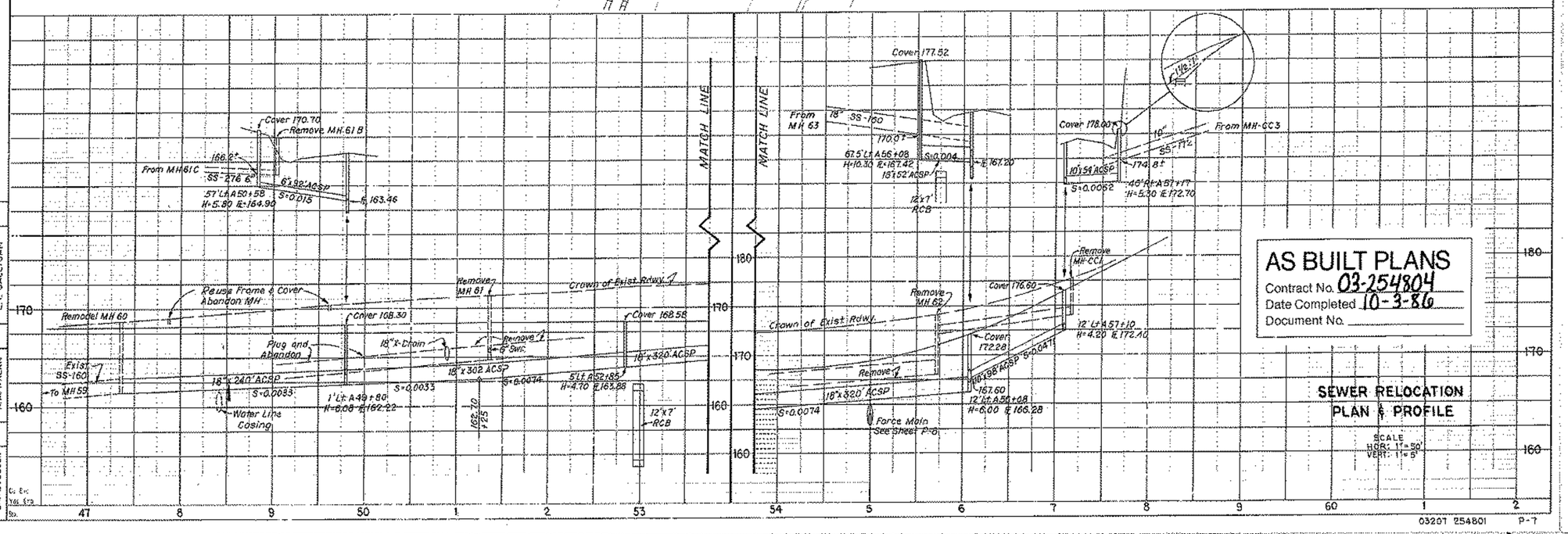
30X

Dist	County	Route	Kilometer Post/Mile	Sheet No.	Total Sheets
03	But	162	16.5/17.0	11	71

Design Engineer: A.M. Wrenn — Registered Civil Engineer C 14388

Date Approved: March 19, 1984





Approved Resident Engineer: E. F. GALLIGAN
Design Engineer: A.M. WRENN
Drawn: G.S. BOGUSCH

CERTIFICATE OF ACCURATE MICROFILM IMAGE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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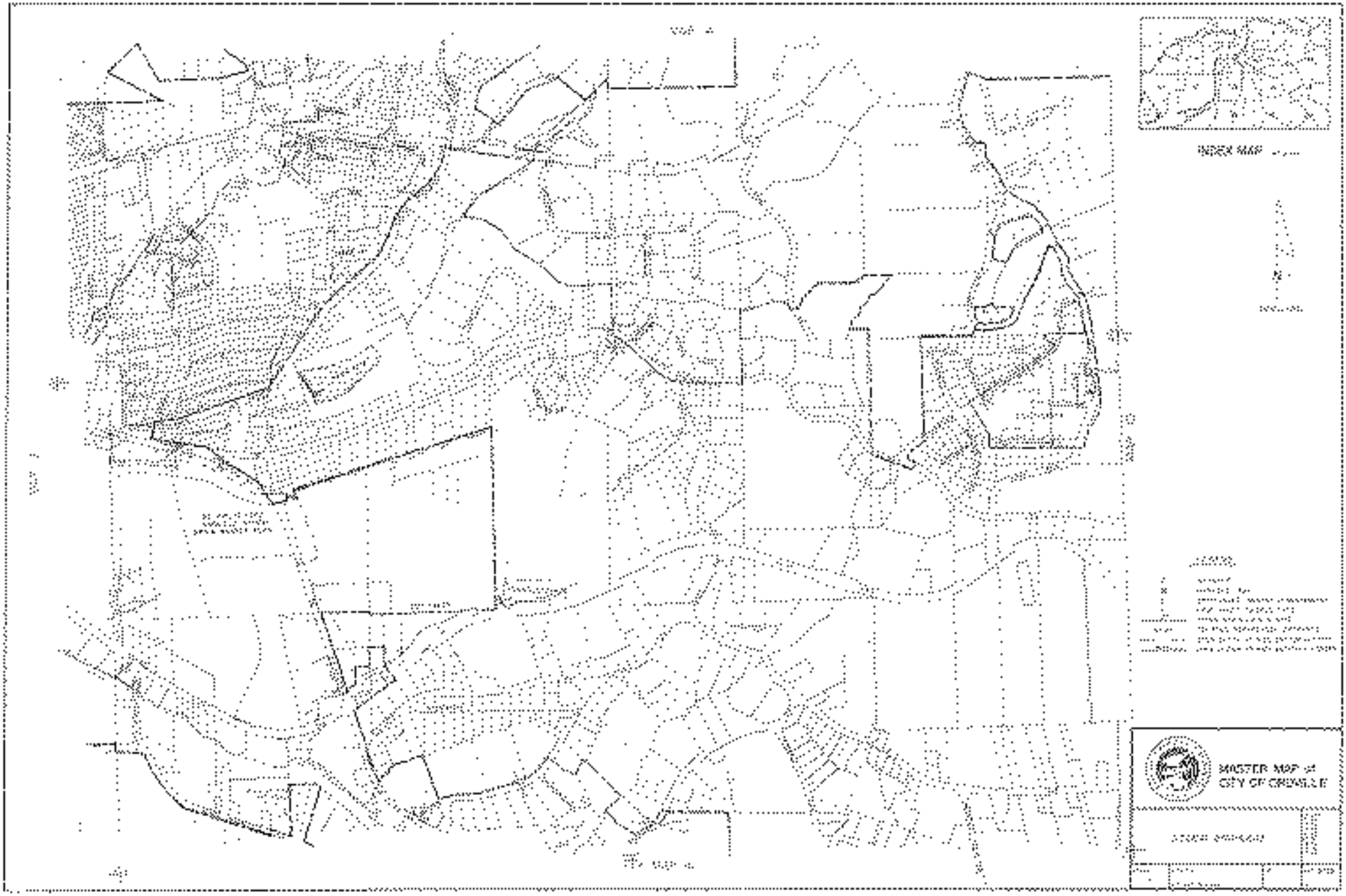
SUPERVISOR OF MICROFILMING Operations — DATE 4/9/92

30X

Appendix C

STORM DRAIN AS-BUILTS


INDEX MAP
MASTER MAP of
CITY OF CRESTLINE

MAP 3

MAP 7

MAP 9

MAP 13

INDEX MAP NO SCALE

N

SCALE 1" = 400'

LEGEND

- MANHOLE
- MANHOLE BOX
- DROP INLET (SQUARE or RECTANGLE)
- DROP INLET (CIRCLE TYPE)
- 12" STORM DRAIN LINE & SIZE
- SD-110 RELATED REFERENCED DRAWINGS
- OPEN DITCH (5' WIDE BOTTOM or LESS)
- OPEN DITCH (5' WIDE BOTTOM or LARGER)

(SS-1821) DRAWER "E" MISCL. PLATS

SD-198, SD-200
OROVILLE STORM
DRAIN MASTER PLAN

MASTER MAP of CITY OF OROVILLE

STORM DRAINAGE

REVISIONS
6-85 5-93
10-85 2-95
12-85
1-81
3-82
11-83
8-89
10-89
9-91

DRAWN BY	APPROVED BY	DATE	SHEET M8
J.S.	DIRECTOR OF PUBLIC WORKS		OF

OROVILLE
HIGHWAY
DAM
STANFORD
AVENUE
SERVICE STATION
Asphalt
HOUSE
SWIMMING POOL
Gravel Driveway
Pacific Gas & Electric Company's Power Tower Transmission Line
8" Sewer Pipe
S 16+36.33
S 15+00.00
SD 110

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	162	16.2, 16.4	10	11

REGISTERED ELECTRICAL ENGINEER — 2-27-95 DATE

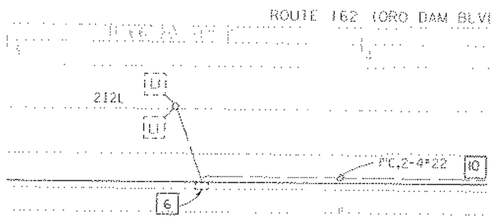
3-27-95
PLANS APPROVAL DATE

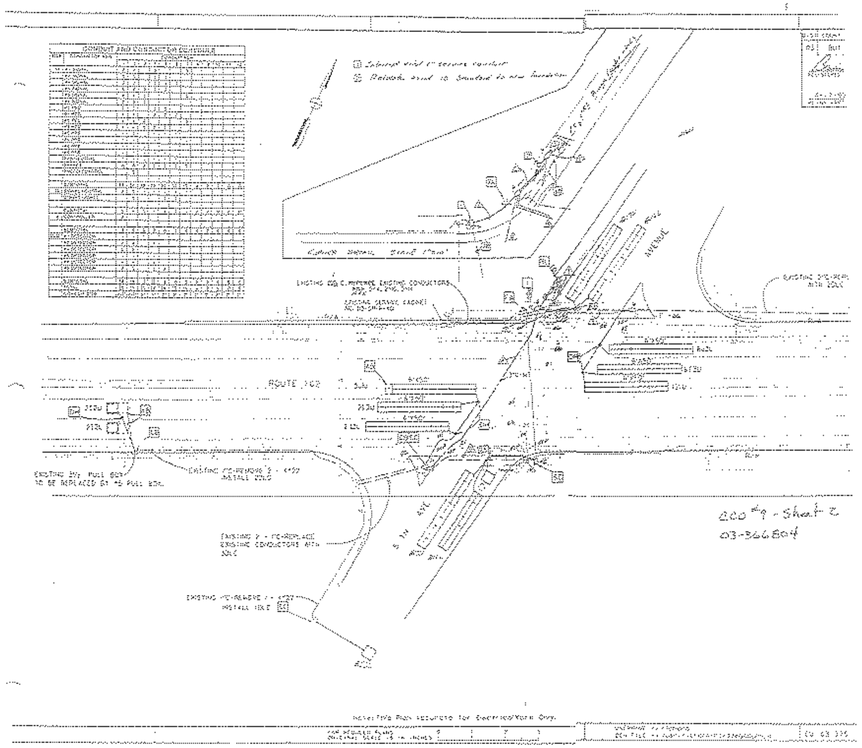
DAVID A. CAMBOA No. E13876 Exp. 6-30-96 ELECTRICAL STATE OF CALIFORNIA

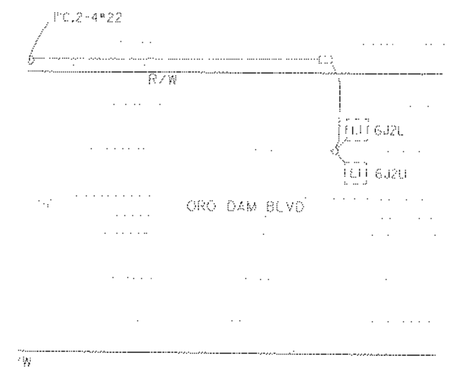
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

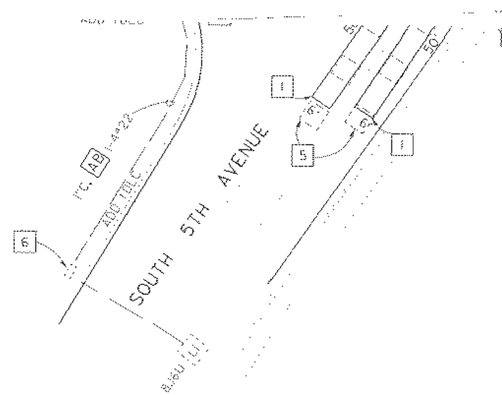
PROJECT NOTES

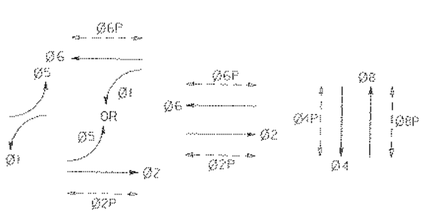
1. INSTALL TYPE C LOOP DETECTOR, SPLICE LEADS TO EXISTING DLC IN PULL BOX. DIMENSIONS AS SHOWN.
2. INSTALL 3"C, 3#10, 1#14, 2DLC
3. EXISTING 2#4, 2#10, 3#14
4. EXISTING SERVICE NO.03-SP-H-40 120/240V TYPE I SERVICE PAD
5. ABANDON EXISTING DETECTOR LOOP
6. SPLICE EXISTING DETECTOR LOOPS TO NEW DLC IN PULL BOX.
7. 3"C,3#10,2#14,7DLC
8. REPLACE EXISTING PULL BOX WITH #6 PULL BOX, LEAVE 30' EXTRA DLC FORFUTURE CONTROLLER RELOCATION
9. REMOVE EXISTING PULL BOX, INSTALL #6 PULL BOX
10. ABANDON EXISTING CONDUCTOR, INSTALL 2 DLC











EXISTING PHASE DIAGRAM

EXISTING CONDUCTOR SCHEDULE

CONDUCTOR RUN	1 EXISTING 2"C				2 EXISTING 2"C				3 EXISTING 2½" C				4 EXISTING 3" C				5 EXISTING 2½" C				6 EXISTING 2" C			
CONDUCTORS	10	14	2/14	4/22	10	14	2/14	4/22	10	14	2/14	4/22	10	14	2/14	4/22	10	14	2/14	4/22	10	14	2/14	4/22
(C2) ø1 Signal		3								3				6										
(A1) ø2 Signal		3				3				3				3										
(B) ø4 Signal		3								3				3										
(C1) ø5 Signal						3				3				3				3				3		
(A2) ø6 Signal														3				3				3		
(B) ø8 Signal																		3				3		
Signal Neutral	1				1				1				1				1				1			
(A1) ø2Ped Signal		2				2				2				2										
(B) ø4Ped Signal		2								2				2				2				2		
(A2) ø6Ped Signal																		2				2		
(A1) ø2PPB		1								1				1										
(B) ø4PPB		1				2				1				2				1				1		
(A2) ø2PPB																		1				1		
PPB Neutral		1				1				1				1				1				1		
(C2) ø1 Detector																			1				1	
(A1) ø2 Detector			1	2							1	2			1	2								
(B) ø4 Detector																			2	1				
(C1) ø5 Detector			1								1				1									
(A2) ø6 Detector																			1	2			1	2
(B) ø8 Detector				1							2	1			2	1								
Spares		3				6				3				3				3				3		
Lighting					2				2				2											
P.E. Control														3										
TOTAL	1	19	2	3	3	22	-	-	3	17	4	3	3	32	4	3	1	19	4	3	1	19	2	2

NOTE: THIS PLAN ACCURATE FOR ELECTRICAL WORK ONLY.

SIGNAL AND LIGHTING (MODIFY)

ROUTE 162 (ORO DAM BLVD) AT 5TH AVENUE
SCALE 1" = 20'

E-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
TRAFFIC
Caltrans

PROJECT ENGINEER

CALCULATED/DESIGNED BY | HRZ | DATE | REVISED BY
CHECKED BY | CM | DATE REVISED

DGN FILE => /usr/bobs/P88/342180u01.dgn
USERNAME => bobs

FORM DC-OE-92-PF (REV. 3/86)

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

USERNAME => bobs
DGN FILE => /usr/bobs/P88/342180u01.dgn

CU 03 375 | EA 421801

TIME PLOTTED => 31-MAR-1995 12:44
LAST REVISION 1-23-95

DESCRIPTION OF WORK

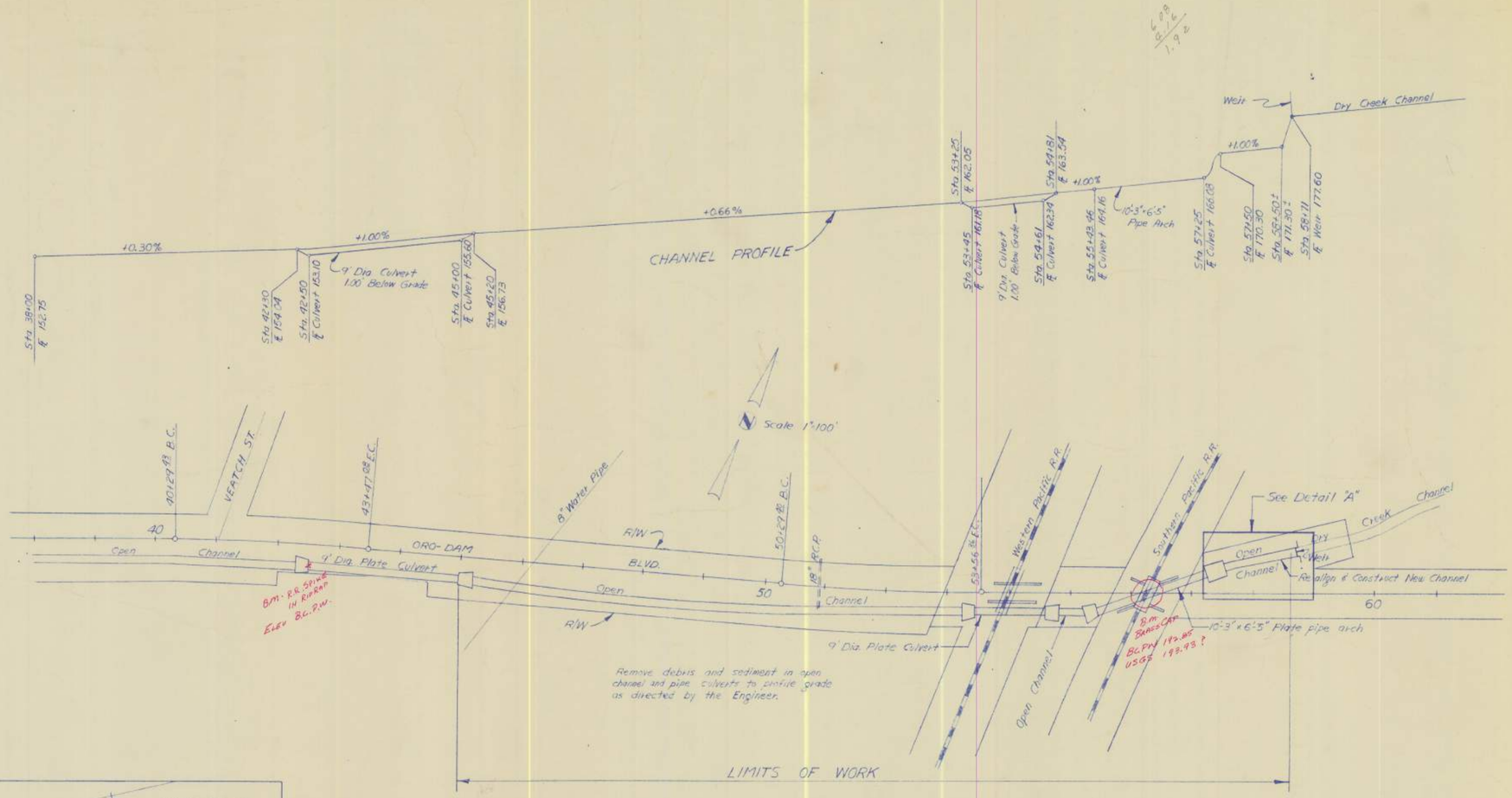
The work to be done consists, in general, of constructing and lining with sacked concrete riprap approximately 100 feet of new open channel, and to cleaning debris and removing sediment from the existing culverts and open channels, as shown on the plan.

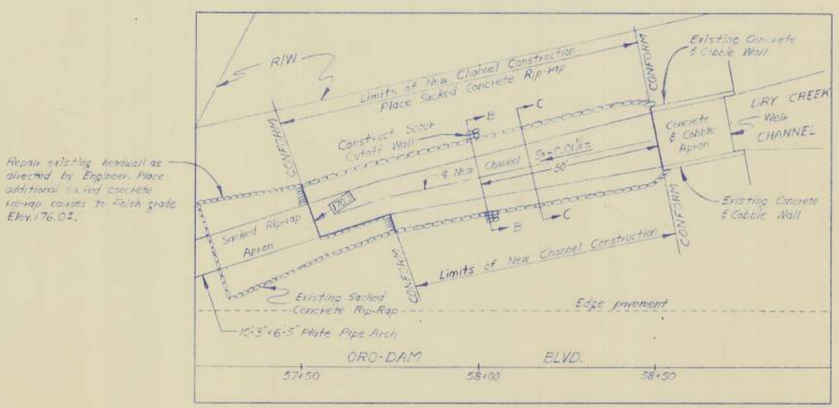
CONSTRUCTION DETAILS

All work shall be performed in conformance with the applicable sections of the Standard Specifications of the State of California, dated January, 1960, the plan entitled "DRY CREEK STORM DAMAGE RESTORATION PLAN-ORO-DAM BLVD. AT S.P.R.R. AND W.P.R.R. UNDERPASS", and as directed by the Engineer.

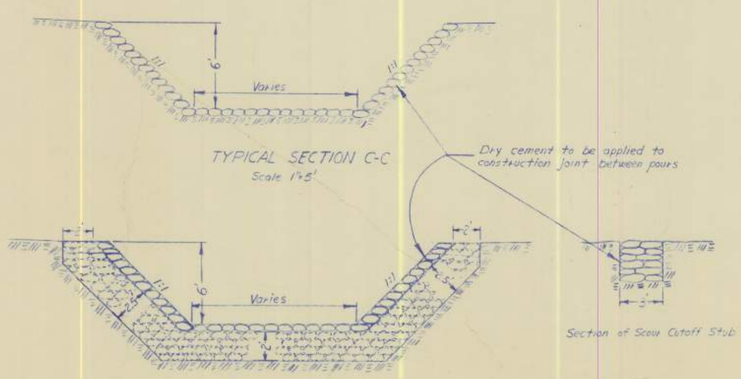
First stage of work shall be the debris and sediment removal from the pipe culverts.

A suitable waste area, off the job site, for disposal of surplus material shall be the responsibility of the contractor.





DETAIL "A"
Scale 1"=20'



APPROXIMATE QUANTITIES

NEW CHANNEL CONST.	
Structure Excavation	9 C.Y.
Channel Excavation	109 C.Y.
Channel Embankment	68 C.Y.
Sacked Concrete Riprap	106 C.Y.
DEBRIS & SEDIMENT REMOVAL	
Pipe Culverts	284 C.Y.
Open Channel	1,065 C.Y.

Count Flood Control Eng. George Stamm

COUNTY OF BUTTE
DEPARTMENT OF PUBLIC WORKS
OROVILLE CALIFORNIA

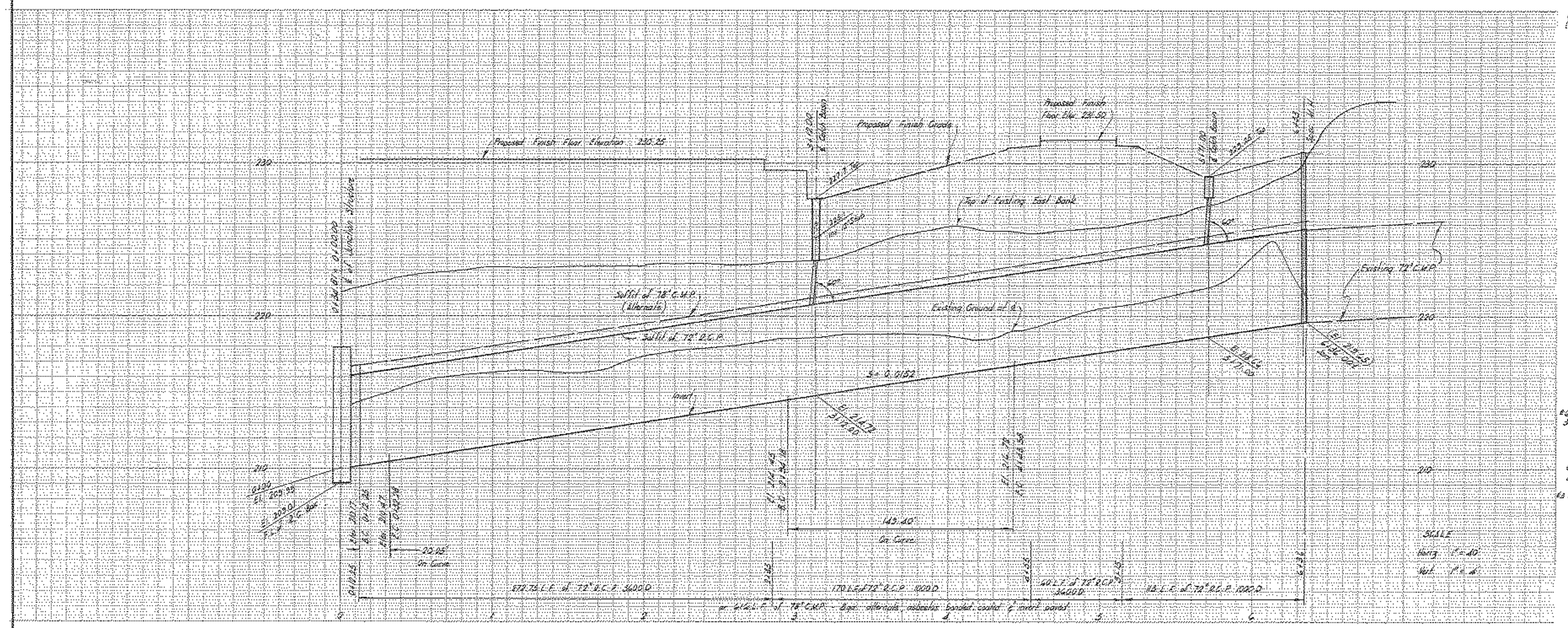
DRY CREEK STORM DAMAGE RESTORATION PLAN-ORO-DAM BLVD. AT S.P.R.R. & W.P.R.R. UNDERPASS

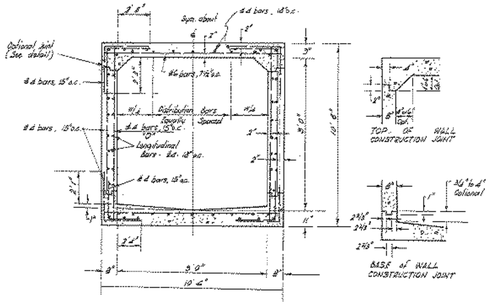
DWN. BY B.C.	DATE NOV. 1962	PROJECT NUMBER	
CHK. BY D.R.	DATE 11/15/62		
F.B. LL	SCALE AS SHOWN	SD 115	

SHEET 1 of 1

FILE NO. E-609

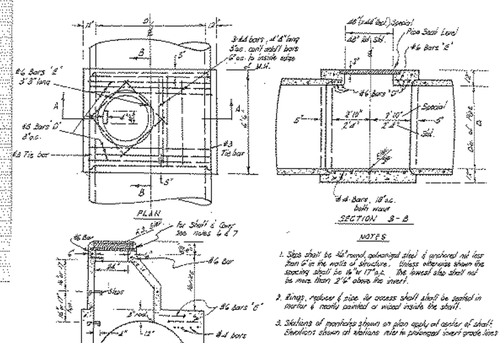
PRINTED ON DIEPO NO. 1000H CLEARPRINT





REINFORCED CONCRETE BOX CONDUIT DETAIL

No Scale

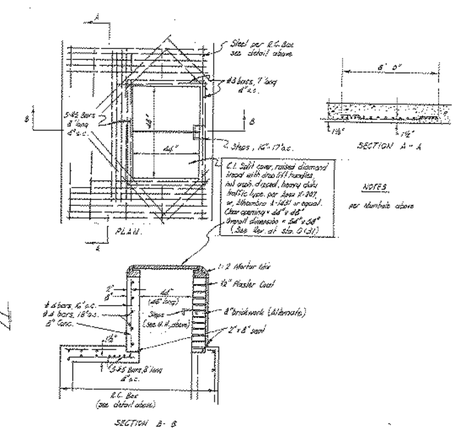


NOTES

1. Slab shall be 1/2" round, galvanized steel & anchored not less than 6" in the walls of structure. Unless otherwise shown the opening shall be 24" x 24" (T.B.L.) The lowest side shall not be more than 3'-6" above the invert.
2. Rings, replaces & size, for access shaft shall be bedded in mortar & firmly anchored or wired inside the shaft.
3. Stations of manholes shown on plan apply at center of shaft. Elevations shown at stations refer to proposed invert grade lines
4. Floor of manholes shall be slat troweled to springing line.
5. Body of manhole shall be poured in one continuous operation, except that a construction joint with or longitudinal keyway may be placed at the springing line.
6. SHAFT:- Shall be standard manhole shaft be eccentric type shaft per Std. Dwg. S-7a. Shaft for special manhole shall be rectangular conc. or brick as detail of box manhole below.
7. COVER:- Cover for standard manhole per Std. Dwg. S-3. Cover for special manhole size from M-207 w. Alternate A W.B.I. or approved equal.

PIPE MANHOLE DETAIL

No Scale



R.C. BOX SPECIAL MANHOLE DETAIL

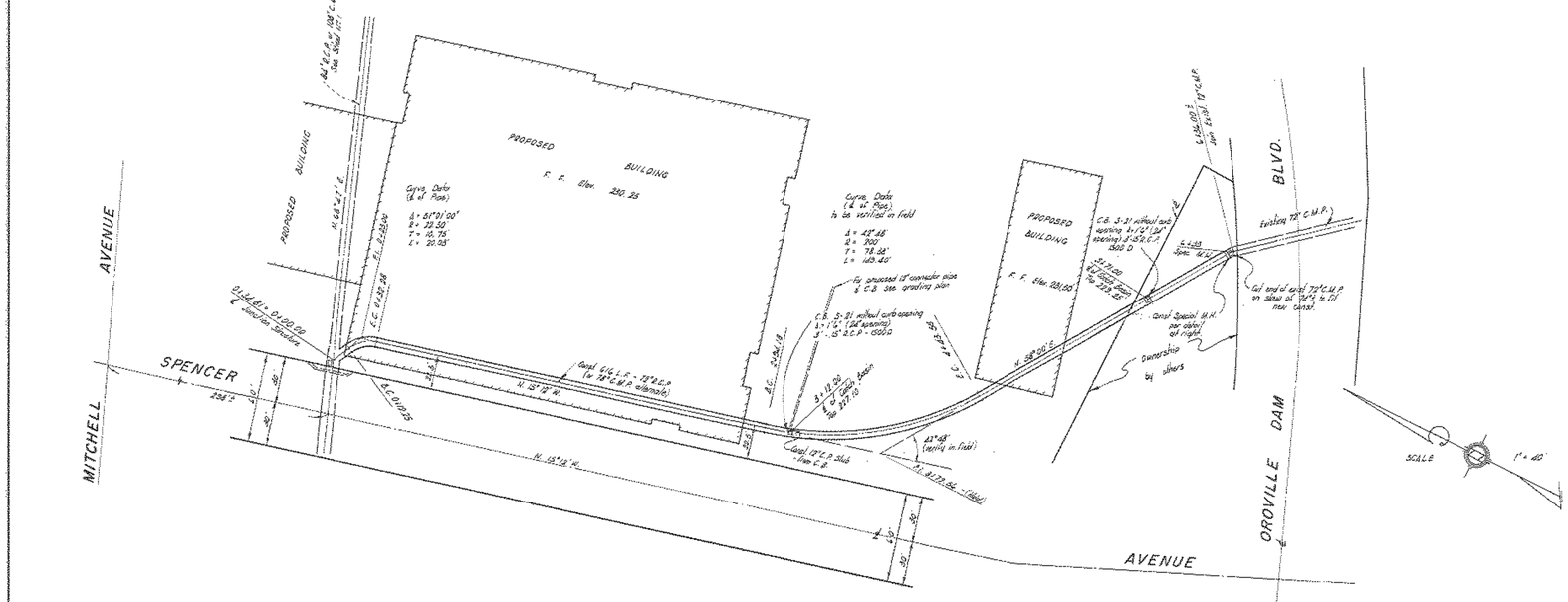
No Scale

STRUCTURAL NOTES

1. Dimensions from face of concrete to steel are to center of bar
2. Longitudinal steel shall be continuous and extend through all construction joints and shall be lapped 30 diameters of splices
3. All bar bends and hooks shall conform to the American Concrete Institute "Manual of Standard Practice."
4. All construction joints in bottom slab, top slab, and side walls shall be in the same plane. No staggering of joints will be permitted.
5. The walls and top slab may be poured monolithic, but after walls have been poured, a delay of two hours shall be made before pouring of the top slab is started.
6. Transverse construction joints shall not be placed within 30 inches of manhole or junction structure openings.
7. "D" bars may be spliced 30 diameters of the lower construction joint.
8. All longitudinal bars shall be #4. Spacing shall be 18" o.c. unless otherwise shown. Bars in top and bottom slabs shall be spaced symmetrically about the center line. Bars in walls shall be spaced symmetrically about mid-height of the walls.

DESIGN DATA

Live Load = 1-H20-S16 truck
Earth load per Marston's formulas:
w = 30 p.c.f. (corresponding to an actual earth weight of 120 p.c.f. – similar to Section 2.2.2.(e) of A.A.S.H.O.)
$K_1 = K_2' = 0.150$
Bd. = outside width of box, plus 2 feet.
Weight of Concrete = 150 p.c.f.
f'c = 3000 psi fc = 1000 psi
fs = 20,000 psi n = 10
v = 30 psi u = 300 psi (Deformed bars complying with A.S.T.M. A-305 - 39T).



REV.	DATE	DESCRIPTION	APPD.	BY
		CITY OF OROVILLE CORRECTIONS		

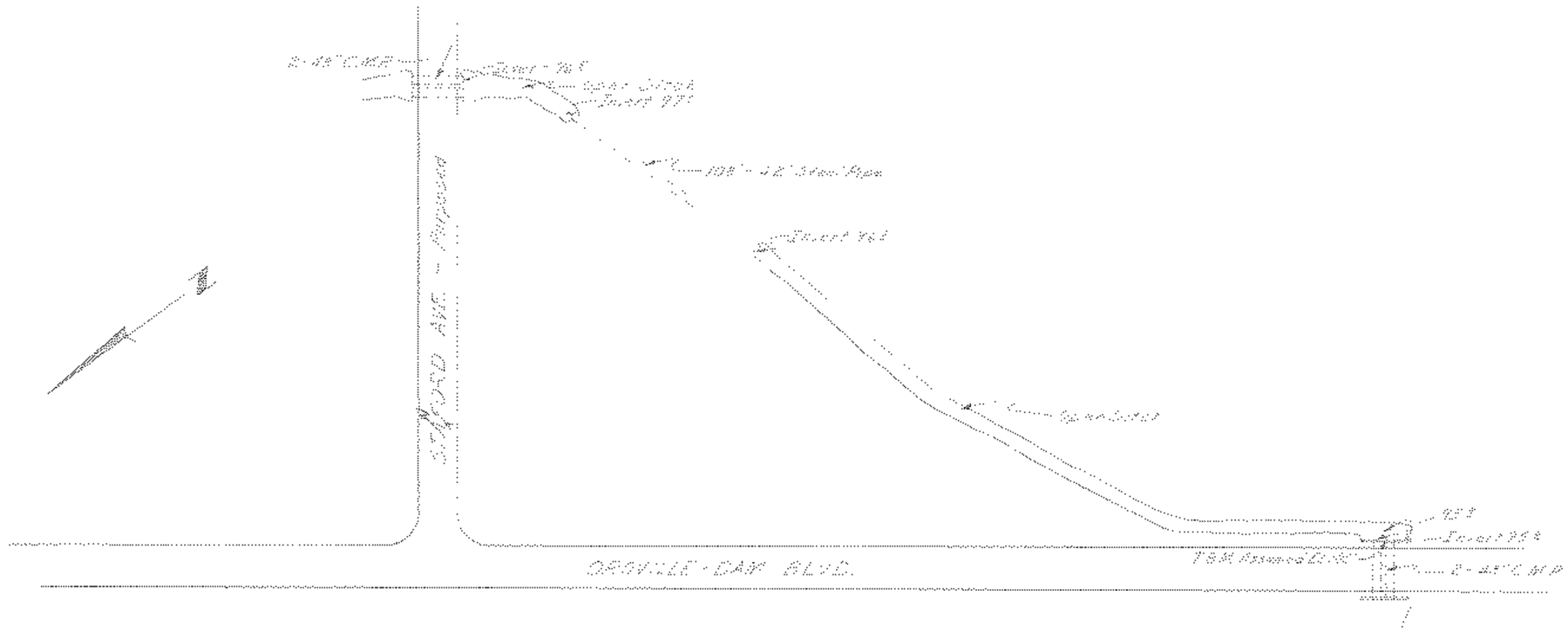
CITY of OROVILLE

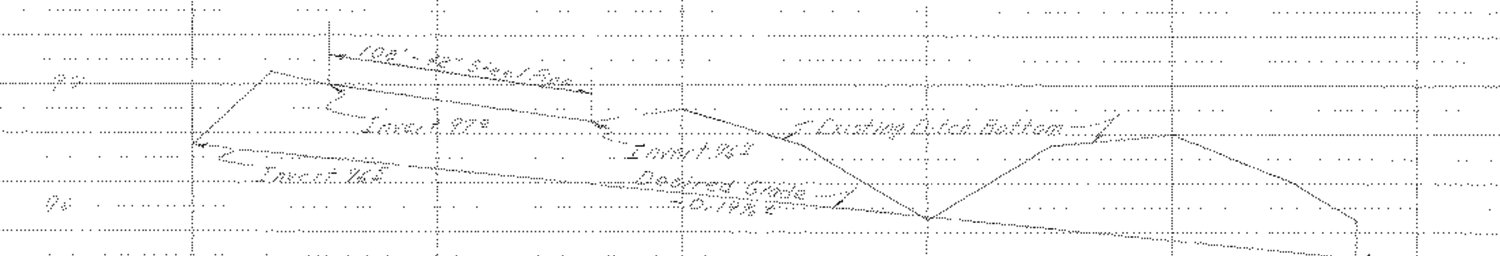
PLAN & PROFILE
of
SOUTH FORK DRY CREEK

SPENCER AVENUE to OROVILLE DAM BOULEVARD

DRAWN BY: Jim Willis	APPROVED: CITY ENGINEER RE 8440	DATE 4/13/63
CHECKED BY: J.L.H.	WALSH-FORKERT CIVIL ENGINEERS INC. 127 N. LONG BEACH, WEST COVINA, CALIF. BY: DATE 4-22-63	SHEET 2 OF 2

SD 119



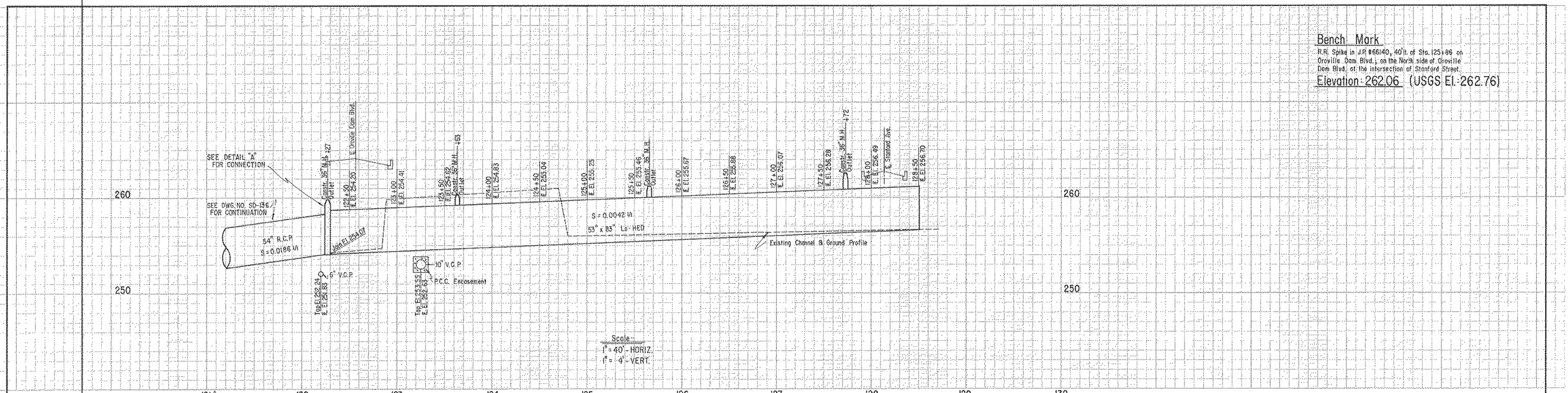


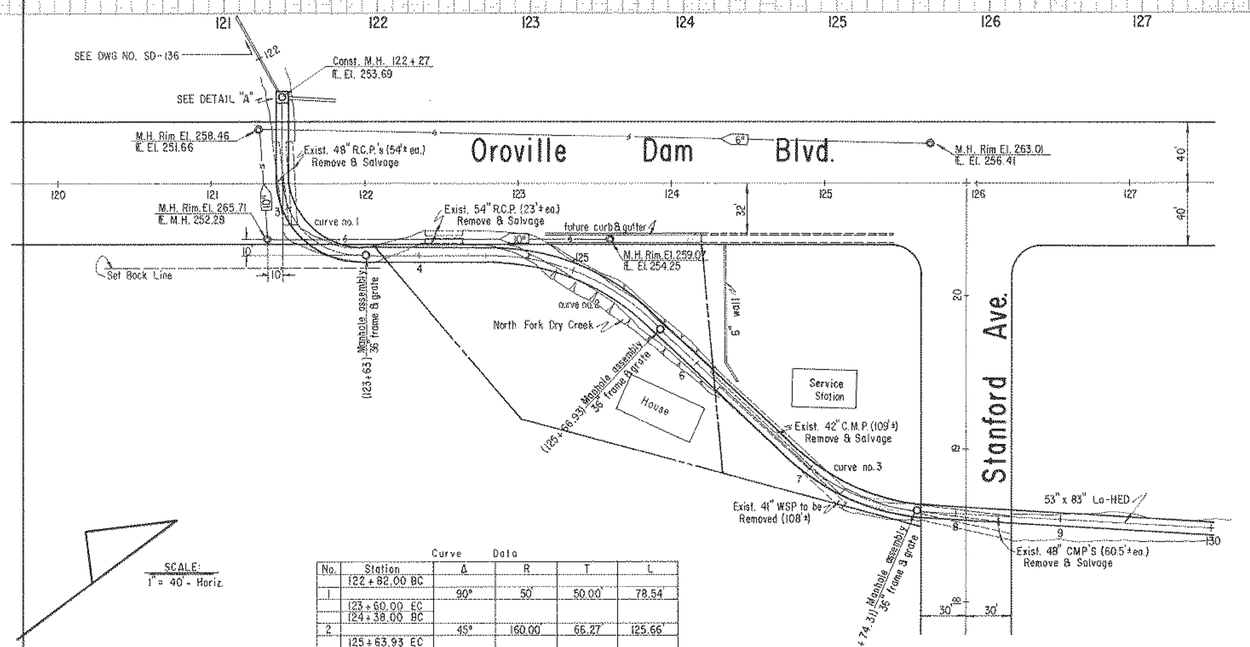
Note: All Elevations Are On An Assumed Datum.

PLAN & PROFILE OF
DRY CREEK CHANNEL
BETWEEN
STAFORD AVE & ORA-VAN BLVD.

City Engineer's Office

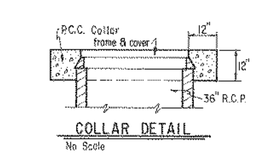
SD 120



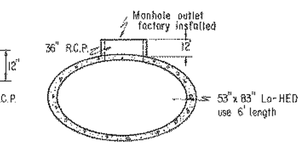


Curve Data

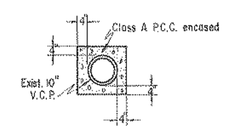
No.	Station	Δ	R	T	L
	122+82.00 BC				
1		90°	50'	50.00'	78.54'
	123+60.00 EC				
	124+38.00 BC				
2		45°	160.00'	66.27'	125.66'
	125+63.93 EC				
	127+01.93 BC				
3		39°30'	100'	35.90'	69.36'
	127+71.31 EC				



COLLAR DETAIL
No Scale



MANHOLE ASSEMBLY
No Scale



V. C. P. ENCASEMENT
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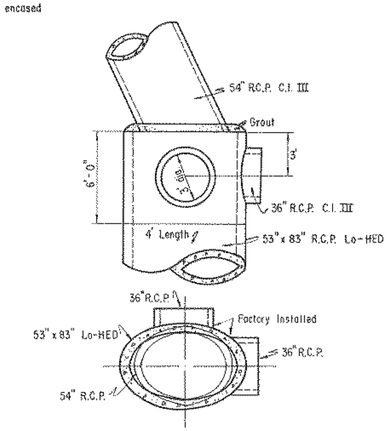


DETAIL "A"
Scale: 1/4" = 1'-0"

All work shall be in accordance with the City of Oroville standards and specifications.

NOTE:
1. Manhole assembly shall be Pinkerton frame part No. A-464 & cover No. A-465 or equal.

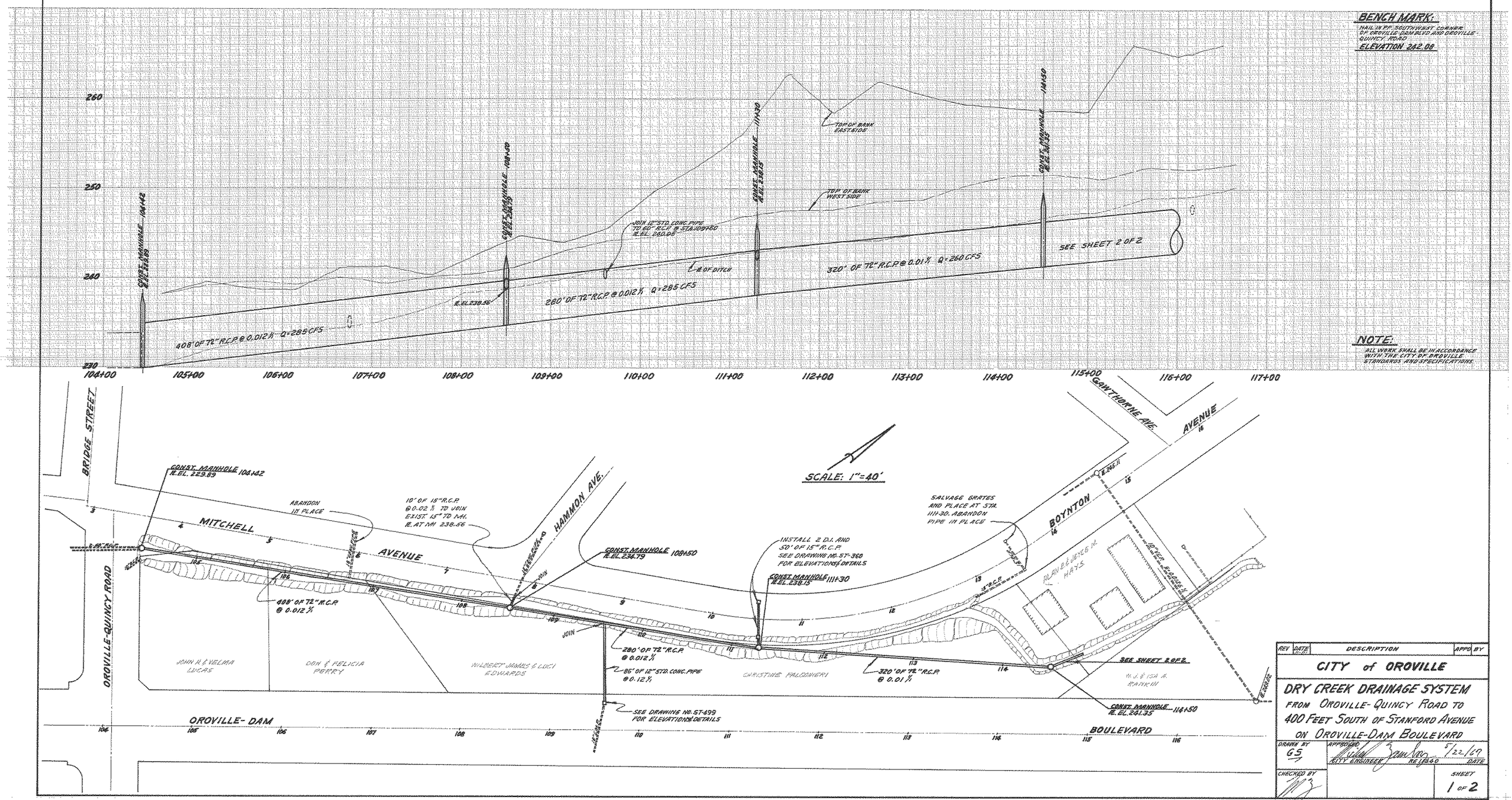
Rev	Date	Description	App	By

City of Oroville

53"x83" Lo-HED R.C.P. in Dry Creek Channel between Oroville-Dam Blvd. & Stanford Avenue

Drawn by TB	Approved by City engineer R.E. 11440	4/17/90 date
Design by MV		Sheet 1 of 1
Checked by		

SD-126



REV	DATE	DESCRIPTION	APPD. BY

CITY of OROVILLE

DRY CREEK DRAINAGE SYSTEM
FROM OROVILLE-QUINCY ROAD TO 400 FEET SOUTH OF STANFORD AVENUE ON OROVILLE-DAM BOULEVARD

DRAWN BY GS

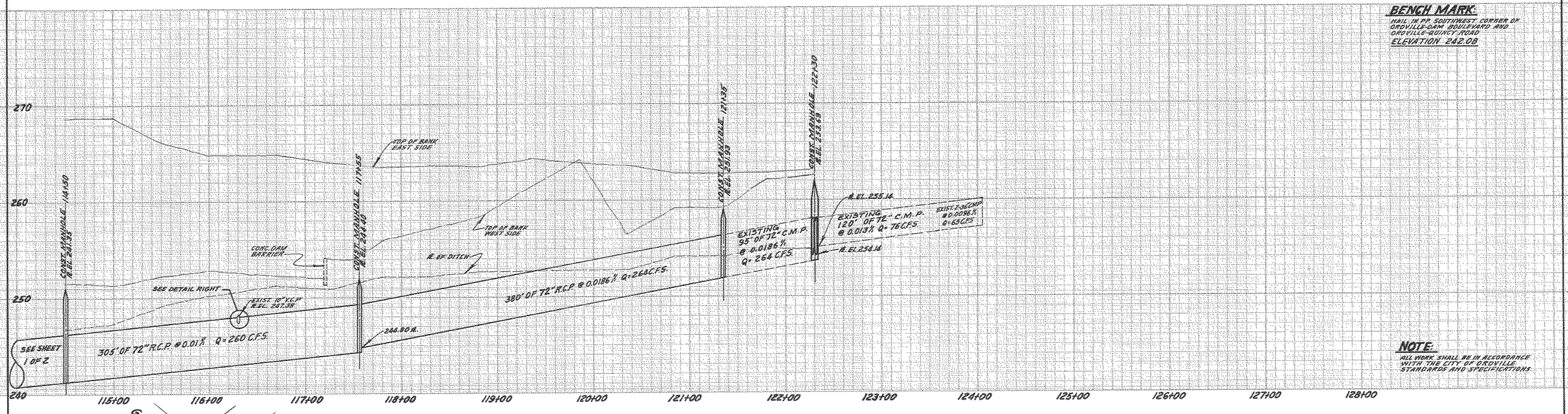
APPROVED: CITY ENGINEER — RE 13860 — 5/22/69 DATE

CHECKED BY

SHEET 1 OF 2

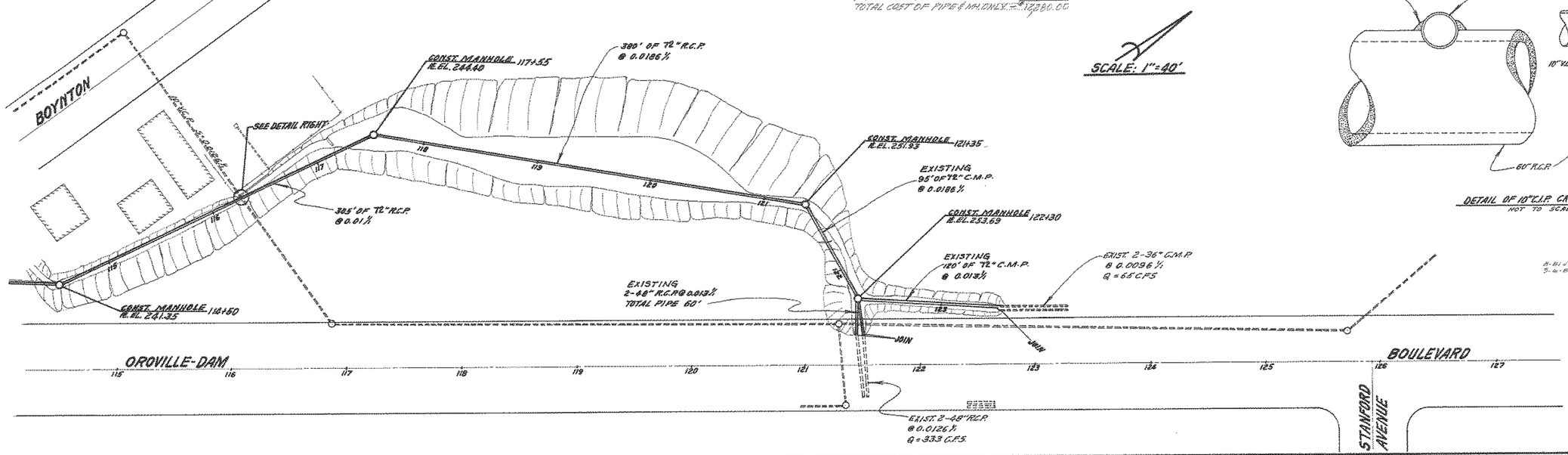
SD 136

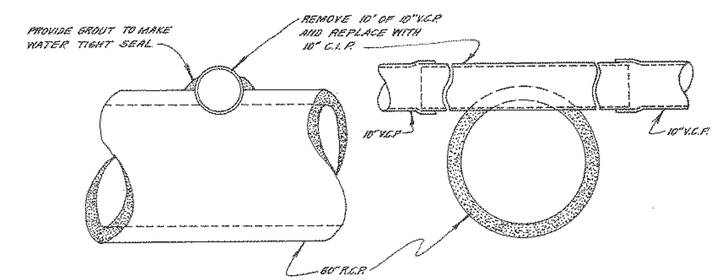
BENCH MARK:
NAIL IN P.P. SOUTHWEST CORNER OF OROVILLE-DAM BOULEVARD AND OROVILLE-QUINCY ROAD
ELEVATION 242.08



NOTE:
ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF OROVILLE STANDARDS AND SPECIFICATIONS.

FLOOD PROTECTION PROJECT
UNDER STAGE CONSTRUCTION
STATION 114+50 TO STATION 117+50
620 FEET OF 60" R.C.P. @ $19.00 PER FT. = $11,780.00
1-6 FEET WIDE MANHOLE = 700.00
TOTAL COST OF PIPE & MH ONLY = $12,480.00





DETAIL OF 10" C.I.P. CROSSING 60" R.C.P.
NOT TO SCALE

REV	DATE	DESCRIPTION	APPD	BY

CITY of OROVILLE

DRY CREEK DRAINAGE SYSTEM
FROM OROVILLE-QUINCY ROAD TO 400 FEET SOUTH OF STANFORD AVENUE ON OROVILLE-DAM BOULEVARD

DRAWN BY: GS
APPROVED: CITY ENGINEER — DATE 5/22/69
CHECKED BY:
SHEET 2 OF 2

SD-136

LEGEND

SD	STORM DRAIN
SS	SANITARY SEWER
W	WATER LINE
	MANHOLE
	CATCH BASIN
	CURB INLET
	TYPE CO INLET
	FIRE HYDRANT
	EXISTING POWER LINE
	POWER POLE

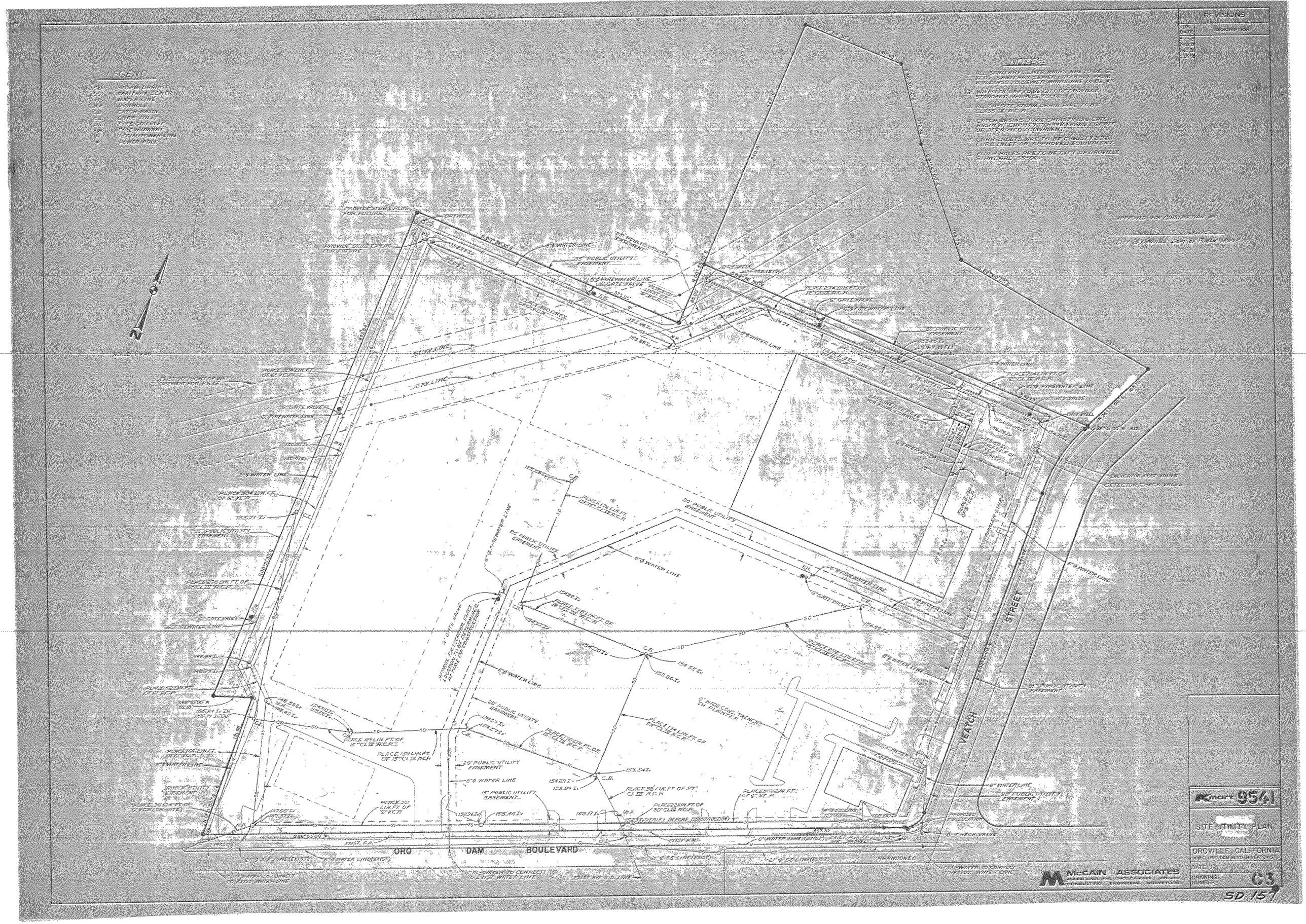
NOTES:

1. ALL SANITARY SEWER MAINS ARE TO BE 6" VCP. SANITARY SEWER LATERALS FROM BUILDINGS TO SEWER MAINS ARE TO BE 4".
2. MANHOLES ARE TO BE CITY OF OROVILLE STANDARD MANHOLE SS-2.0.
3. ALL ON-SITE STORM DRAIN PIPE TO BE CLASS II R.C.P.
4. CATCH BASINS TO BE CHRISTY U36 CATCH BASIN W/ CHRISTY U-FRAME, FRAME & GRATE OR APPROVED EQUIVALENT.
5. CURB INLETS ARE TO BE CHRISTY U36 CURB INLET OR APPROVED EQUIVALENT.
6. FLUSH HOLES ARE TO BE CITY OF OROVILLE STANDARD SS-06.

APPROVED FOR CONSTRUCTION BY

CITY OF OROVILLE DEPT. OF PUBLIC WORKS

SCALE 1"=40'



REVISIONS

BY DATE	DESCRIPTION

Kmart 9541

SITE UTILITY PLAN

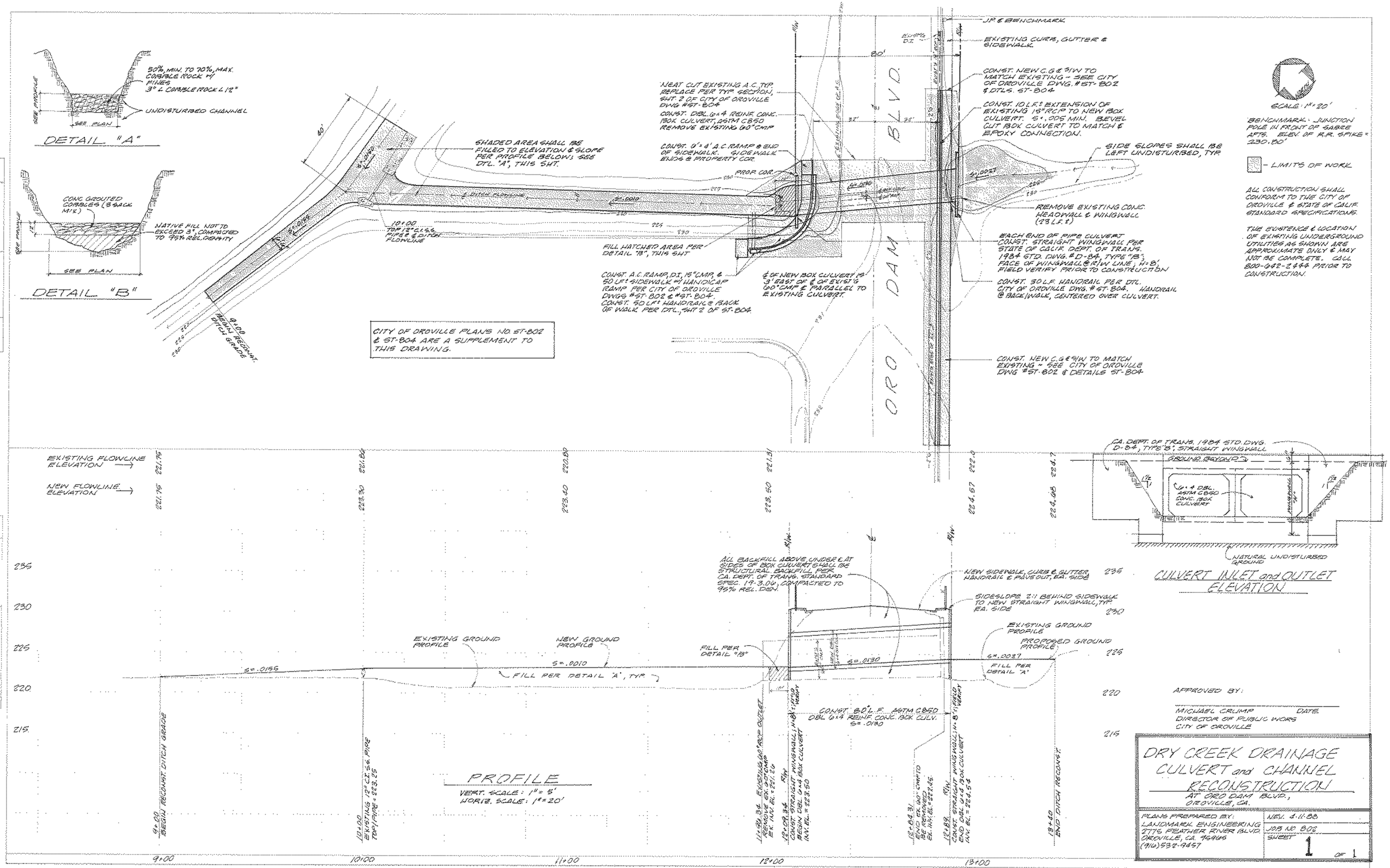
OROVILLE, CALIFORNIA
N.W.C. ORO DAM BLVD & VEATCH ST.

DATE

DRAWING NUMBER C3

McCAIN ASSOCIATES
CONSULTING ENGINEERS SURVEYORS

SD 157

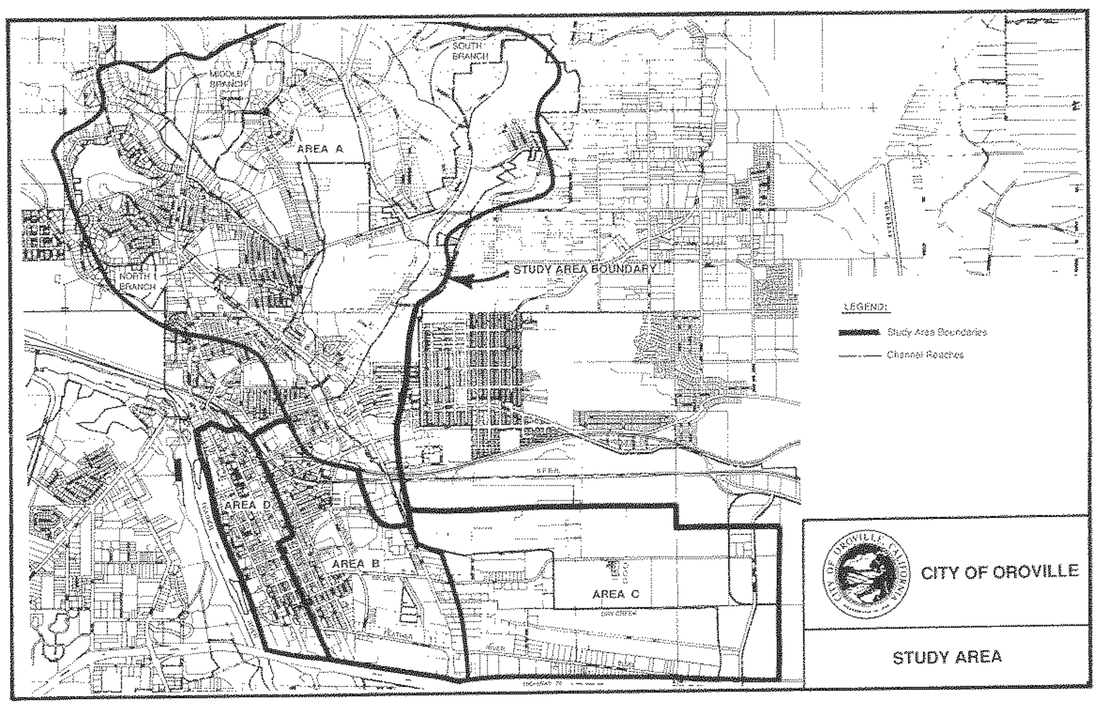

DETAIL "A"
50% MIN. TO 70% MAX. COBBLE ROCK W/ FILLER
3" L COBBLE ROCK L/12"
UNDISTURBED CHANNEL
SEE PROFILE
SEE PLAN
DETAIL "B"
CONC GROUTED COBBLES (S BACK N:1)
NATIVE FILL NOT TO EXCEED 3", COMPACTED TO 95% REL. DENSITY
SHADED AREA SHALL BE FILLED TO ELEVATION & SLOPE PER PROFILE BELOW: SEE DTL. "A", THIS SHT.
10+00 TOP 12" CL S.S. PIPE & GIRD. FLOWLINE
BEGIN REGRAD. DITCH GRADE
FILL HATCHED AREA PER DETAIL "B", THIS SHT
CONST. A.C. RAMP, DI, 15" CMP, & 50 L.F. SIDEWALK W/ HANDICAP RAMP PER CITY OF OROVILLE DWGS #ST-802 & #ST-804. CONST. 50 L.F. HANDRAIL @ BACK OF WALK PER DTL., SHT 2 OF ST-804.
CITY OF OROVILLE PLANS NO ST-802 & ST-804 ARE A SUPPLEMENT TO THIS DRAWING.
NEAT CUT EXISTING A.C. TYP. REPLACE PER TYP SECTION, SHT 2 OF CITY OF OROVILLE DWG #ST-804
CONST. DBL. 6'x4' REINF. CONC. BOX CULVERT, ASTM C850 REMOVE EXISTING 60" CMP
CONST. 6' x 6' A.C. RAMP @ END OF SIDEWALK. SIDEWALK ENDS @ PROPERTY COR.
PROP. COR.
℄ OF NEW BOX CULVERT IS 3' EAST OF ℄ OF EXIST'G 60" CMP & PARALLEL TO EXISTING CULVERT.
JP & BENCHMARK
EXISTING CURB, GUTTER & SIDEWALK
CONST. NEW C.G.& S/W TO MATCH EXISTING - SEE CITY OF OROVILLE DWG. #ST-802 & DTLS. ST-804
CONST. 10 L.F. ± EXTENSION OF EXISTING 15" RCP TO NEW BOX CULVERT. S=.005 MIN. BEVEL CUT BOX CULVERT TO MATCH & EPOXY CONNECTION.
SIDE SLOPES SHALL BE LEFT UNDISTURBED, TYP.
REMOVE EXISTING CONC. HEADWALL & WINGWALL (25 L.F. ±)
EACH END OF PIPE CULVERT CONST. STRAIGHT WINGWALL PER STATE OF CALIF. DEPT. OF TRANS. 1984 STD. DWG. # D-84, TYPE "B", FACE OF WINGWALL @ R/W LINE, H=8', FIELD VERIFY PRIOR TO CONSTRUCTION
CONST. 30 L.F. HANDRAIL PER DTL. CITY OF OROVILLE DWG. # ST-804. HANDRAIL @ BACK WALK, CENTERED OVER CULVERT.
CONST. NEW C.G.& S/W TO MATCH EXISTING - SEE CITY OF OROVILLE DWG #ST-802 & DETAILS ST-804
ORO DAM BLVD.
SCALE: 1" = 20'
BENCHMARK: JUNCTION POLE IN FRONT OF SABRE APTS. ELEV. OF R.R. SPIKE = 230.80'
LIMITS OF WORK
ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF OROVILLE & STATE OF CALIF. STANDARD SPECIFICATIONS.
THE EXISTENCE & LOCATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ARE APPROXIMATE ONLY & MAY NOT BE COMPLETE. CALL 800-642-2444 PRIOR TO CONSTRUCTION.
CA. DEPT. OF TRANS. 1984 STD. DWG. D-84, TYPE "B", STRAIGHT WINGWALL
GROUND BEYOND
6'x4' DBL. ASTM C850 CONC. BOX CULVERT
NATURAL UNDISTURBED GROUND
CULVERT INLET and OUTLET ELEVATION
EXISTING FLOWLINE ELEVATION
NEW FLOWLINE ELEVATION
ALL BACKFILL ABOVE, UNDER & AT SIDES OF BOX CULVERT SHALL BE STRUCTURAL BACKFILL PER CA. DEPT. OF TRANS. STANDARD SPEC. 19-3.00, COMPACTED TO 95% REL. DEN.
NEW SIDEWALK, CURB & GUTTER, HANDRAIL & PAVE OUT, BA. SIDE
SIDESLOPE 2:1 BEHIND SIDEWALK TO NEW STRAIGHT WINGWALL, TYP BA. SIDE
EXISTING GROUND PROFILE
NEW GROUND PROFILE
PROPOSED GROUND PROFILE
FILL PER DETAIL "B"
S=.0155
S=.0010
S=.0130
S=.0037
FILL PER DETAIL "A", TYP.
FILL PER DETAIL "A"
CONST. 80 L.F. ASTM C850 DBL 6'x4' REINF. CONC. BOX CULV. S=.0130
PROFILE
VERT. SCALE: 1" = 5'
HORIZ. SCALE: 1" = 20'
9+00
10+00
11+00
12+00
13+00
APPROVED BY:
MICHAEL CRUMP DATE
DIRECTOR OF PUBLIC WORKS
CITY OF OROVILLE
DRY CREEK DRAINAGE CULVERT and CHANNEL RECONSTRUCTION
AT ORO DAM BLVD., OROVILLE, CA.
PLANS PREPARED BY:
LANDMARK ENGINEERING
2776 FEATHER RIVER BLVD
OROVILLE, CA. 95965
(916) 532-9457
REV. 4-11-88
JOB NO 802
SHEET 1 OF 1
SD-185

MAPS FOR

CITY OF OROVILLE MASTER DRAINAGE PLAN

CITY OF OROVILLE CALIFORNIA

FEBRUARY 1991



SHEET INDEX

SHT. NO.	TITLE
1	TITLE SHEET
2	SHED MAP
3	AREA "A" KEY MAP
A-1	REACH 1 - AREA "A"
A-2	REACH 1 - AREA "A"
A-3	REACH 2 - AREA "A"
A-4	REACH 3 - AREA "A"
A-5	REACH 4 - AREA "A"
A-6	REACH 4 - AREA "A"
A-7	REACH 5 - AREA "A"
A-8	REACH 6 - AREA "A"
A-9	REACH 7 & REACH 8 - AREA "A"
A-10	REACH 7 - AREA "A"
B-1	AREA "B" & "D" MASTER PLAN MAP
B-2	AREA "B" EXISTING FACILITIES
C-1	AREA "C" MASTER PLAN MAP
C-2	AREA "C" DRY CREEK IMPROVEMENTS
C-3	AREA "C" EXISTING DRY CREEK FACILITIES

SEAL

DESIGNED

DRAFTED RGT

CHECKED JWD

REV.	DATE	DESCRIPTION	BY	APPD

BENCHMARK

ELEV. ADJUSTMENT

PSOMAS

Psomas and Associates—Sacramento
646 North Market Boulevard, Suite 4
Sacramento, California 95834
916/929-7100

Engineers
Surveyors
Planners

OROVILLE DRAINAGE MASTER PLAN

TITLE SHEET

CITY OF OROVILLE CALIFORNIA

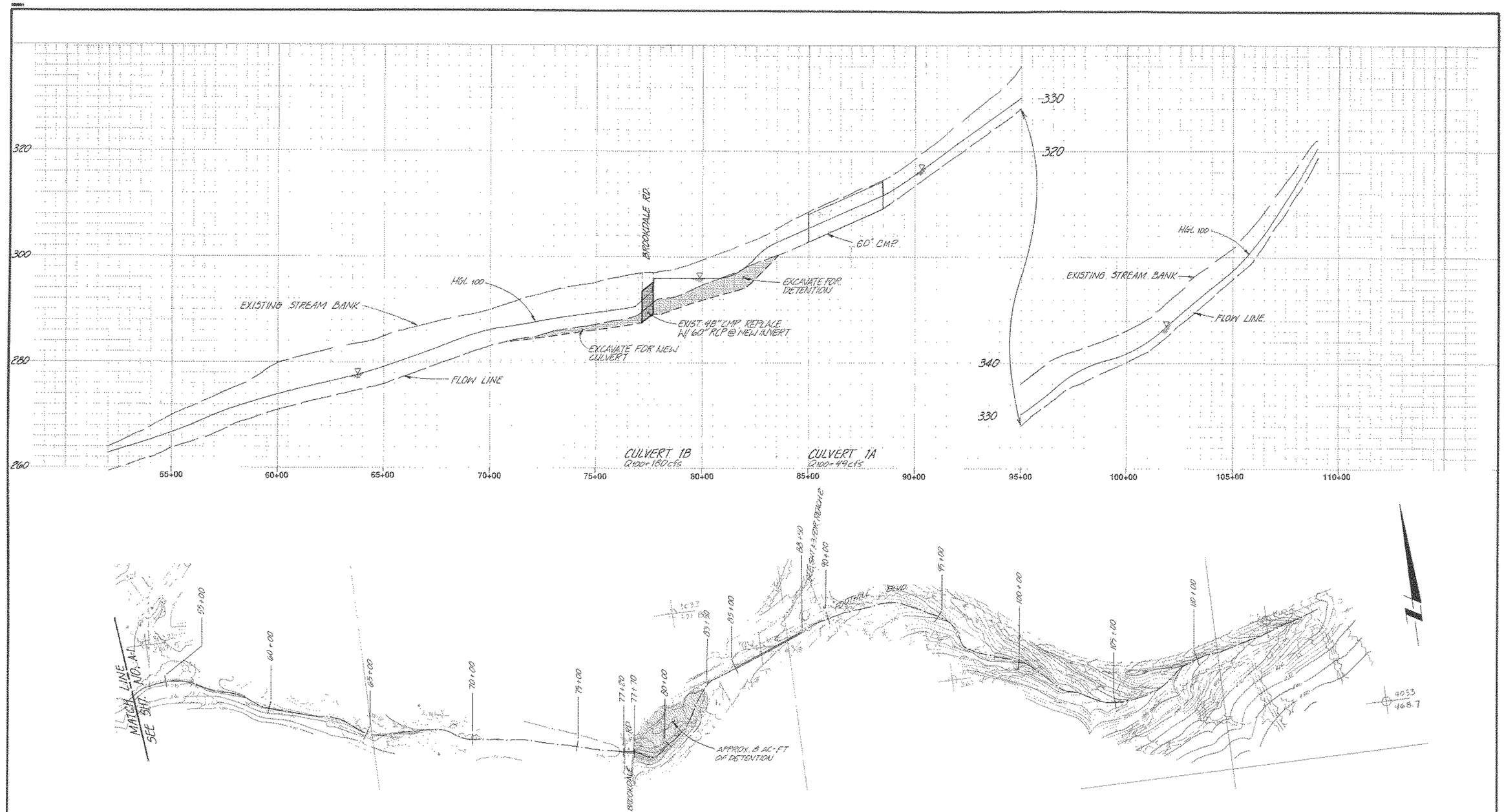
DATE FEB 1991

SCALE NONE

PROJECT NUMBER 6ORO0101

SHEET 1 OF 18

SD-198



SEAL	DESIGNED DLS			BENCHMARK	
	DRAFTED DLS				
	CHECKED JWD	REV	DATE	DESCRIPTION	BY / APP'D

ELEV. _____ ADJUSTMENT _____

PSOMAS

Psomas & Associates-Sacramento
646 North Market Boulevard, Suite 4
Sacramento, California 95834
916/929-7900

Engineers
Surveyors
Planners

FLOOD PLAIN MAPS FOR

REACH 1 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

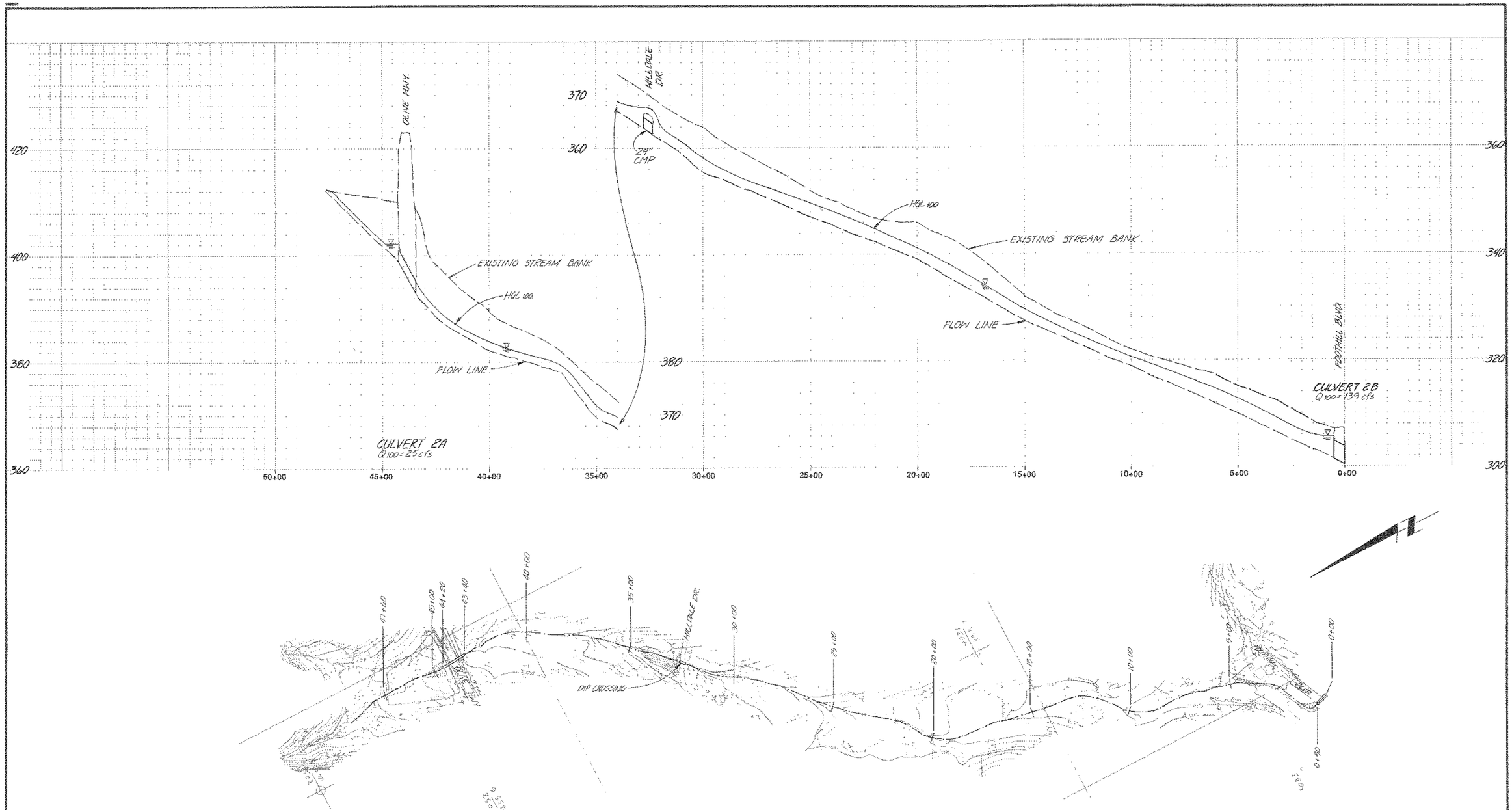
CITY OF OROVILLE — CALIFORNIA

DATE: FEB 1991

SCALE: 1"=200'

PROJECT NUMBER: 6ORO0101

SHEET A-2 OF 18



DESIGNED DLS					BENCHMARK
DRAFTED DLS					
CHECKED JWD	REV	DATE	DESCRIPTION	BY	APP'D

ELEV. _____ ADJUSTMENT _____

SEAL

PSOMAS

Psomas & Associates-Sacramento
646 North Market Boulevard, Suite 4
Sacramento, California 95834
916/929-7300

Engineers
Surveyors
Planners

FLOOD PLAIN MAPS FOR

REACH 2 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE — CALIFORNIA

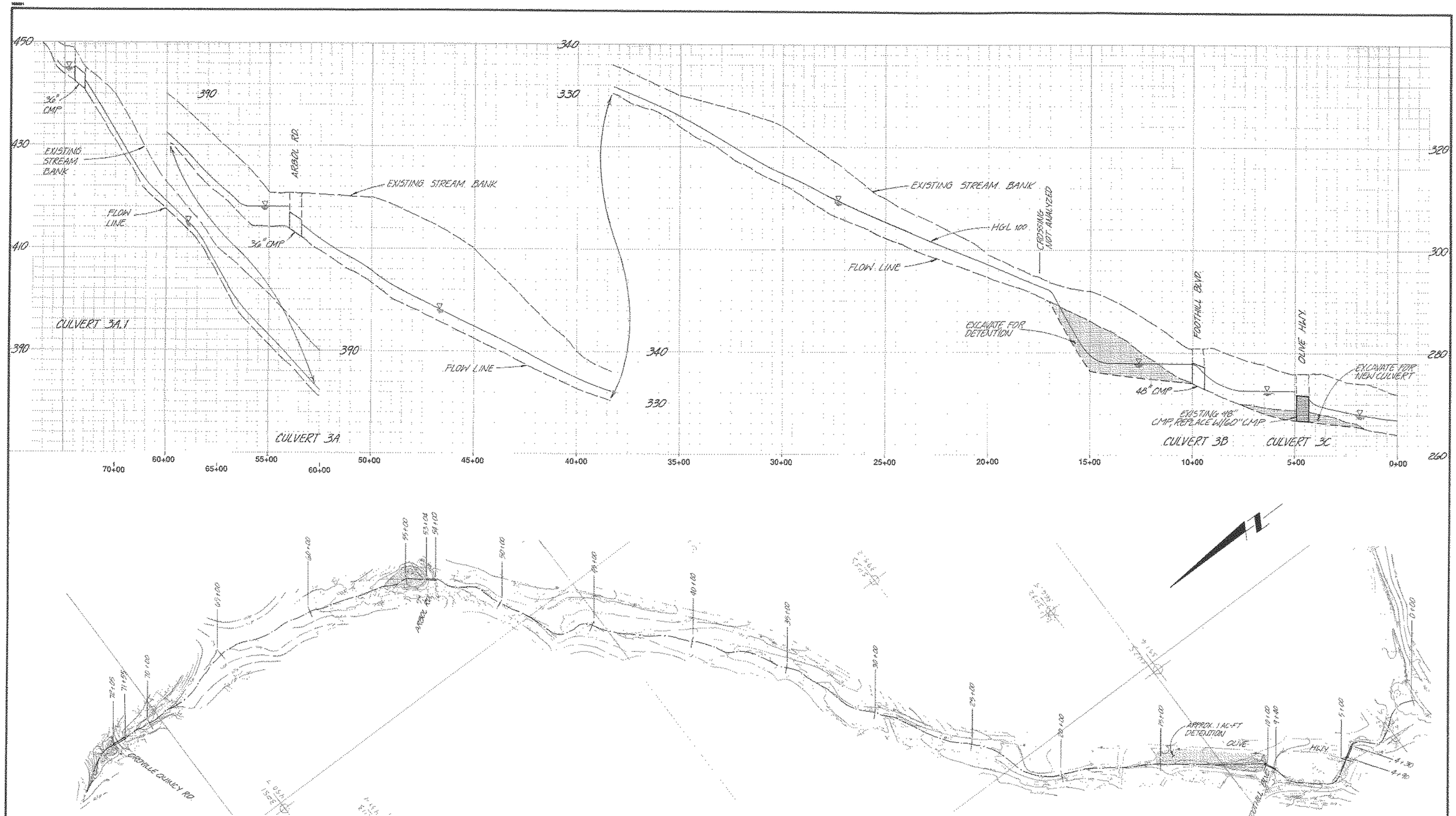
DATE: FEB 1991

SCALE: 1"=200'

PROJECT NUMBER: 6ORO0101

SHEET A-3 OF 18

SD - 198



6ORO 0101
Flood Plain Maps

SEAL	DESIGNED DLS	BENCHMARK	PSOMAS Psomas & Associates-Sacramento 646 North Market Boulevard, Suite 4 Sacramento, California 95834 916/929-7100 Engineers, Surveyors, Planners
	DRAFTED DLS		
	CHECKED JWD		
	REV / DATE / DESCRIPTION / BY / APPD	ELEV. ____ ADJUSTMENT ____	

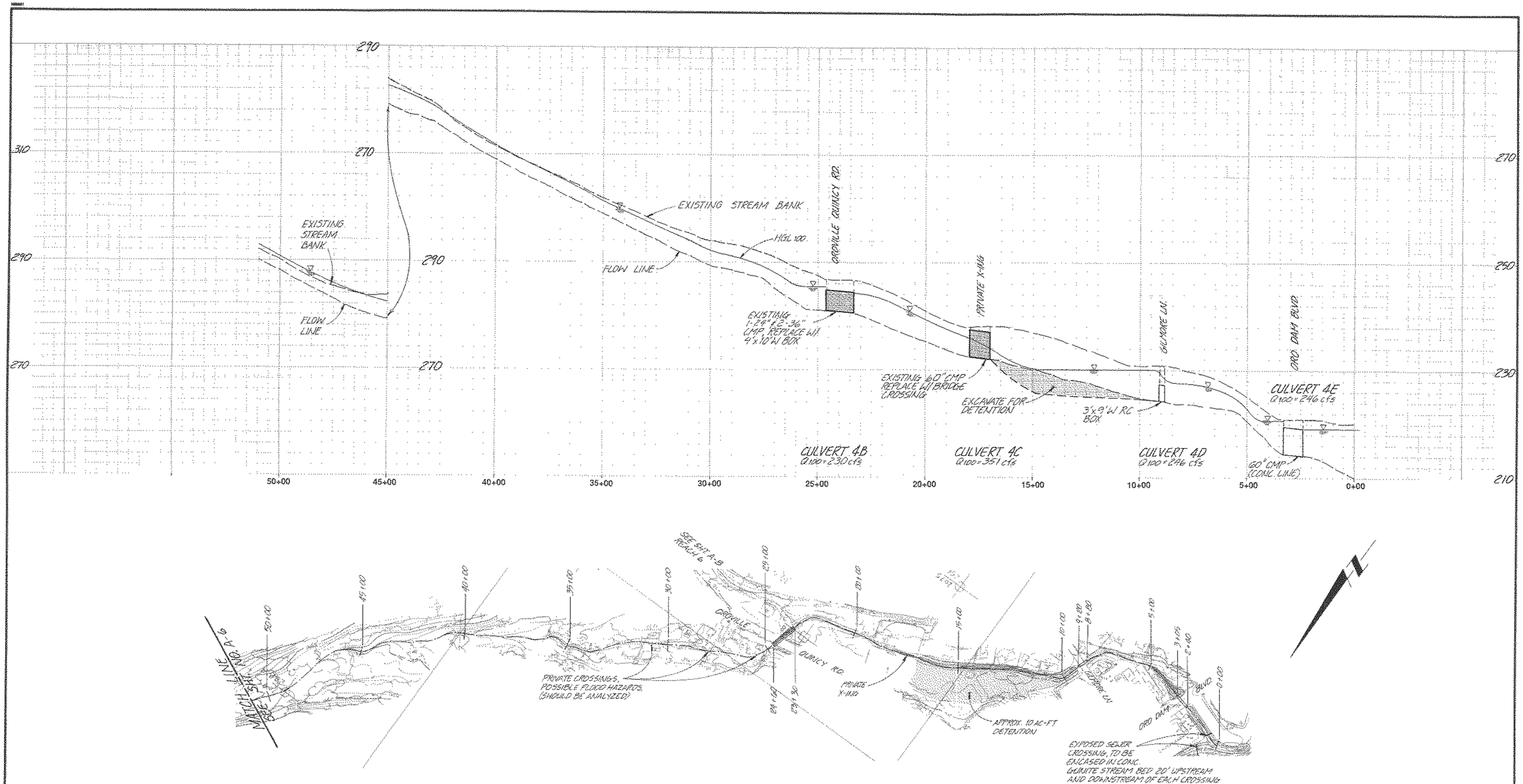
FLOOD PLAIN MAPS FOR

REACH 3 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE — CALIFORNIA

DATE: FEB 1991
SCALE: 1"=200'
PROJECT NUMBER: 6ORO0101
SHEET A-4
OF 18



6000 0 6000
Feet 2000 0 2000

SEAL	DESIGNED DLS	BENCHMARK	PSOMAS
	DRAFTED DLS		Psomas & Associates-Sacramento 646 North Market Boulevard, Suite 4 Sacramento, California 95834 916/929-7700
	CHECKED JWD		Engineers Surveyors Planners
	REV / DATE / DESCRIPTION / BY / APP'D	ELEV. ____ ADJUSTMENT ____	

FLOOD PLAIN MAPS FOR

REACH 4 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

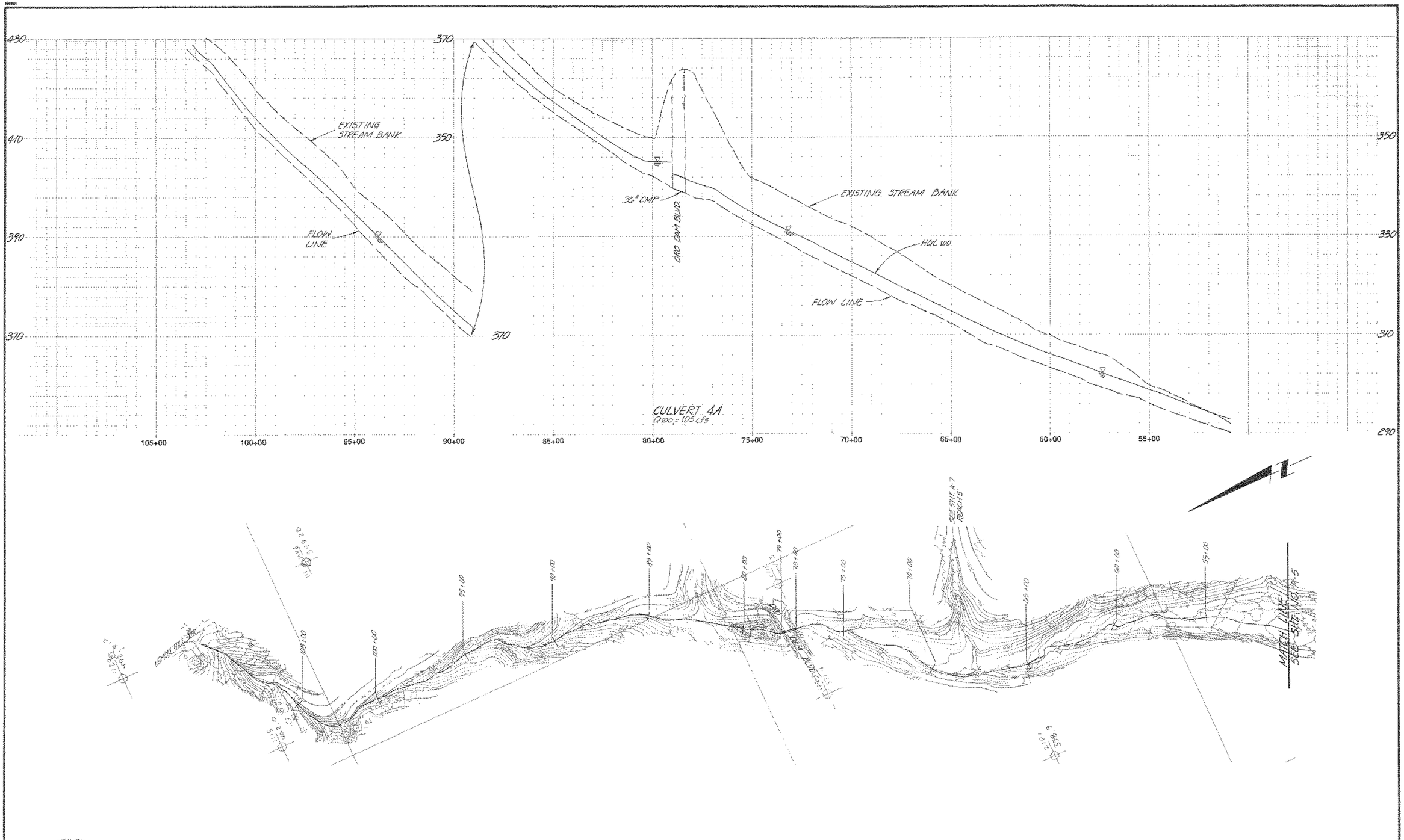
CITY OF OROVILLE — CALIFORNIA

DATE: FEB 1991

SCALE: 1"=200'

PROJECT NUMBER: 6ORO0101

SHEET A-5 OF 18



DESIGNED DLS					BENCHMARK
DRAFTED DLS					
CHECKED JWD	REV	DATE	DESCRIPTION	BY	APP'D

ELEV. _____ ADJUSTMENT _____

SEAL

PSOMAS

Psomas & Associates-Sacramento
646 North Market Boulevard, Suite 4
Sacramento, California 95834
916/925-7900

Engineers
Surveyors
Planners

FLOOD PLAIN MAPS FOR

REACH 4 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE — CALIFORNIA

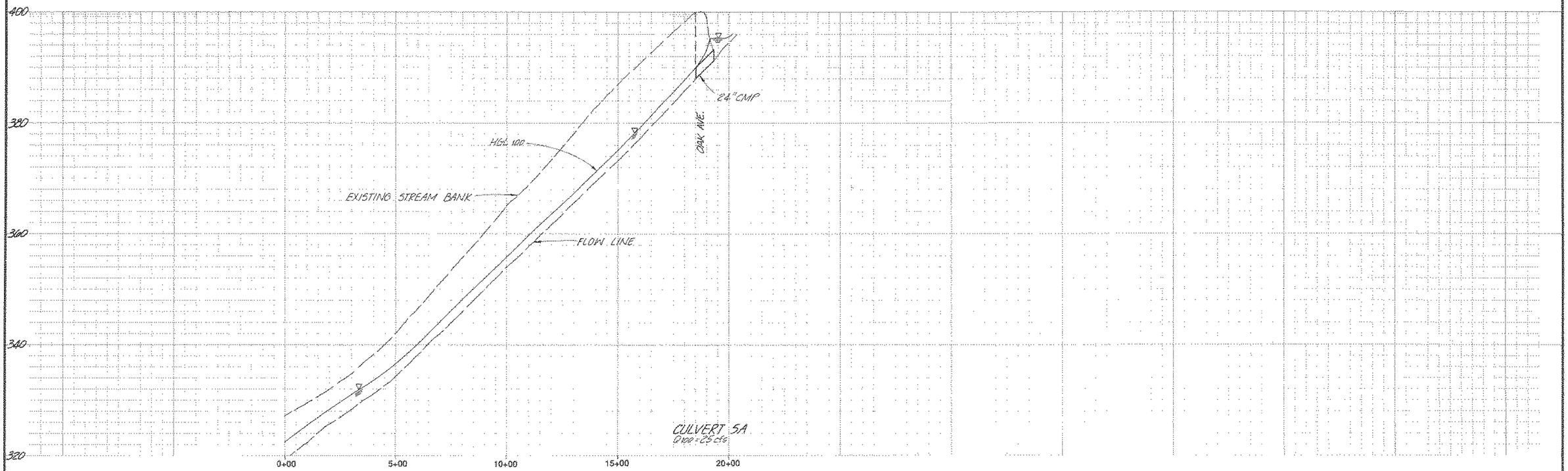
DATE: FEB 1991

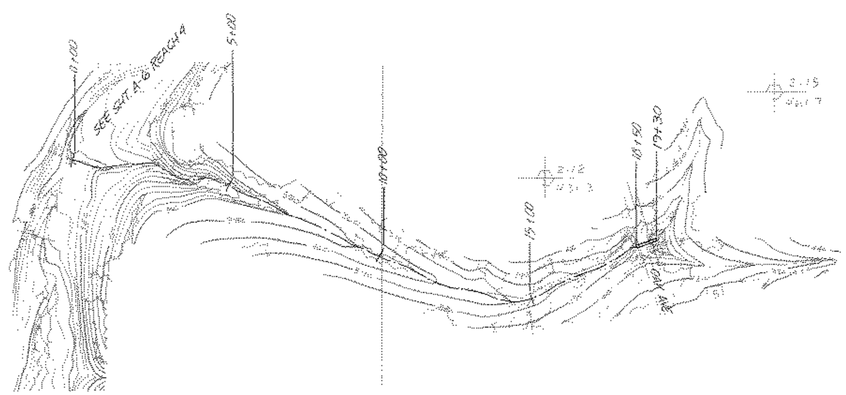
SCALE: 1"=200'

PROJECT NUMBER: 6ORO0101

SHEET A-6 OF 18

SD - 198





6,000 cfs 100 YEAR FLOOD PLAIN MAPS

SEAL

DESIGNED	DLS
DRAFTED	DLS
CHECKED	JWD

REV	DATE	DESCRIPTION	BY	APP'D

BENCHMARK

ELEV _____ ADJUSTMENT _____

PSOMAS

Psomas & Associates-Sacramento
646 North Market Boulevard, Suite 4
Sacramento, California 95834
916/929-7100

Engineers
Surveyors
Planners

FLOOD PLAIN MAPS FOR

REACH 5 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE — CALIFORNIA

DATE: FEB 1991

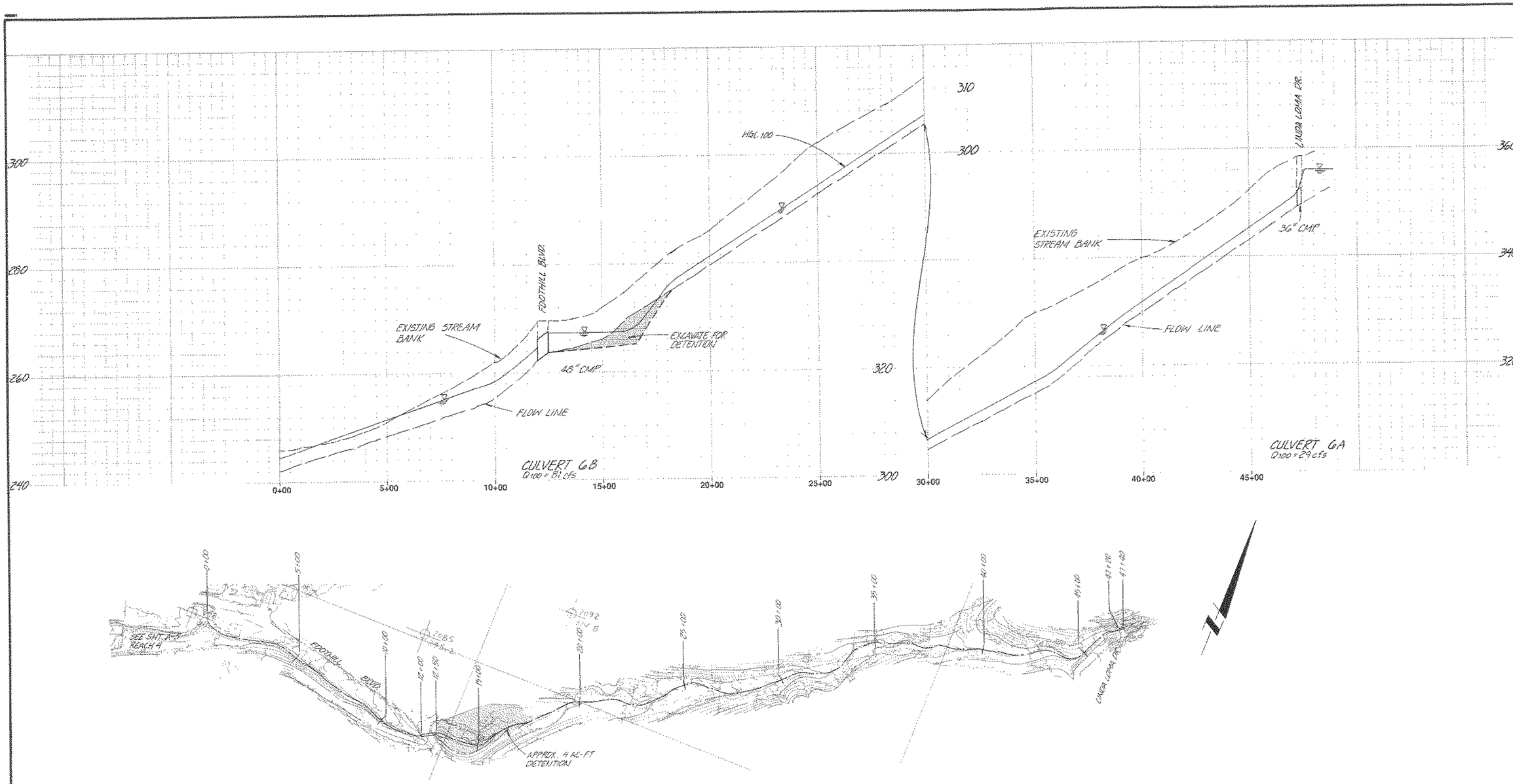
SCALE: 1"=200'

PROJECT NUMBER: 6ORO0101

SHEET A-7 OF 18

SD-199

6-ORO 01/01
FLOOD PLAIN MAPS



DESIGNED DLS		BENCHMARK	
DRAFTED DLS			
CHECKED JWD	REV / DATE / DESCRIPTION / BY / APP'D	ELEV. ADJUSTMENT	

PSOMAS

Psomas & Associates-Sacramento
646 North Market Boulevard, Suite 4
Sacramento, California 95834
916/929-7100

Engineers
Surveyors
Planners

FLOOD PLAIN MAPS FOR

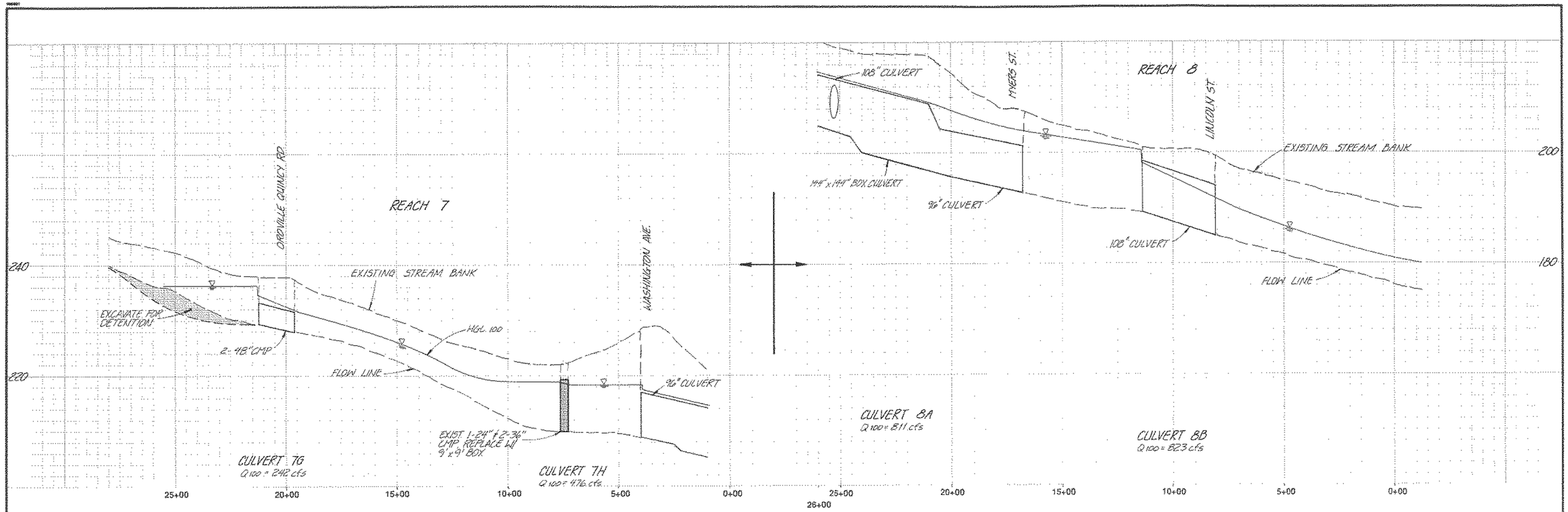
REACH 6 - AREA "A"

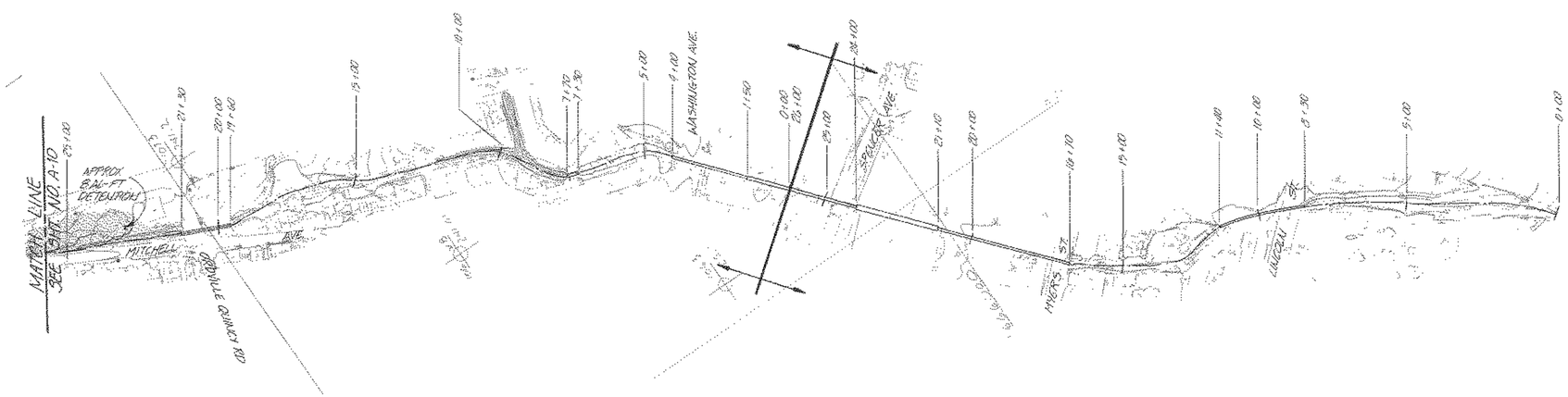
OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE — CALIFORNIA

DATE: FEB 1991
SCALE: 1"=200'
PROJECT NUMBER: 6ORO0101
SHEET A-8 OF 18

SD - 198





REACH 7

REACH 8

6ORO 01/01
FLOOD PLAIN MAPS

SEAL	DESIGNED DLS	REV	DATE	DESCRIPTION	BY / APP'D
	DRAFTED DLS				
	CHECKED JWD				

BENCHMARK

ELEV _____ ADJUSTMENT _____

PSOMAS

Psomas & Associates-Sacramento
546 North Market Boulevard, Suite 4
Sacramento, California 95834
916/929-7100

Engineers
Surveyors
Planners

FLOOD PLAIN MAPS FOR

REACH 7 AND REACH 8 AREA "A"

OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE CALIFORNIA

DATE: FEB 1991

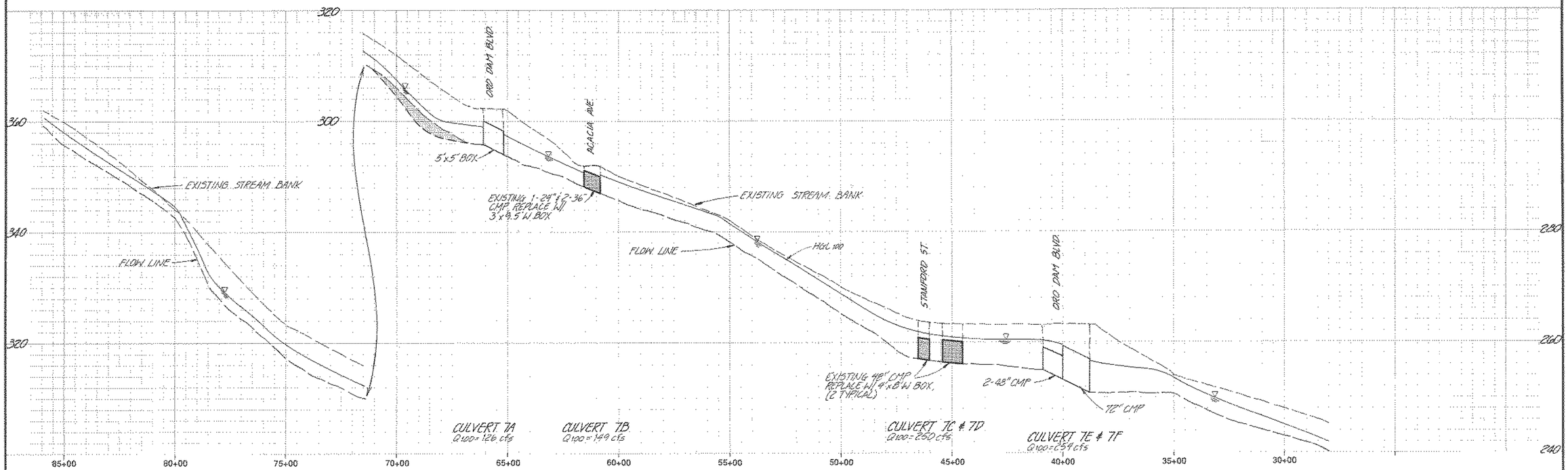
SCALE: 1"=200'

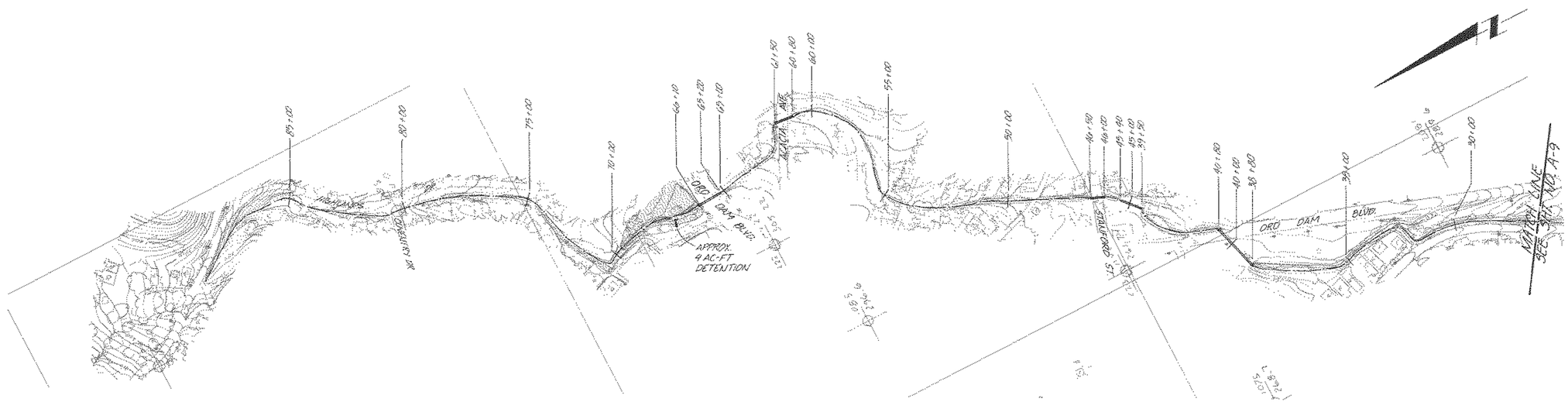
PROJECT NUMBER 6ORO0101

SHEET A-9 OF 18

SD-198

6ORO 0101
FLOOD PLAIN MAPS





SEAL	DESIGNED DLS		BENCHMARK	PSOMAS Engineers Surveyors Planners
	DRAFTED DLS			Psomas & Associates-Sacramento, 646 North Market Boulevard, Suite 4, Sacramento, California 95834, 916/929-9180
	CHECKED JWD	REV / DATE / DESCRIPTION / BY / APP'D	ELEV. ADJUSTMENT	

FLOOD PLAIN MAPS FOR

REACH 7 - AREA "A"

OROVILLE DRAINAGE MASTER PLAN

CITY OF OROVILLE — CALIFORNIA

DATE: FEB 1991
SCALE: 1"=200'
PROJECT NUMBER: 6ORO0101
SHEET A-10 OF 18

MAP 3

MAP 7

MAP 9

MAP 13

AREA "D"

AREA "B"

INDEX MAP NO SCALE

N

SCALE 1" = 400'

LEGEND:

EXISTING DRAINAGE SYSTEM

DRAIN PIPE IMPROVEMENTS

DRAINAGE AREA BOUNDARY

AREA IN ACRES XX.Xac

CHANNEL IMPROVEMENTS

DETENTION LOCATIONS

CITY OF OROVILLE CALIFORNIA

MAP B-1

MASTER MAP of CITY OF OROVILLE

AREA B&D

DRAINAGE MASTER PLAN

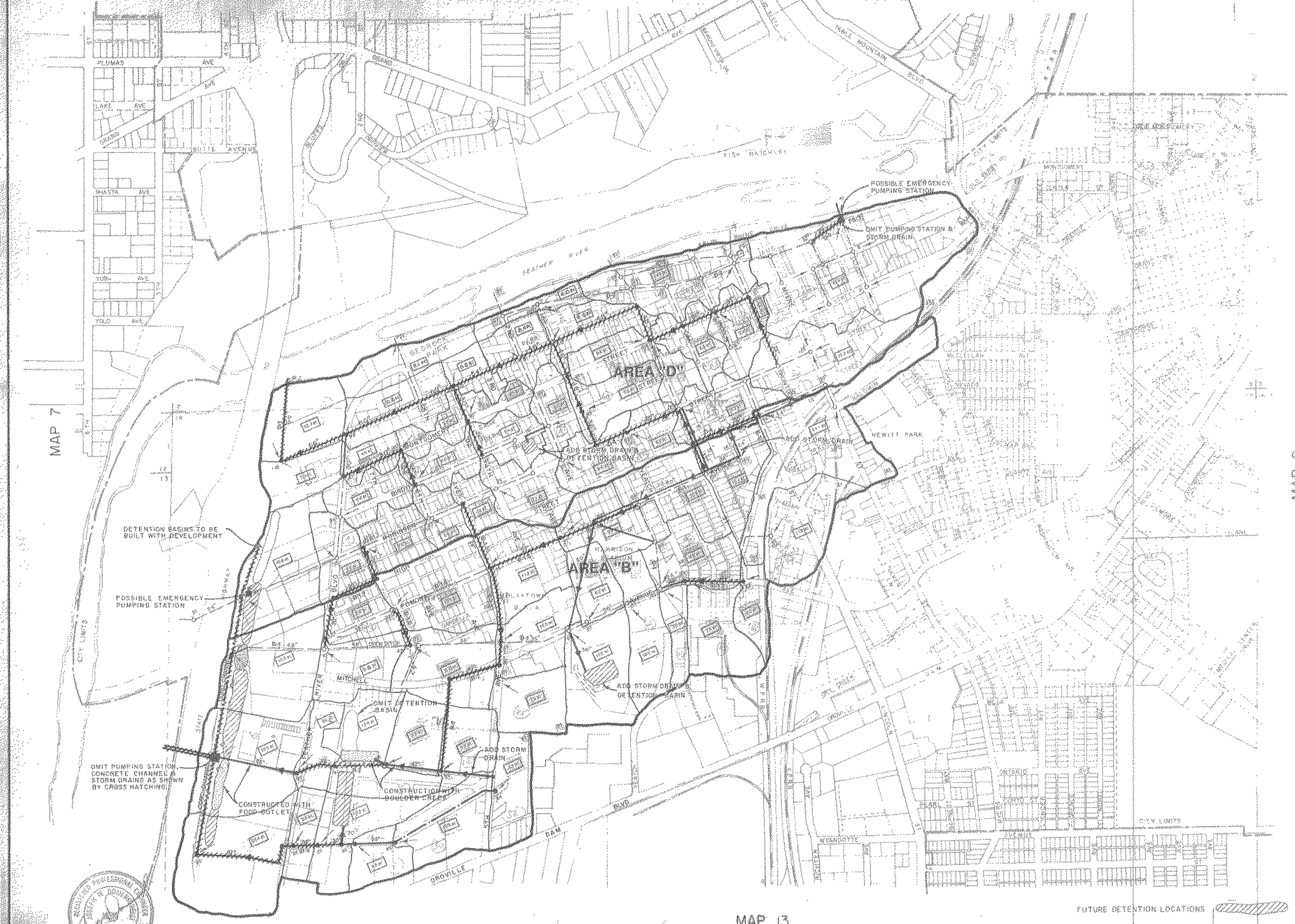
SCALE: 1" = 400'

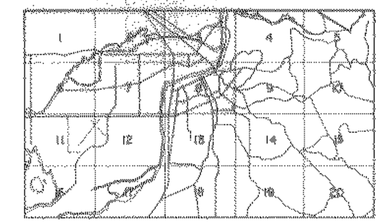
REVISIONS
6-85
10-90
12-90
1-91
3-93
11-93
6-98

DESIGN BY	APPROVED BY	DATE	SHEET
V.L.	DIRECTOR OF PUBLIC WORKS	FEB 1991	B-1 OF 18

SD-198

PROPOSED REVISIONS TO AREA "B" & "D"





INDEX MAP NO SCALE

N

SCALE 1" = 400'

LEGEND:

- EXISTING DRAINAGE SYSTEM
- DRAIN PIPE IMPROVEMENTS
- DRAINAGE AREA BOUNDARY
- AREA IN ACRES
- CHANNEL IMPROVEMENTS
- DETENTION LOCATIONS (EXISTING)

CITY OF OROVILLE CALIFORNIA

MAP B-1

MASTER MAP of CITY OF OROVILLE

AREA B&D

DRAINAGE MASTER PLAN

PROPOSED REVISIONS

SCALE: 1" = 400'

REVISIONS
6-80
5-83
12-83
7-84
8-84
7-85
8-86

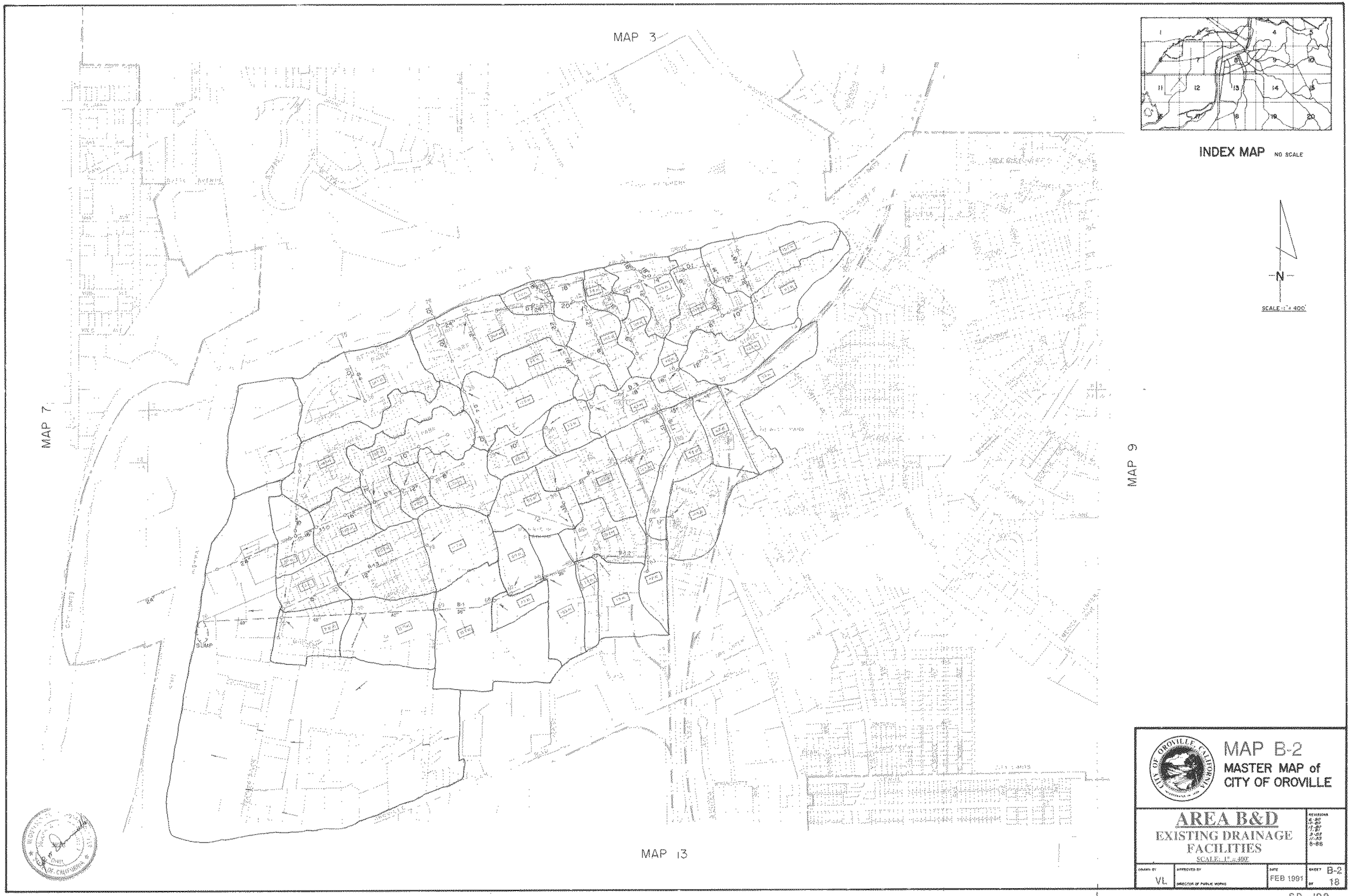
DRAWN BY: A.T.P.

APPROVED BY: DIRECTOR OF PUBLIC WORKS

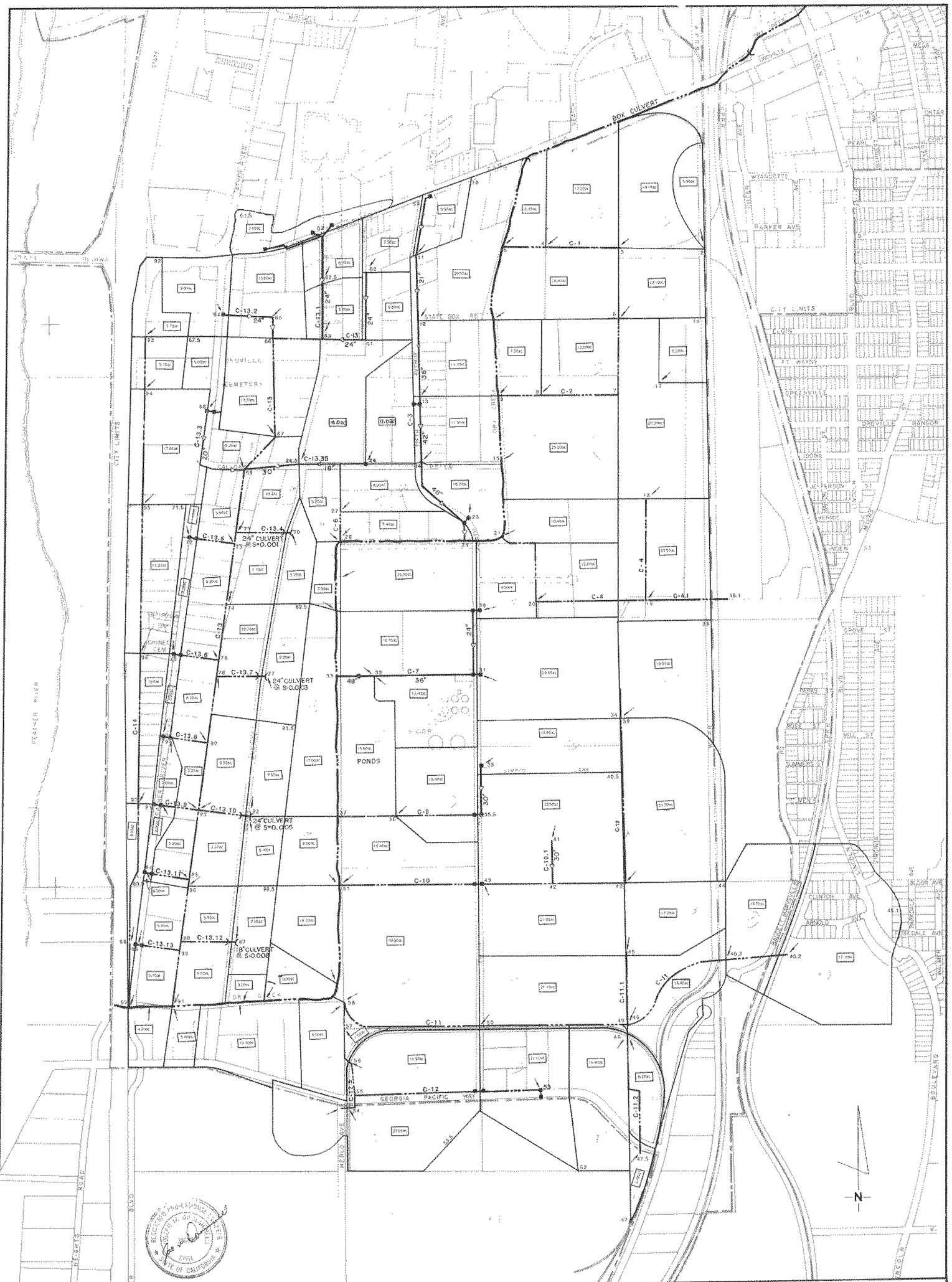
DATE: APRIL 1982

SHEET B-1 OF 18

SD-198


MAP 3
MAP 7
MAP 9
MAP 13
SUMP
INDEX MAP NO SCALE
N
SCALE 1" = 400'
MAP B-2
MASTER MAP of
CITY OF OROVILLE
AREA B&D
EXISTING DRAINAGE
FACILITIES
SCALE: 1" = 400'
REVISIONS
6-89
10-89
7-90
7-91
2-92
7-93
8-98
DRAWN BY
VL
APPROVED BY
DIRECTOR OF PUBLIC WORKS
DATE
FEB 1991
SHEET B-2
OF 18
SD-198

EASI FILE CORP. IRVINE, CA EFH 34



LEGEND:

- PIPE
- DRAINAGE DITCH
- DRY CREEK
- DRAINAGE AREA BOUNDARY
- AREA IN ACRES XX.X

DRAINAGE MASTER PLAN

CITY OF OROVILLE
INDUSTRIAL UNIT NO. 2

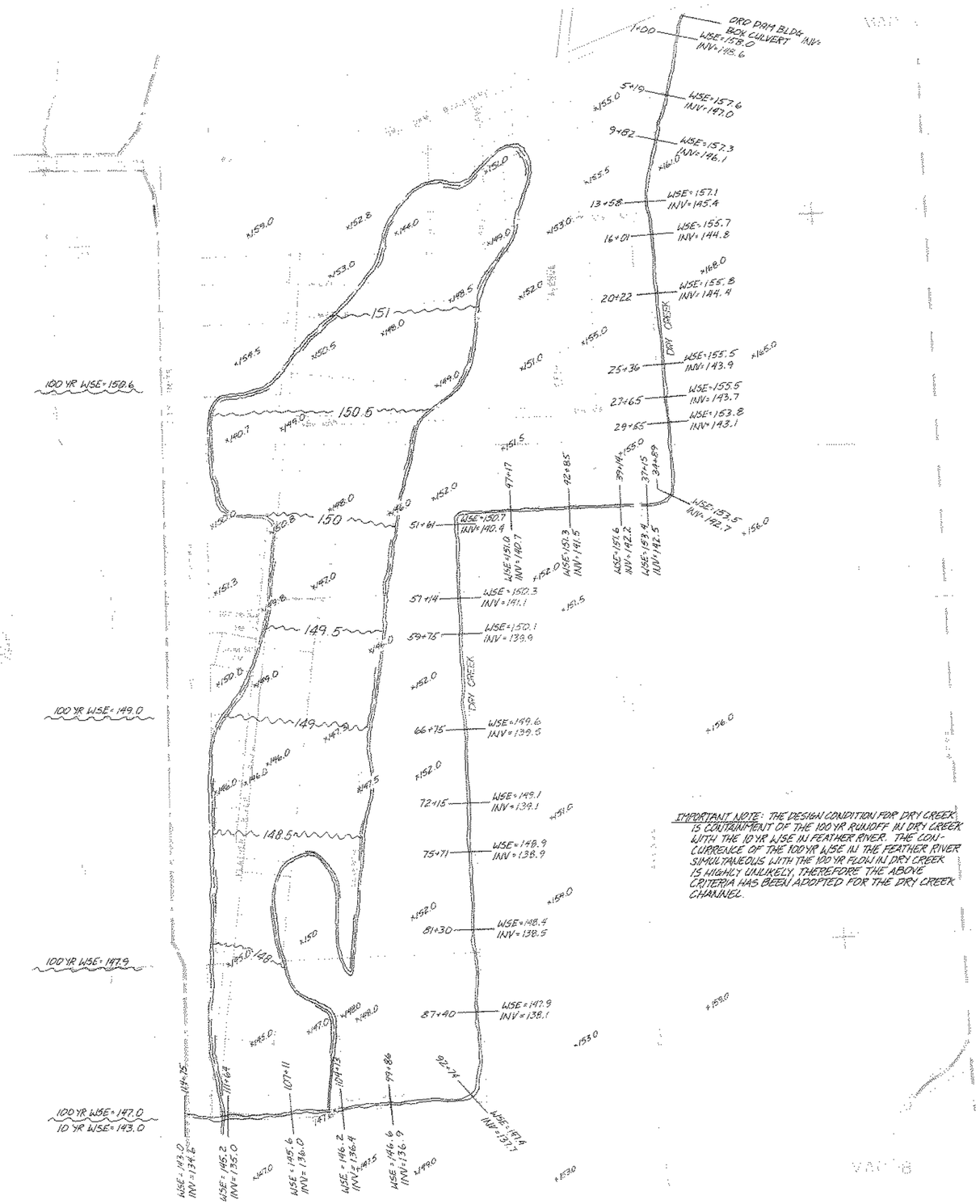
CITY OF OROVILLE - DEPARTMENT OF PUBLIC WORKS

MAP C-1
MASTER MAP of CITY OF OROVILLE

AREA C
DRAINAGE MASTER PLAN

SCALE: 1" = 400'

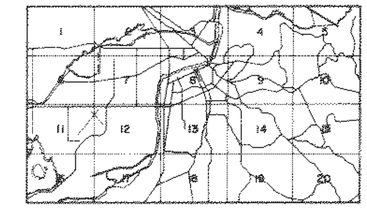
DRAWN BY	APPROVED BY	DATE	SHEET
V.L.	DIRECTOR OF PUBLIC WORKS	FEB 1991	C-1 OF 18



IMPORTANT NOTE: THE DESIGN CONDITION FOR DRY CREEK IS CONTAINMENT OF THE 100 YR RUNOFF IN DRY CREEK WITH THE 10 YR WSE IN FEATHER RIVER. THE CONCURRENCE OF THE 100 YR WSE IN THE FEATHER RIVER SIMULTANEOUS WITH THE 100 YR FLOW IN DRY CREEK IS HIGHLY UNLIKELY, THEREFORE THE ABOVE CRITERIA HAS BEEN ADOPTED FOR THE DRY CREEK CHANNEL.

DRY CREEK ALIGNMENT DATA

STATION	CHANNEL CENTERLINE COORDINATES		HEC-2 SECTION NUMBER
1+00	N662816.9	E2129212.5	1
5+19	662298.7	2129238.6	3
9+82	661842.7	2129316.6	4
13+58	661474.0	2129392.6	5
14+68 STATE BOX RD.	661364.2	2129393.9	7.2
16+01	661239.6	2129454.9	7
20+22	660844.3	2129600.1	8
25+36	660362.1	2129779.9	9
27+65	660145.7	2129861.0	10
28+43 CAL OAK DR.	660070.7	2129869.1	12.2
29+55	659970.3	2129926.2	12
34+89	659478.7	2130134.6	13
37+15	659352.3	2129946.9	14
38+39 S. FIFTH AVE.	659346.4	2129822.6	15.1
39+14	659263.7	2129768.3	16
42+85	659143.7	2129417.7	18
47+17	659003.3	2129009.2	19
51+61	658773.7	2128629.3	20
57+14	658250.5	2128805.8	22
59+75	658004.1	2128888.9	23
66+75	657328.6	2129077.3	24
72+15	656820.3	2129259.3	26
75+71	656479.5	2129359.3	27
81+30	655943.7	2129521.1	29
87+40	655365.3	2129714.2	30
92+74	654758.5	2129804.8	32
99+86	654574.2	2129230.5	33
104+13	654431.6	2128828.2	34.3
104+43 S. SEVENTH AVE.	654420.9	2128800.2	34.2
107+11	654316.3	2128552.8	35
111+64	654196.8	2128116.1	38
113+84 HWY 70	654168.4	2127904.0	39
114+75	654182.6	2127805.3	40



INDEX MAP NO SCALE

N

SCALE: 1" = 400'

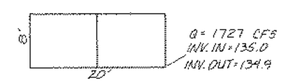
LEGEND

x153.0	AVERAGE EXISTING GRADE
INV	CHANNEL INVERT
WSE	CHANNEL WATER SURFACE WITH DRY CREEK 100 YR. FLOW CONTAINED WITHIN CHANNEL SECTION
~150~	AREA FLOODED DO TO INFILTRATION OF HIGH WATER FROM FEATHER RIVER 100 YR FLOW (150,000 CFS)

IMPROVED CHANNEL CROSS SECTIONS

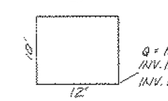
(TO CONTAIN 100 YR FLOW IN DRY CREEK WITH 10 YR WSE IN FEATHER RIVER)

HIGHWAY 70
FEATHER RIVER BLVD.
PACIFIC HEIGHTS



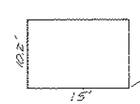
Q = 1727 CFS
INV. IN = 135.0
INV. OUT = 134.9

7TH AVE. X-ING (EXISTING)



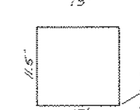
Q = 1572 CFS
INV. IN = 136.4
INV. OUT = 136.2

5TH AVE. X-ING



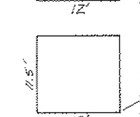
Q = 1403 CFS
INV. IN = 142.4
INV. OUT = 142.2

CAL OAK DR.



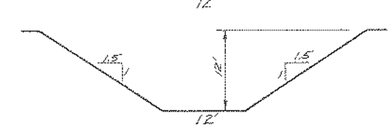
Q = 1325 CFS
INV. IN = 143.3
INV. OUT = 143.2

STATE BOX RD.

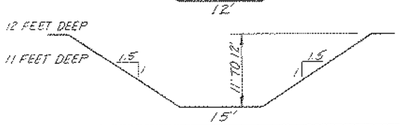


Q = 1296 CFS
INV. IN = 145.0
INV. OUT = 144.9

* STA 1+00 TO 28+20



* STA 28+50 TO 34+00 — 12 FEET DEEP
* STA 34+00 TO 112+00 — 11 FEET DEEP



BENCHMARK: BRASS CAP ON NORTH END RETURN AT THE NW CORNER OF 5TH AVE. AND ORO DAM BLVD. ELEVATION 154.47

* CHANNEL FREEBOARD IS APPROXIMATELY 1' WITH THESE TYPICAL SECTIONS. HOWEVER, JUST UPSTREAM OF CROSSINGS, BANKS WILL HAVE TO BE BUILT UP 0.5' TO 0.9' TO MAINTAIN 1' OF FREEBOARD (SEE WSE VS. INVERTS).

MAP C-2
MASTER MAP of CITY OF OROVILLE

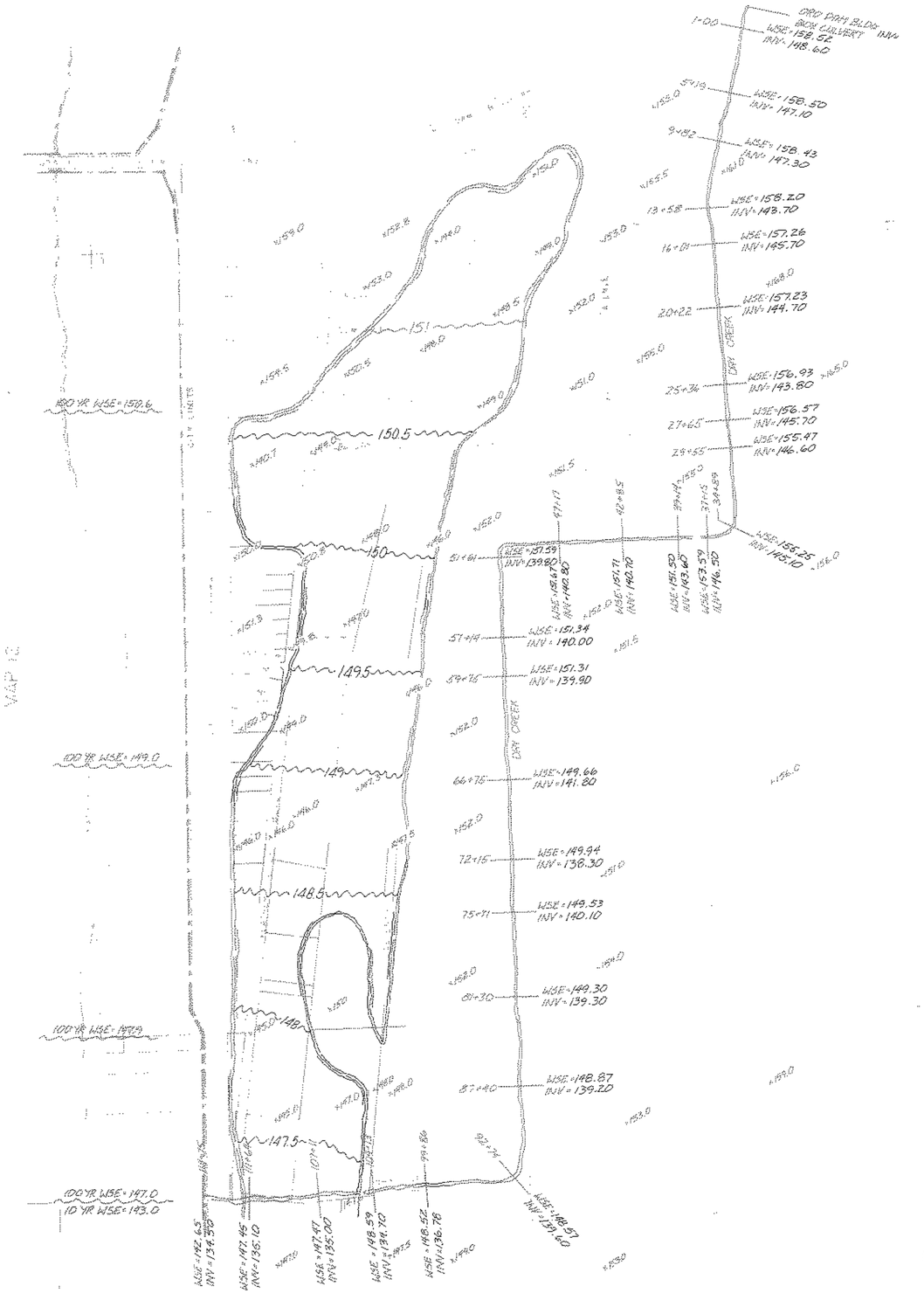
AREA C DRY CREEK CHANNEL IMPROVEMENTS

OROVILLE DRAINAGE STUDY

REVISIONS: 6-80, 3-82, 8-88

DRAWN BY	APPROVED BY	DATE	SHEET
RGT	DIRECTOR OF PUBLIC WORKS	FEB 1991	C-2 OF 18

SD-198



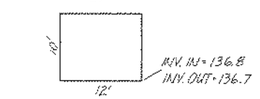
DRY CREEK ALIGNMENT DATA

STATION	CHANNEL CENTERLINE COORDINATES		HEC-2
			SECTION NUMBER
1+00	N662816.9	E2129212.5	1
5+19	662298.7	2129236.6	2
9+82	661842.7	2129316.6	4
13+58	661474.0	2129392.6	5
14+66 STATE BOX RD.	661364.2	2129393.9	7.2
18+01	661239.6	2129454.9	7
20+22	660844.3	2129600.1	8
25+36	660362.1	2129779.9	9
27+65	660148.7	2129861.0	10
28+43 CAL OAK DR.	660070.7	2129868.1	10.3
29+55	659970.3	2129926.2	12
34+89	659478.7	2130134.6	13
37+15	659352.3	2129946.9	14
38+38 S. FIFTH AVE.	659348.4	2129822.6	15.1
39+14	659283.7	2129768.3	16
42+85	659143.7	2129417.7	18
47+17	659003.3	2129009.2	19
51+61	658773.7	2128629.3	20
57+14	658260.5	2128605.8	22
59+75	658004.1	2128688.6	23
66+75	657328.6	2128077.3	24
72+15	656820.3	2128259.3	26
75+71	656479.5	2128359.3	27
81+30	655943.7	2128521.1	29
87+40	655365.3	2128714.2	30
92+74	654758.5	2128804.8	32
99+80	654074.2	2128230.5	33
104+13	654431.6	2128828.2	34.3
106+43 S. SEVENTH AVE.	654420.9	2128800.2	34.2
107+11	654316.3	2128552.8	35
111+64	654196.8	2128116.1	36
113+84 HWY 70	654168.4	2127904.0	39
114+75	654162.6	2127805.3	40

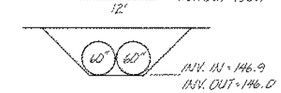
EXISTING CHANNEL SECTIONS

HIGHWAY 70 - 2-6'x10' BOXES
FEATHER RIVER BLVD. 2-6'x12' BOXES
PACIFIC HEIGHTS 2-6'x10' BOXES

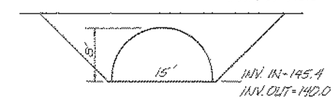
SOUTH 7TH AVE.



SOUTH 5TH AVE.

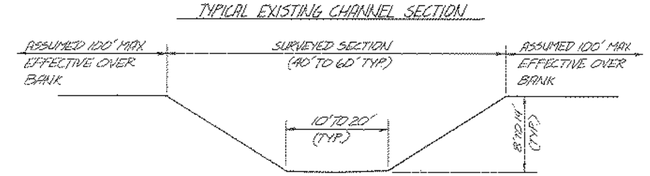


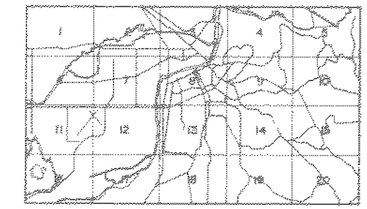
CAL OAK DR.



STATE BOX RD.

TYPICAL EXISTING CHANNEL SECTION





INDEX MAP NO SCALE

+153.0	AVERAGE EXISTING GRADE
INV	CHANNEL INVERT
WSE	CHANNEL WATER SURFACE WITH DRY CREEK 100 YR. FLOW
~~150~~~	AREA FLOODED DUE TO INFILTRATION OF HIGH WATER FROM FEATHER RIVER 100 YR FLOW (150,000 CFS)

BENCHMARK: BRASS CAP ON NORTH END RETURN AT THE NW CORNER OF 5TH AVE & ORO DAM BLVD. ELEVATION 154.47

MAP C-3
MASTER MAP of CITY OF OROVILLE

AREA C DRY CREEK
EXISTING CHANNEL

OROVILLE DRAINAGE STUDY

REVISIONS: 6-80, 3-82, 9-86

DRAWN BY | APPROVED BY DIRECTOR OF PUBLIC WORKS | DATE FEB 1991 | SHEET C-3 OF 18

SD-198

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	162	16.2, 16.4	5	11

Dennis R. Jagoda
REGISTERED CIVIL ENGINEER

3-27-95
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
D. R. JAGODA
No. 44000
Exp. 6-30-97
CIVIL
STATE OF CALIFORNIA

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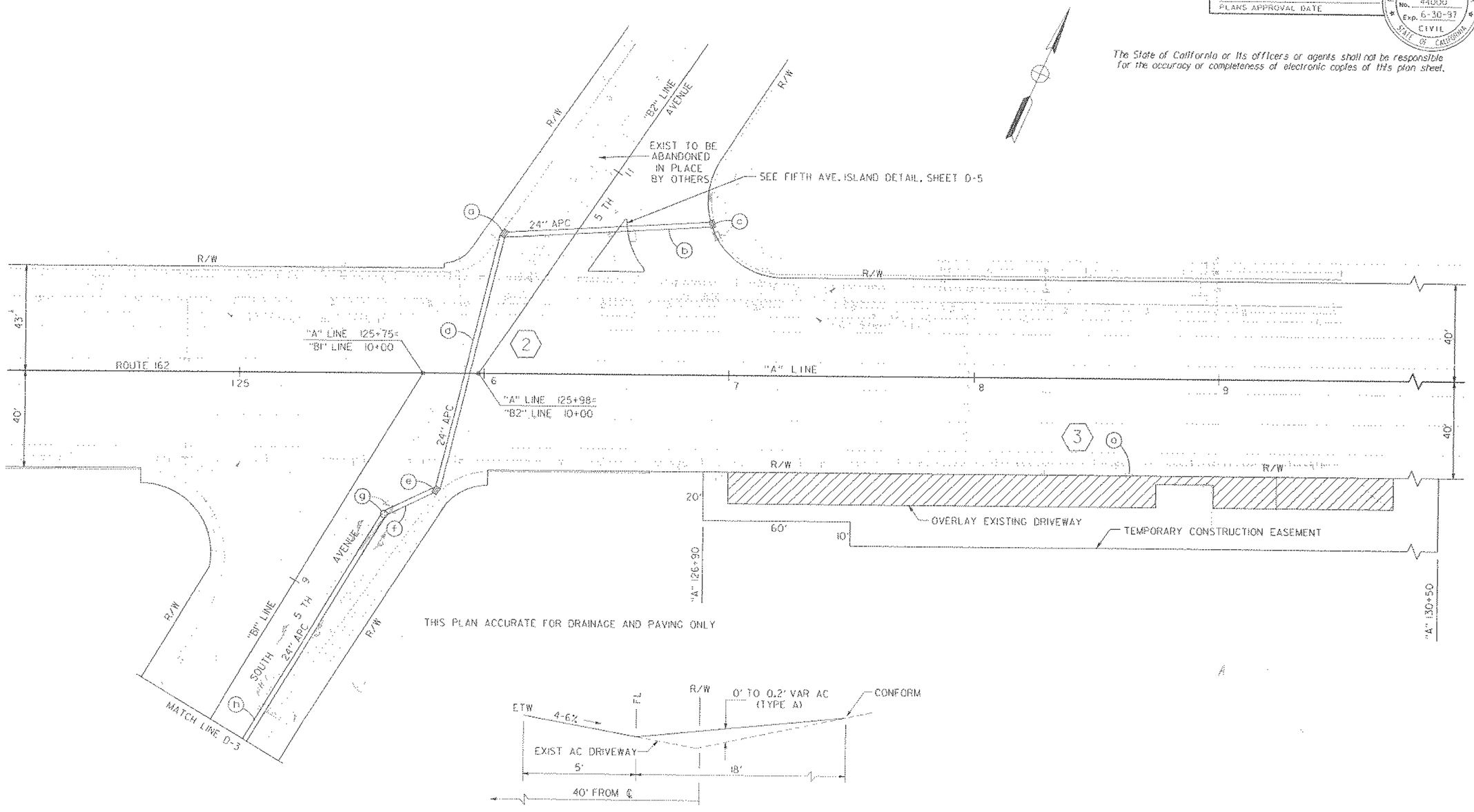
NOTE:
FOR COMPLETE RIGHT OF WAY DATA,
SEE RIGHT OF WAY RECORD MAPS
AT DISTRICT OFFICE.



DRIVEWAY PROFILE (TYPICAL)
RT "A" 127+00 TO 129+72
CONFORM TO EXIST FLOWLINE @ 127+00
LONGITUDINAL SLOPE OF NEW CUTTER = +0.2%
NO SCALE

DRAINAGE PLAN

SCALE: 1"=20'

D-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
HYDRAULICS

PROJECT ENGINEER: G. BERRY

CALCULATED/DESIGNED BY | DATE | REVISED BY
CHECKED BY | DATE REVISED

LAST REVISION 1-26-95
TIME PLOTTED => 31-MAR-1995 7:59

FORM DC-GE-92-FF (REV. 3/88)

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

USERNAME => ornda
DGN FILE => /usr/ornda/P26/342180102.dg

CU 03312

EA 421801

SD-201

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	But	162	16.2, 16.4	7	11

REGISTERED CIVIL ENGINEER

3-27-95

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER D. R. JAGODA No. 44000 Exp. 6-30-97 CIVIL STATE OF CALIFORNIA

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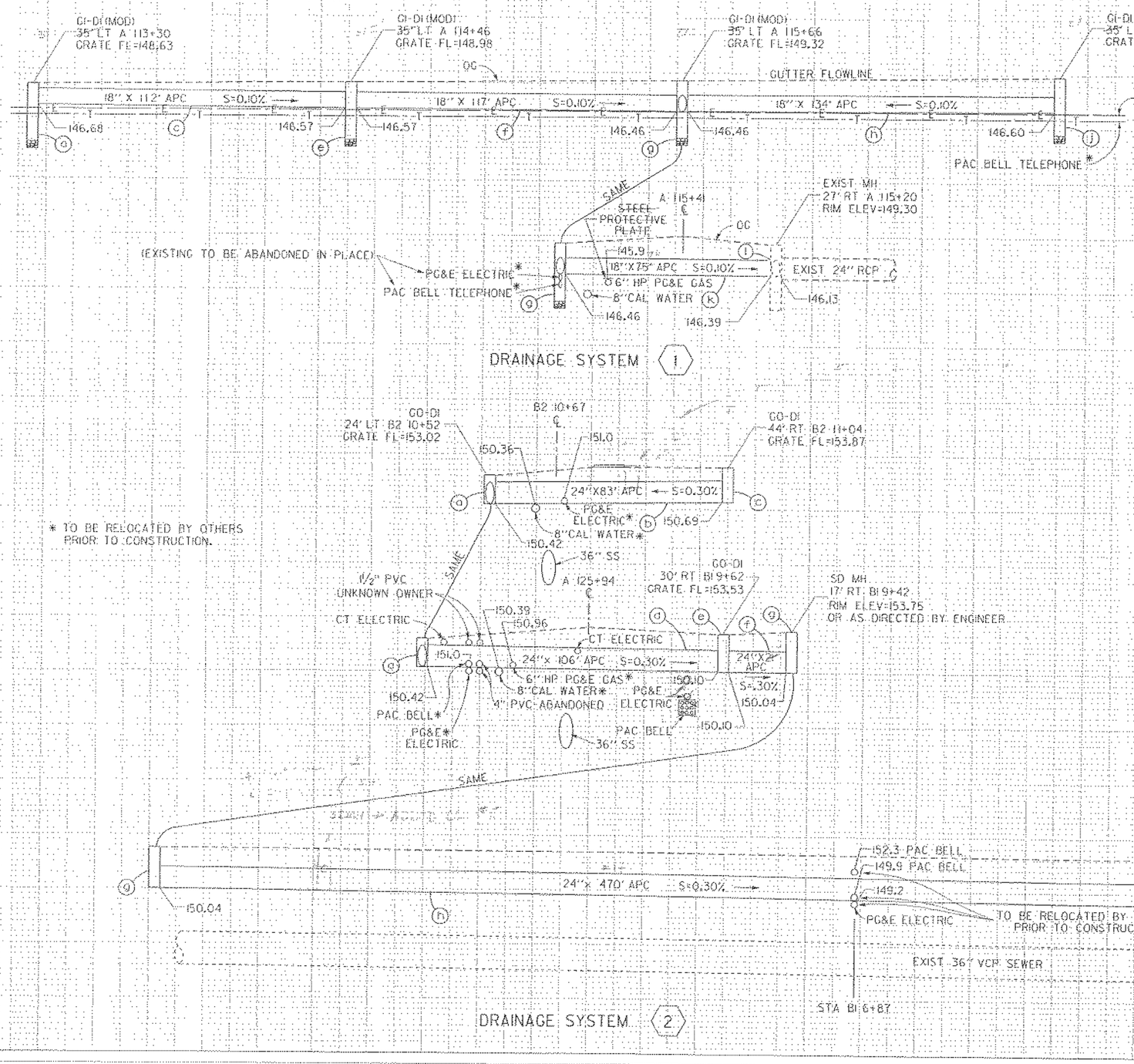

ABBREVIATIONS

CT ELECTRIC	CALTRANS ELECTRIC
HP	HIGH PRESSURE
PG&E	PACIFIC GAS & ELECTRIC CO.
CAL WATER	CALIFORNIA WATER SERVICE
PAC BELL	PACIFIC BELL

DRAINAGE PROFILE

VERT. SCALE: 1"=5'
HORIZ. SCALE: 1"=20'

D-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
HYDRAULICS
PROJECT ENGINEER G. BERRY
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

TIME PLOTTED => 31-MAR-1995 12:17

LAST REVISION 1-26-95

FORM DC-OE-92-PF (REV. 3/88)

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

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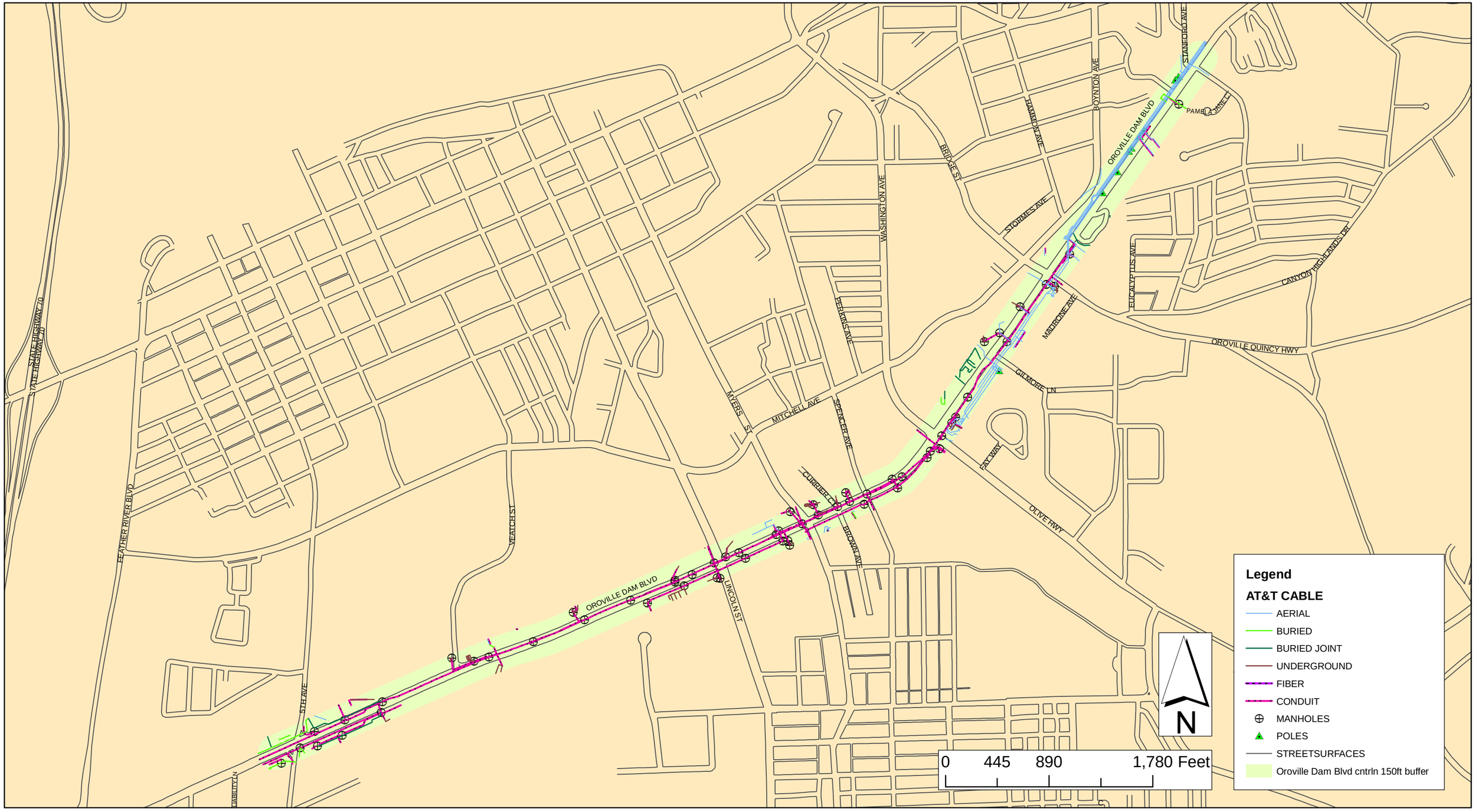
DGN FILE => /usr/bobs/P88/342180104.dgn

CU 03312

EA 421801

Appendix D

AT&T UTILITY MAPS



LGSC WEST (GIS WEST)
9390 Gateway Drive, #250
Reno, NV 89521
775-851-6067
map made Mar 2012
UTM Zone 10
GCS_NAD_1983

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Oroville Dam Boulevard Facility Map

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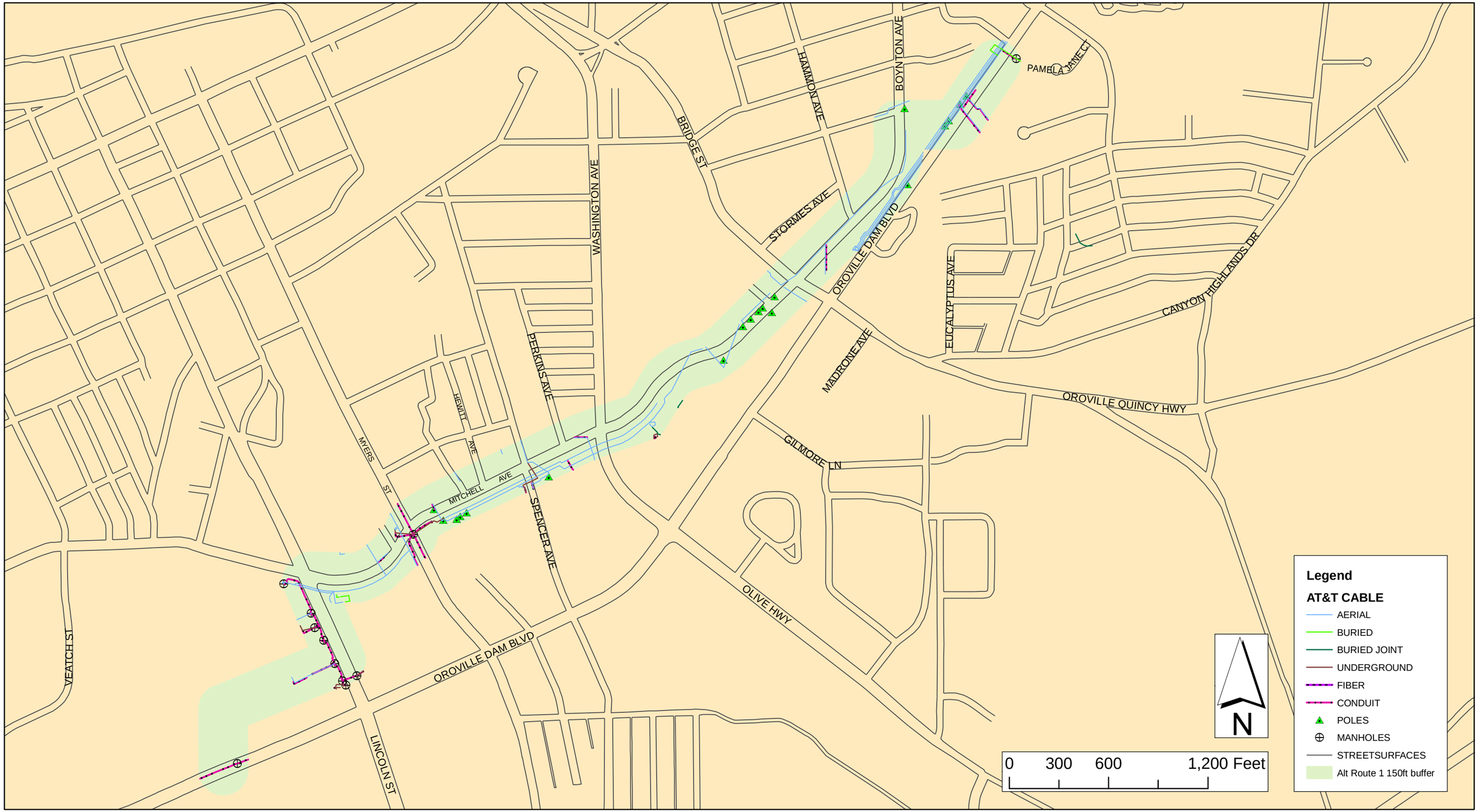

LGSC WEST (GIS WEST)
9390 Gateway Drive, #250
Reno, NV 89521
775-851-6067
map made Mar 2012
UTM Zone 10
GCS_NAD_1983

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Oroville Relief Sewer Alternative 1 Facility Map

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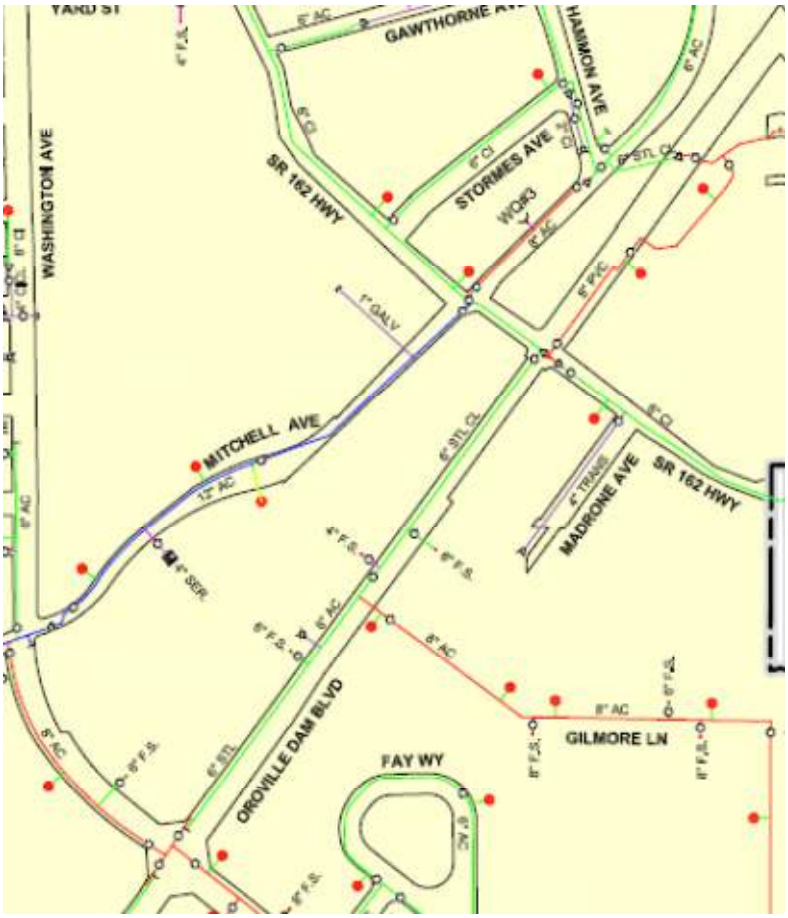
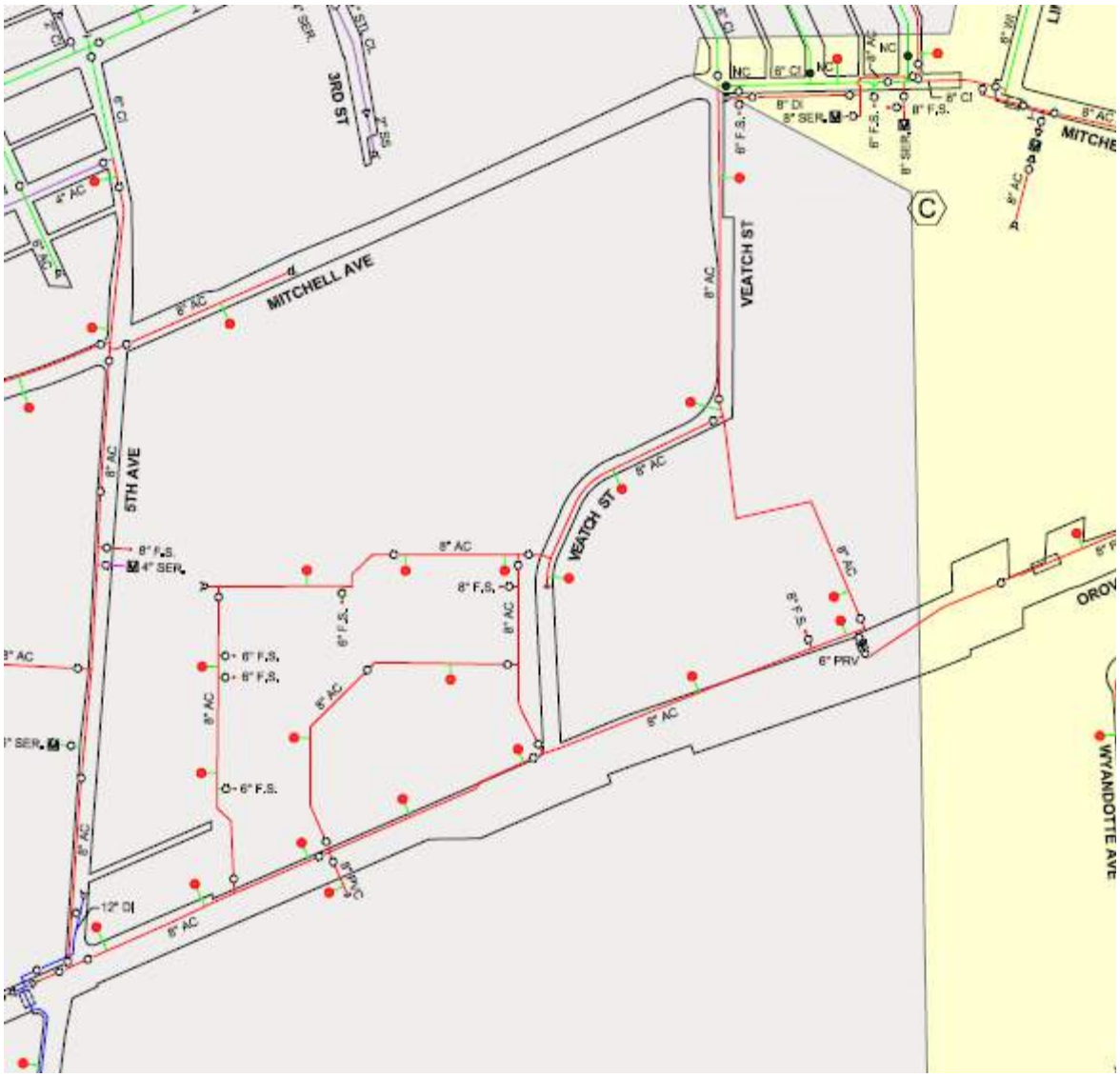
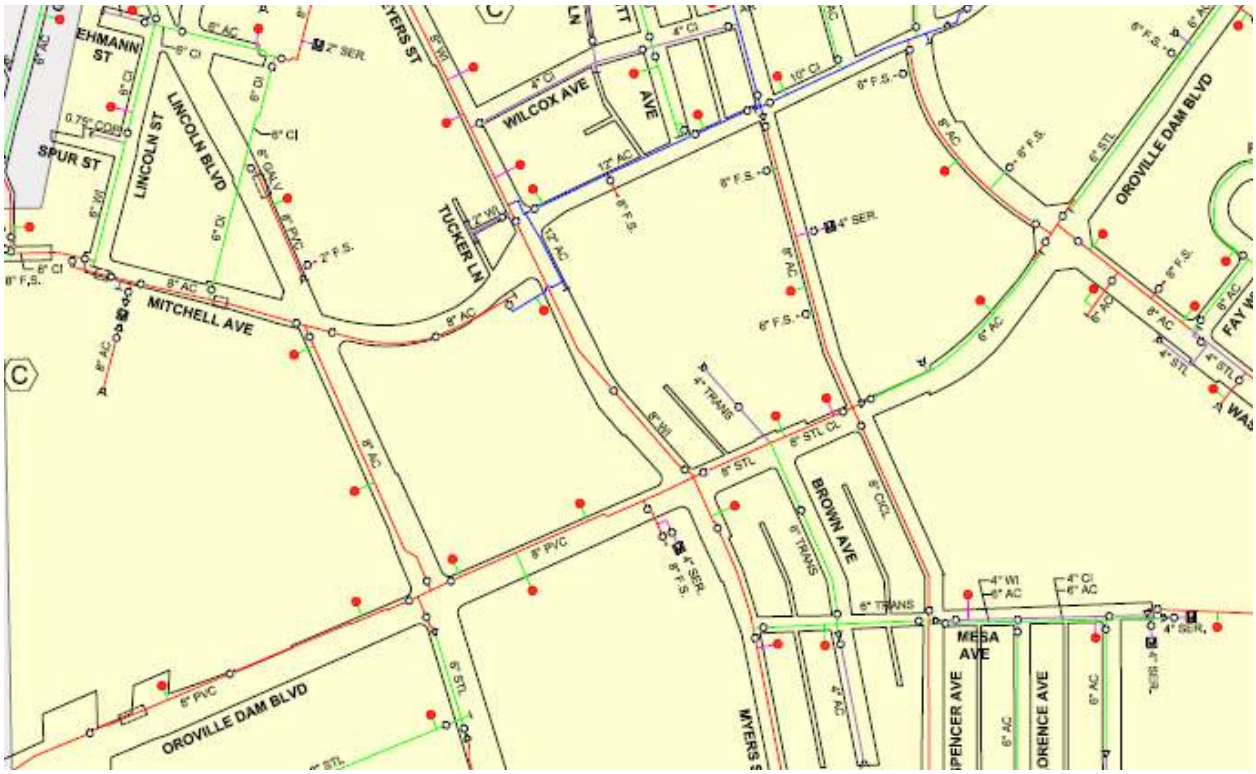
Appendix E

CALWATER UTILITY MAPS


YARD ST
WASHINGTON AVE
GAWTHORNE AVE
HAMMON AVE
SR 162 HWY
STORMES AVE
WO#3
MITCHELL AVE
MADRONE AVE
SR 162 HWY
OROVILLE DAM BLVD
FAY WY
GILMORE LN


MITCHELL AVE
5TH AVE
VEATCH ST
VEATCH ST
3RD ST
WYANDOTTE AVE
8" AC
8" F.S.
4" SER.
6" F.S.
6" PRV
12" DI
8" CI
8" DI
8" SER.
NC
C


EHMANN ST
SPUR ST
LINCOLN ST
LINCOLN BLVD
MITCHELL AVE
TUCKER LN
WILCOX AVE
AVE
OROVILLE DAM BLVD
BROWN AVE
MESA AVE
SPENCER AVE
ORENCE AVE
MYERS ST

Appendix F

SOUTH FEATHER WATER AND POWER UTILITY MAPS FOR WATER DISTRIBUTION

South Feather Water and Power

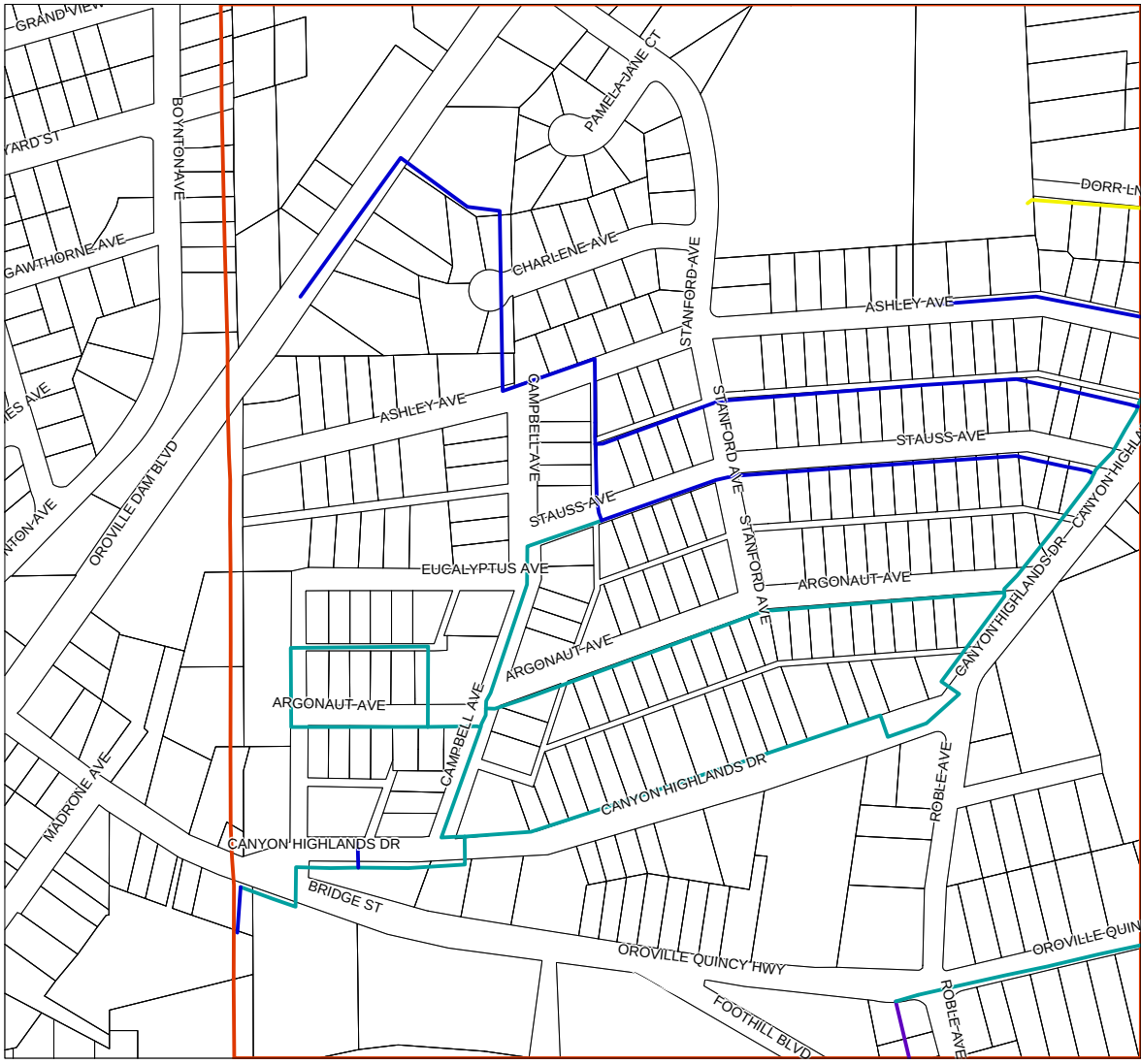
Waterlines by size
- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 16
- 20
- 24
- 30
- 36
- unknown

District & Divisions

Roads

Parcels

Ditch System



SCALE 1 : 5,356

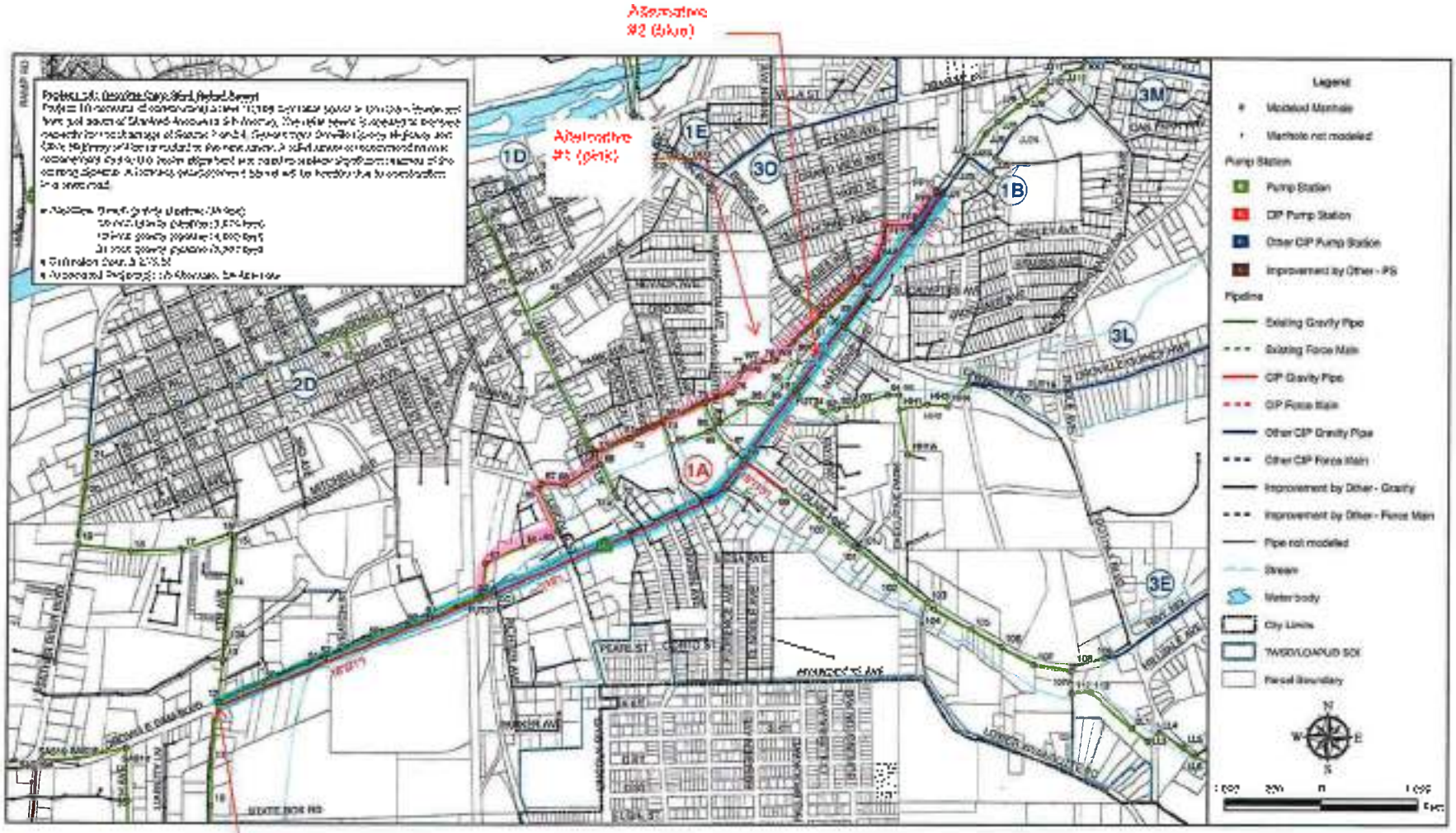
500 0 500 1,000 1,500

FEET

N

Appendix G

PG&E ELECTRICAL MAPS



carollo

G23 24, 25
G24 16, 17, 12, 21

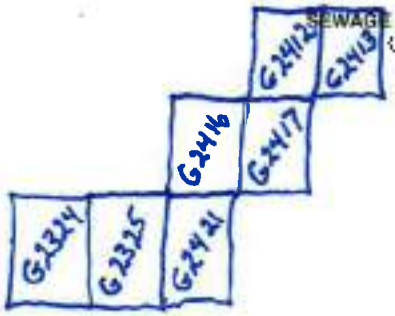
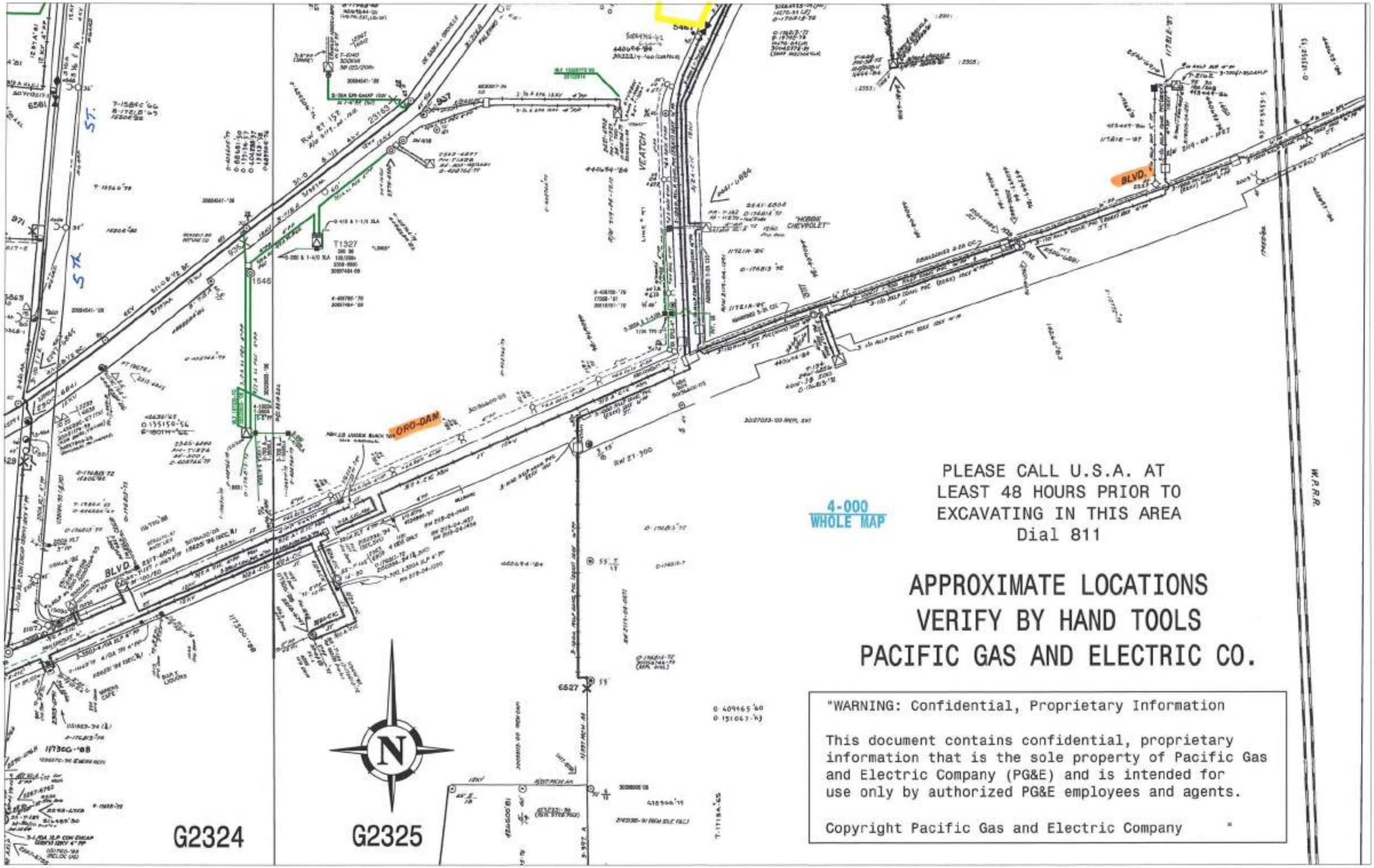


Figure 7.8
PROJECT 1A
SEWAGE DISPOSAL MASTER PLAN
CITY OF OROVILLE



PLEASE CALL U.S.A. AT
LEAST 48 HOURS PRIOR TO
EXCAVATING IN THIS AREA
Dial 811

APPROXIMATE LOCATIONS
VERIFY BY HAND TOOLS
PACIFIC GAS AND ELECTRIC CO.

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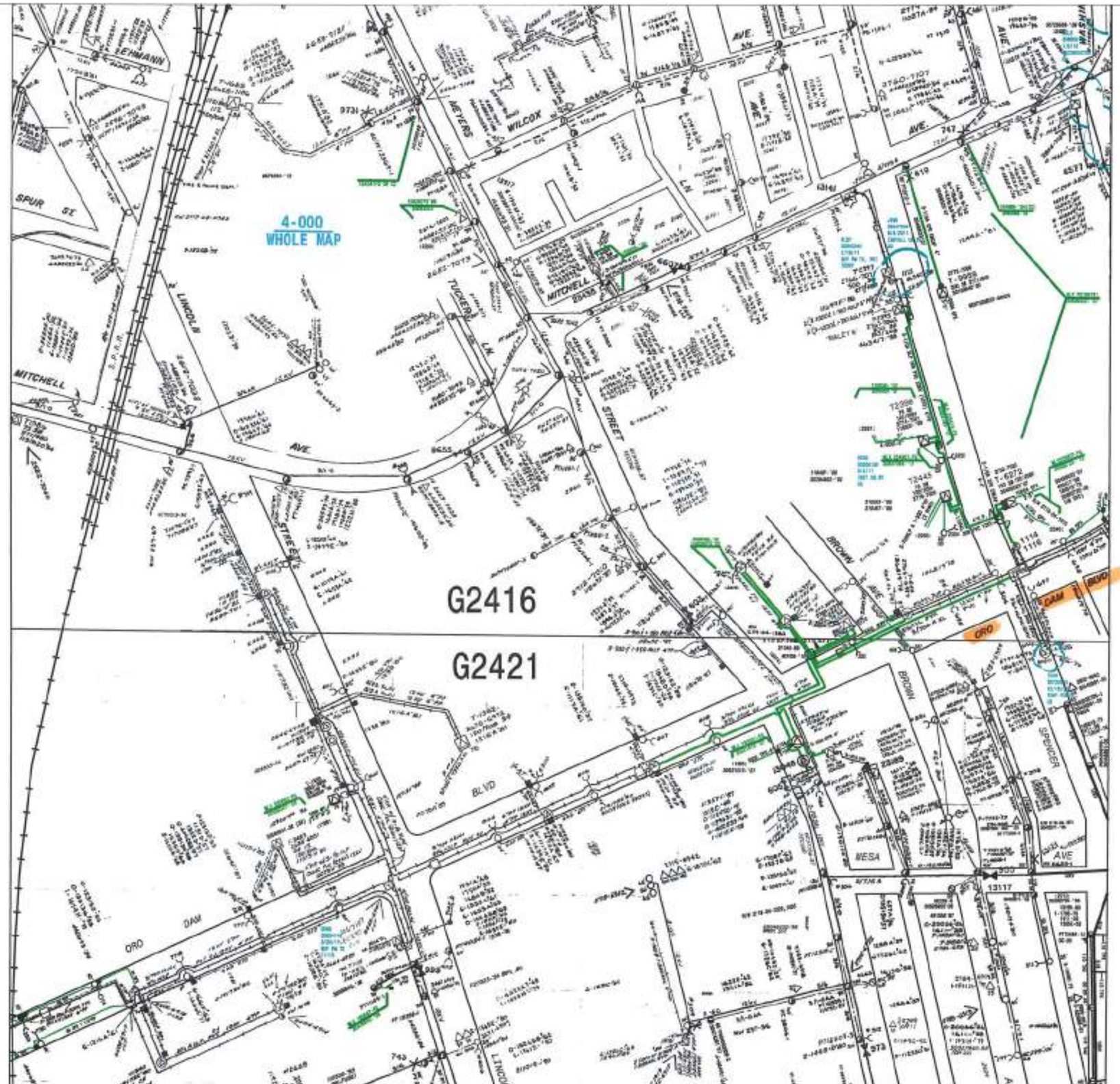
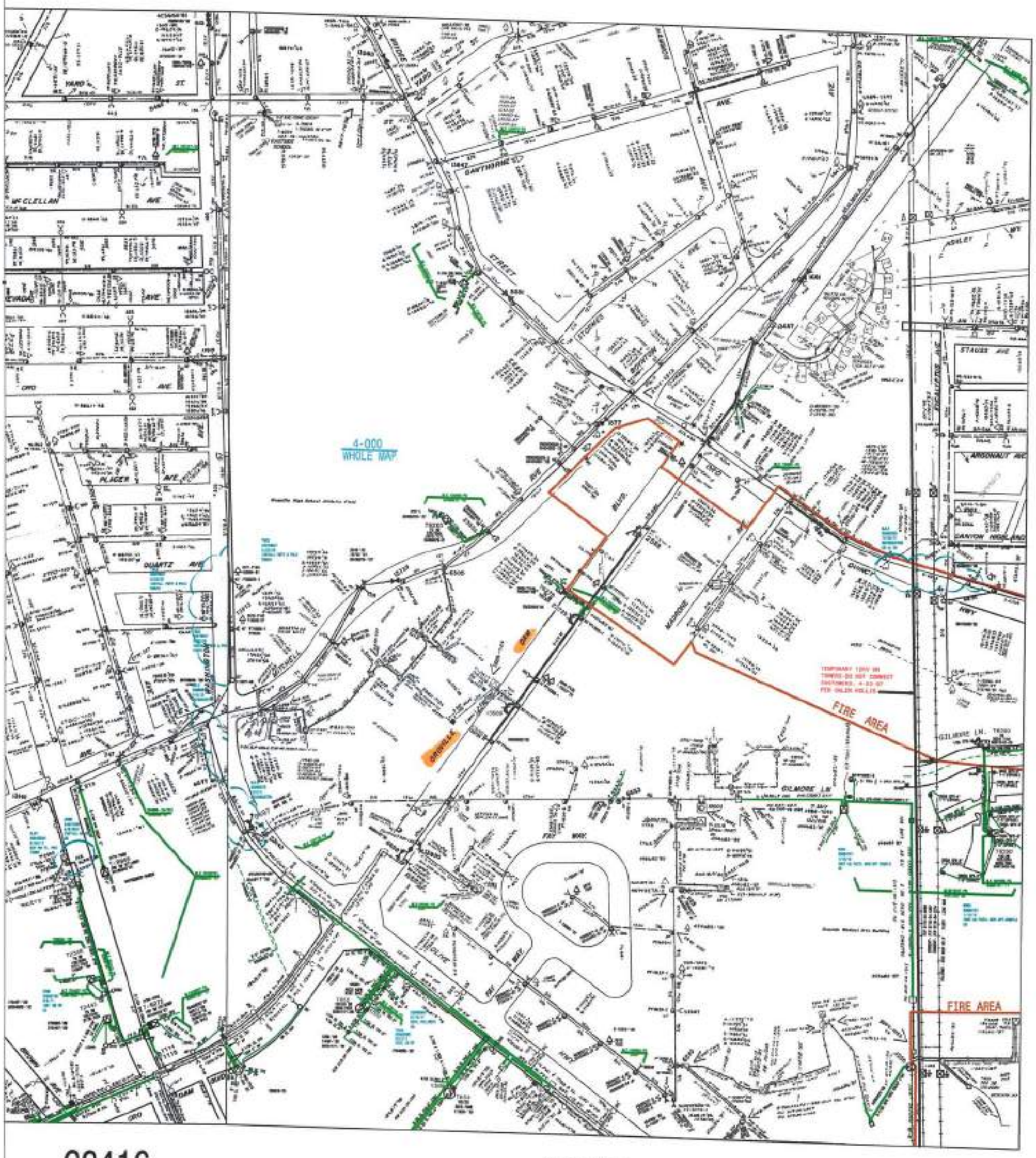

4-000
WHOLE MAP
G2416
G2421
LEHMANN
SPUR ST
LINCOLN
MITCHELL
AVE
STREET
MEYERS
WILCOX
TUCKER
LN
BROWN
AVE
BLVD
ORO
DAM
SPENCER
MESA
AVE
CAM
BLVD

N


4-000
WHOLE MAP
FIRE AREA
FIRE AREA
MCCLELLAN AVE
PLACER AVE
QUARTZ AVE
GARTHORNE
STREET
STORKES
MADISON
BLVD.
GRIDLEY
GILMORE LN
FIRE WAY
OLIVE
STADDS AVE
ARGONAUT AVE
CANYON RIDGE DRIVE
HWY
ASHLEY
G2416
G2417
N

NOTE!
TEMPORARY 12KV ON TOWERS
DO NOT CONNECT CUSTOMERS
PER GALEN HOLLIS 4-23-97

SEE 135-4-42
POL. 1

G2412

G2413

4-000

ORO DAM BLVD.

ORANGE AVE

ACACIA AVE.

ORO DAM BLVD.

SERVICE ST.

MIDWAY DR

OAK PARK AVE.

HIGHLANDS AVE.

HIGHLAND TER.

DONNA ST.

STANFORD AVE.

JANE CT.

PAMELA

LONG BAR AVE.

FIRE AREA

"STANFORD ELEMENTARY SCHOOL"

Appendix H

PG&E GAS MAPS

PACIFIC GAS AND ELECTRIC COMPANY
GAS LEGEND

FOR FURTHER INFORMATION PLEASE CONTACT:
RICH LACUNA (530)~~894-4783~~ 889-3277

SYMBOLS

- VALVE
- HIGH PRESSURE REGULATOR (OFF TRANSMISSION LINE)
- FITTINGS
- GURS METER BOX (SERVICE)
- ELECTROLYSIS TEST STATION

PIPE MATERIAL

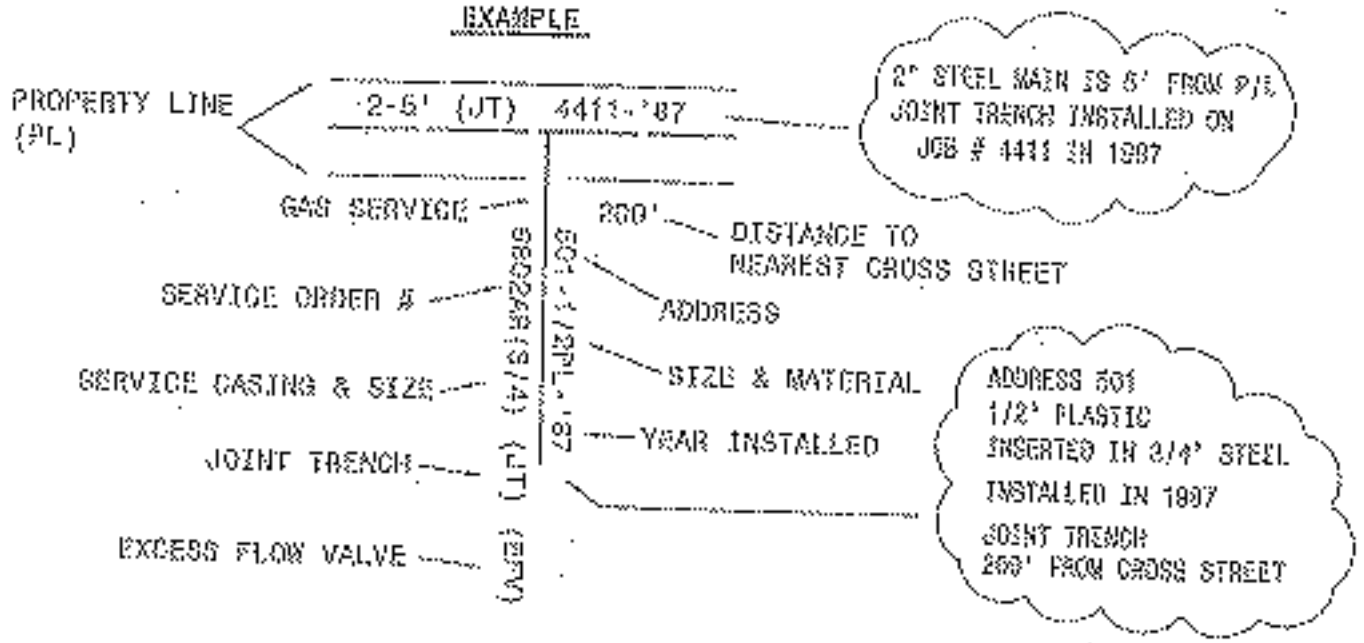
CI	CAST IRON
WI	WROUGHT IRON
PL	PLASTIC
CU	COPPER
PLC	PLASTIC COATED STEEL PIPE
SOM	SOMATIC STEEL

GAS MAINS

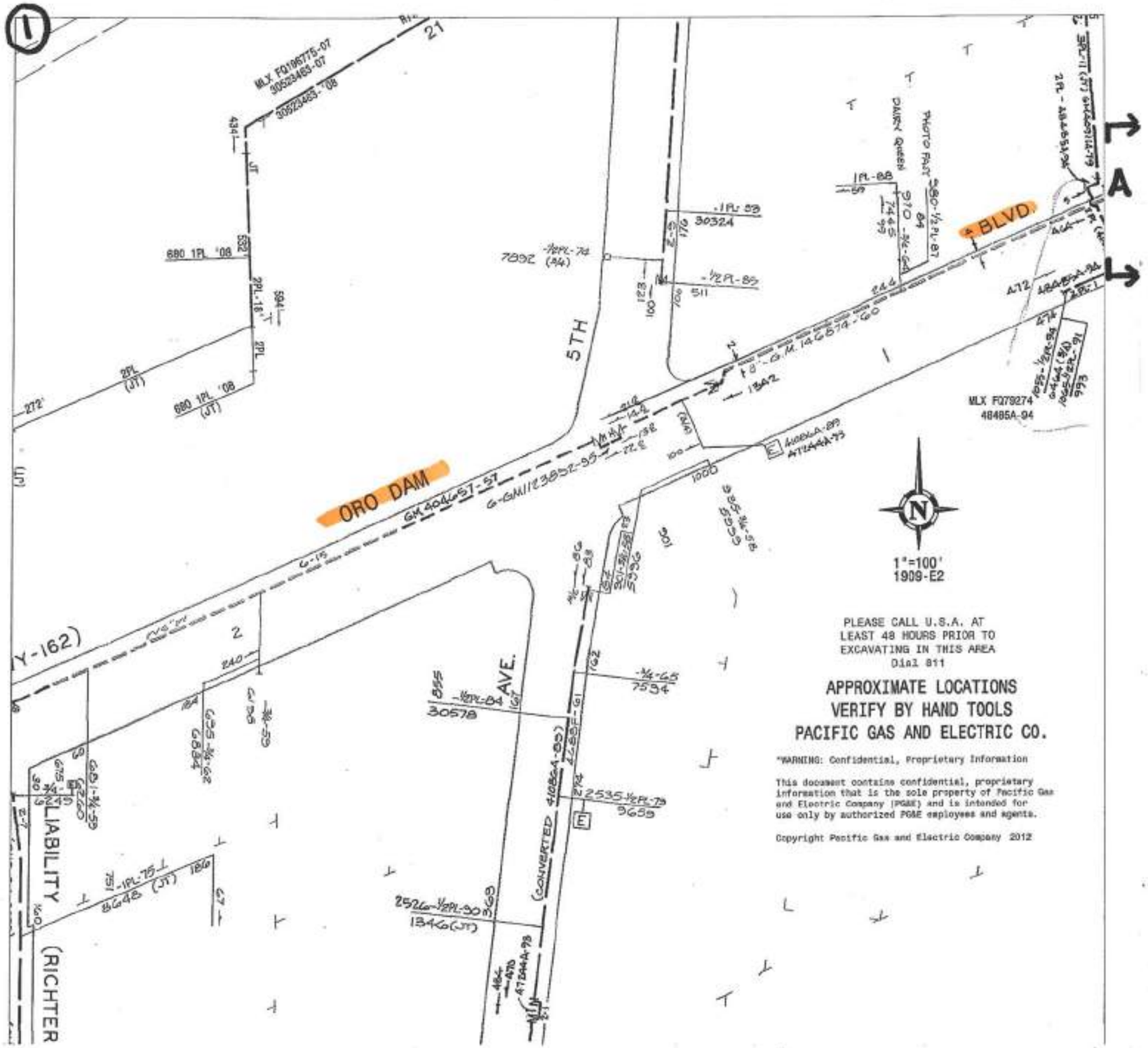
- HIGH PRESSURE
- TRANSMISSION

* UNIDENTIFIED MAIN ASSUMED TO BE STEEL.
* MAP SCALE 1"=100'

EXAMPLE



MAPS FOR REFERENCE ONLY: EXACT LOCATIONS TO BE VERIFIED IN FIELD PRIOR TO EXCAVATING CALL UNDERGROUND SERVICE ALERT (USA) 1-800-642-2444


1
A
ORO DAM
BLVD.
5TH
AVE.
LIABILITY
(RICHTER
CONVERTED
MLX FQ196775-07
305234B5-08
680 1PL '08
680 1PL '08 (JT)
MLX FQ79274
48485A-94
1"=100'
1909-E2
PLEASE CALL U.S.A. AT
LEAST 48 HOURS PRIOR TO
EXCAVATING IN THIS AREA
Dial 811
APPROXIMATE LOCATIONS
VERIFY BY HAND TOOLS
PACIFIC GAS AND ELECTRIC CO.
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②

PACIFIC GAS & ELECTRIC COMPANY
NORTH VALLEY DIVISION
COUNTY

DATE	BY	DATE	BY

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SURVEY BOOK
GAS DISTRIBUTION MAP
COMPLETED ON

BLOCK

DRAWN 11/29/1963
DATE LAST CORRECTED 6/07/2000 RGL
TOTAL SERVICES

_____ MILEAGE OF MAIN

☐ MAP CHANGES

190903

1909

N 665

1"=100'
1909-E3

PLEASE CALL U.S.A. AT
LEAST 48 HOURS PRIOR TO
EXCAVATING IN THIS AREA
Dial 811

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APPROXIMATE LOCATIONS
VERIFY BY HAND TOOLS
PACIFIC GAS AND ELECTRIC CO.

ST.

VEATCH

(HWY 162)

OROVILLE PLAZA

(STATE)

ORO DAM

CREEK

236061

A

4-000
WHOLE MAP

4

1"=100'
1909-D4

PLEASE CALL U.S.A. AT
LEAST 48 HOURS PRIOR TO
EXCAVATING IN THIS AREA
Dial 811

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APPROXIMATE LOCATIONS
VERIFY BY HAND TOOLS
PACIFIC GAS AND ELECTRIC CO.

HOT BOTH LINES 4/22/2011
HOT 4/14/2011

HOT 8/8/2011

STATE (ORO DAM)

HWY-162 (BLVD)

N 669950

190904

PACIFIC GAS & ELECTRIC COMPANY
NORTH VALLEY DIVISION
COUNTY

DATE	BY	DATE	BY

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SOMESONSIAN
SURVEY BOOK
GAS DISTRIBUTION MAP
SCALE 1" = 100' ZONE 8
COMPLETED ON _____

BLOCK 108

1909D4

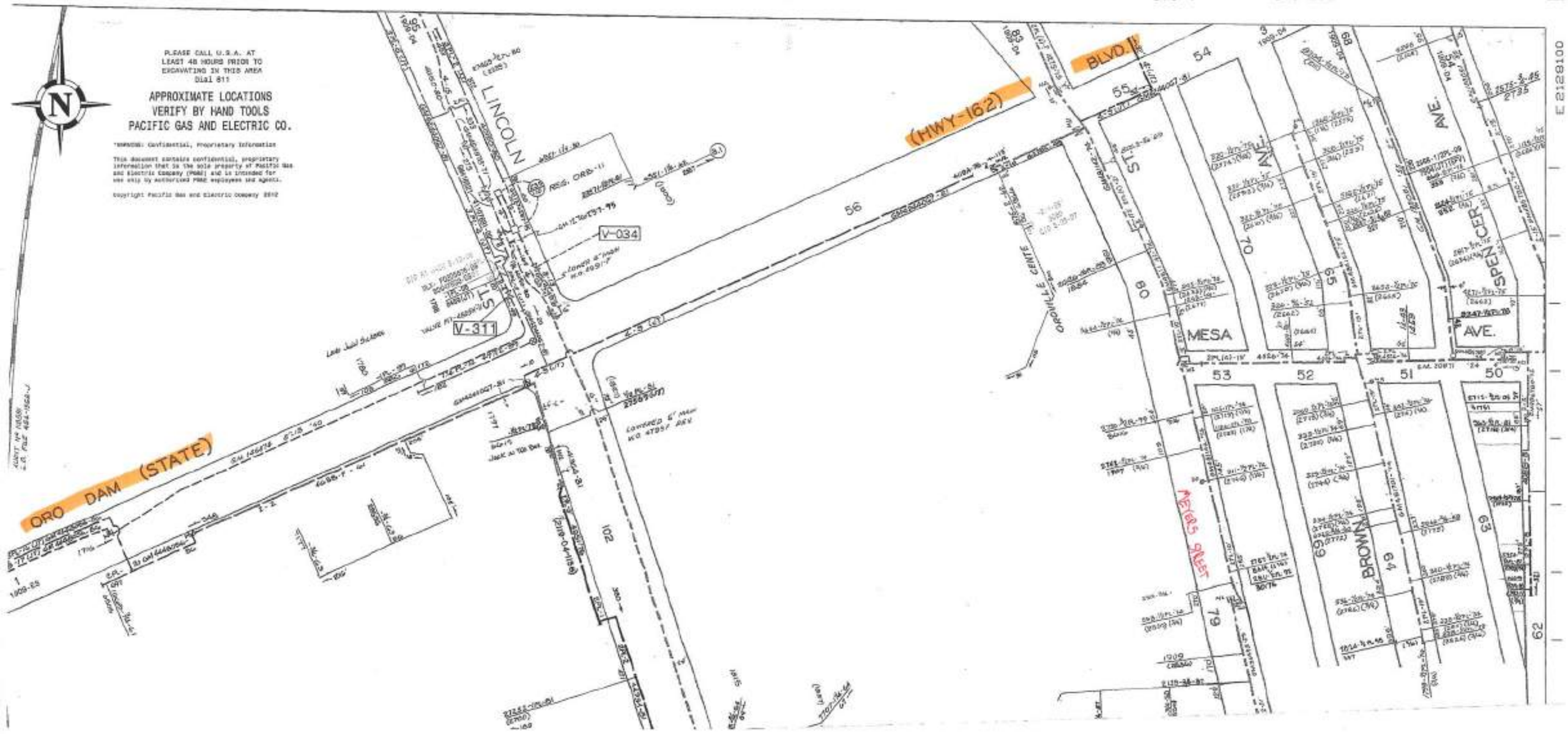
_____ MILEAGE OF MAIN

DRAWN 1/30/1964
DATE LAST CORRECTED 10/24/2011 RGL7
TOTAL SERVICES
1YR MAIN=0 SVC=4
5YR MAIN=4 SVC=261

1909E4
G2421

N669950

E2128100



PACIFIC GAS & ELECTRIC COMPANY
NORTH VALLEY DIVISION
COUNTY

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GAS DISTRIBUTION MAP
SCALE 1" = 100' ZONE 2

BLOCK
NEXT 12 59

DRAWN
5/28/1969
1YR
MAIN=.05
SVC=16

DATE LAST CORRECTED
10/15/2008 RGL
5YR
MAIN=4.15
SVC=274

1909D5
0847
E

N672200

1909C5

PLEASE CALL U.S.A. AT
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APPROXIMATE LOCATIONS
VERIFY BY HAND TOOLS
PACIFIC GAS AND ELECTRIC CO.

1909-D5

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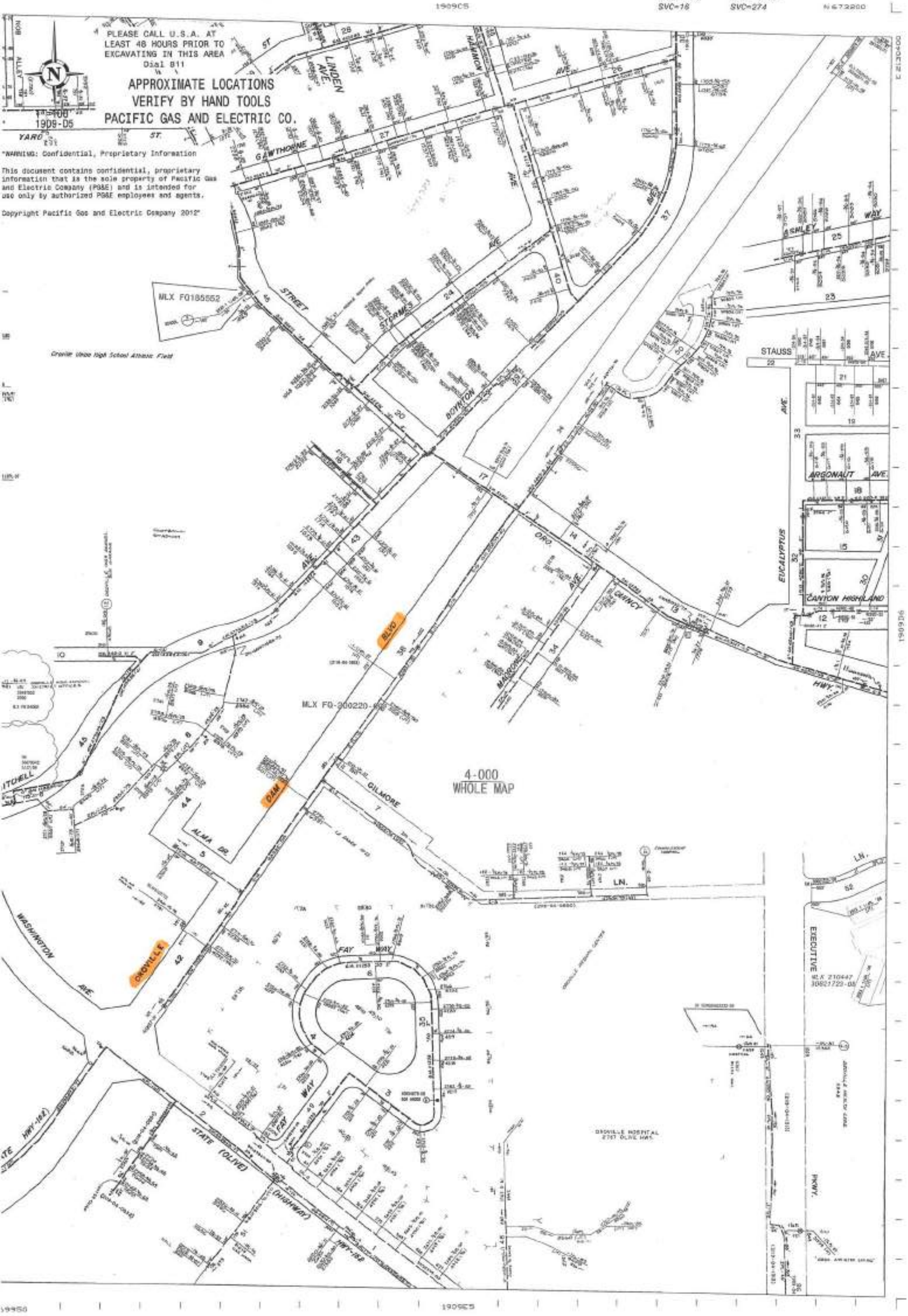

6

PLEASE CALL U.S.A. AT
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APPROXIMATE LOCATIONS
VERIFY BY HAND TOOLS
PACIFIC GAS AND ELECTRIC CO.

1909-E55

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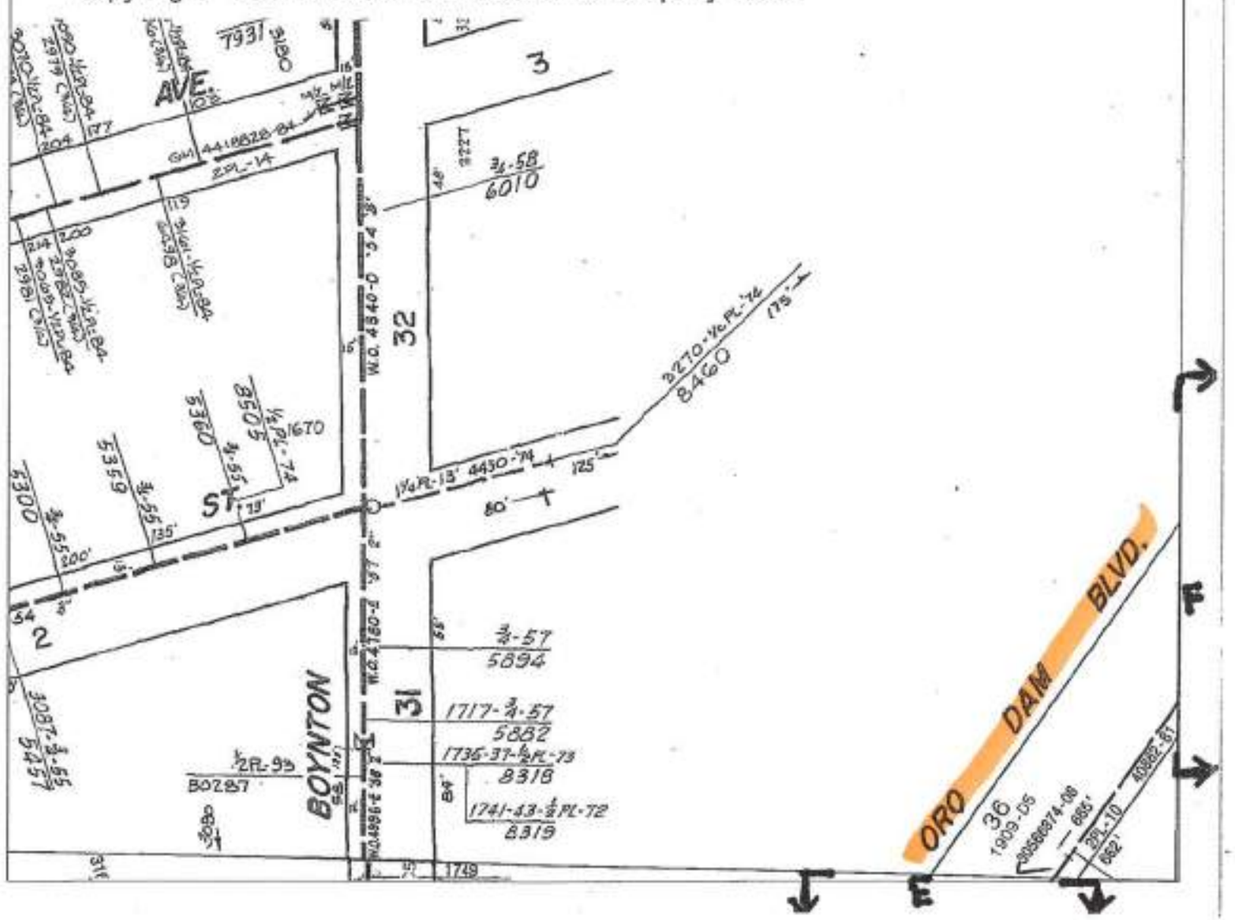

7

MOBILE VILLAGE

N

1"=100'
1909-C6

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Dial 811

APPROXIMATE LOCATIONS
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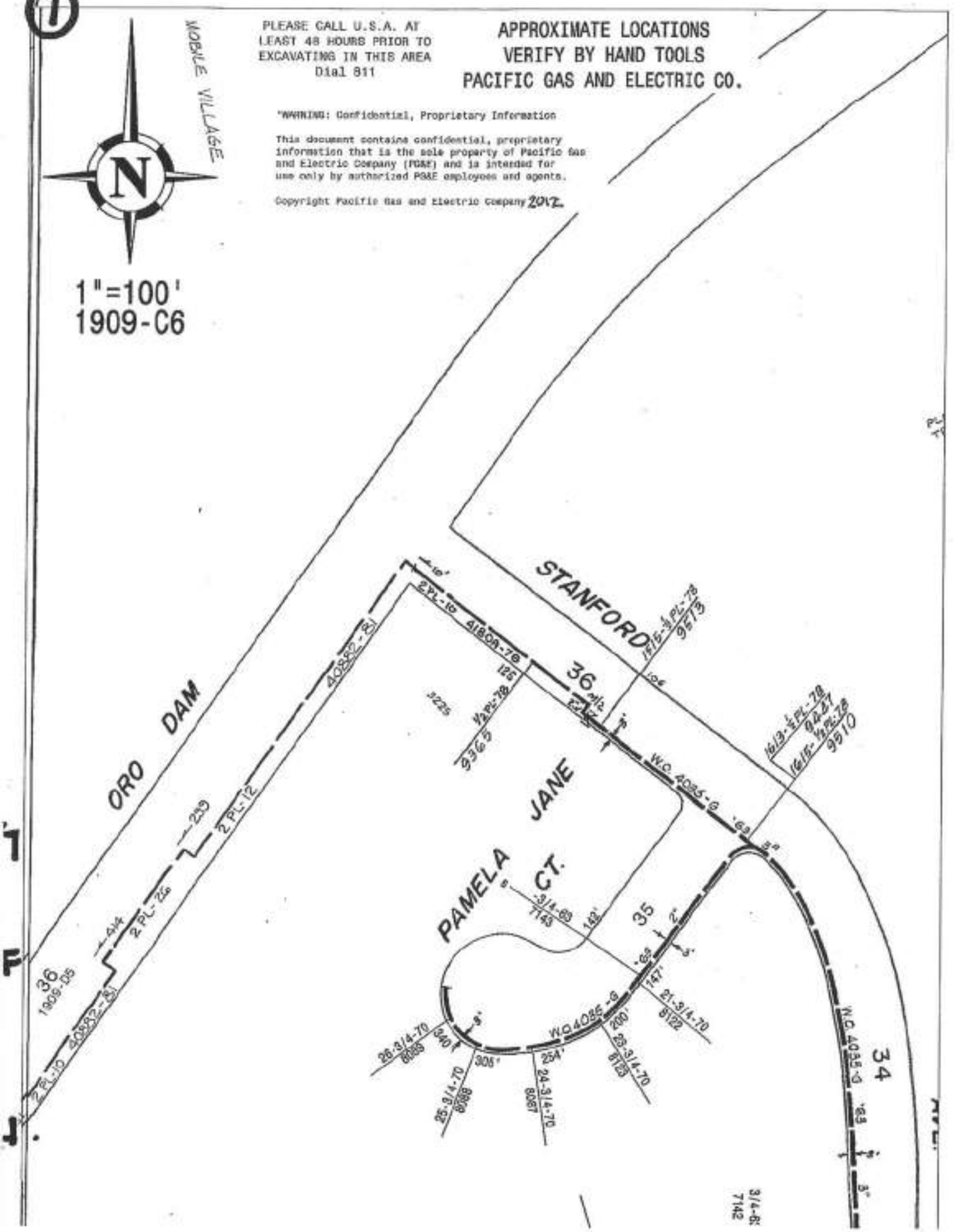

Appendix I

COST ESTIMATE

Engineers...Working Wonders With Water™

PROJECT : **Oroville Dam Blvd Sewer Relief**
JOB # : **8675A.10** **DATE :** **8-Feb-12**
LOCATION : **Oroville, CA** **BY :** **KTC**
ELEMENT : **Cost Estimate** **REVIEWED:**

	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE		TOTAL
	PROJECT 1 --Project 1A					
	MH 12 to MH FUT 37	1	LS	$1,294,511		$1,294,511
	MH FUT 37 to MH 98	1	LS	$1,272,525		$1,272,525
	MH 99 to MH 98	1	LS	$221,026		$221,026
	MH 98 to MH FUT 34	1	LS	$245,319		$245,319
	MH FUT 34 to MH FUT 33	1	LS	$225,960		$225,960
	MH FUT 33 to MH GG1	1	LS	$10,917		$10,917
	MH FUT 33 to MH JJ1	1	LS	$452,495		$452,495
	Bypass Pumping	1	LS	$28,000		$28,000
	Project 1 Total					**$3,750,754**
	PROJECT 2--Project 1A Alternate and 2A Alternate					
	Install 12" in residential neighborhood	1	LS	$490,384		$490,384
	Install 15" in residential neighborhood	1	LS	$631,487		$631,487
	Install 18" in residential neighborhood	1	LS	$905,084		$905,084
	Install 18" in Oroville Dam Blvd/Highway 162	1	LS	$226,057		$226,057
	Install 21" in Oroville Dam Blvd/Highway 162	1	LS	$119,968		$119,968
	Install 21" in open field	1	LS	$379,912		$379,912
	Install 21" in residential neighborhood	1	LS	$301,231		$301,231
	Install 24" in Oroville Dam Blvd/Highway 162	1	LS	$1,177,754		$1,177,754
	Bypass Pumping	1	LS	$126,000		$126,000
	Project 2 Total					**$4,357,879**

The opinion of cost herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

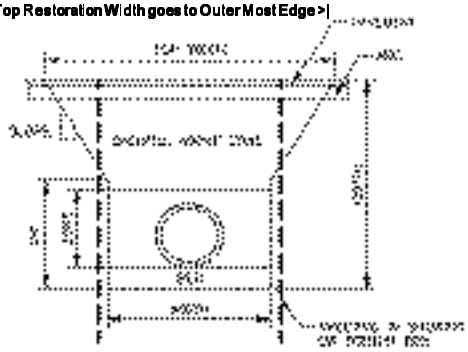
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **21" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH 12 to MH FUT 37**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	21.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	2,947.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	12.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	**70,728**	**In ft**
Pavement Removal	=	**20,629**	**sq ft**
Trench Excavation	=	**5,457**	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	**1,511**	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	**1,238**	**cu yd**
Bed Only Fill	=	**273**	**cu yd**
Backfill Above Zone	=	**3,684**	**cu yd**
Waste if Import Bed, Zone	=	**1,774**	**cu yd**
Waste if Native Bed, Zone	=	**263**	**cu yd**
Surface Restoration Area	=	**20,629**	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	**NONE**	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	**NONE**	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.3	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	70,728	in FT	**$0.86**	$60,579	*$20.56*	AC Thickness = 12 in
Pavement Removal	20,629	SF	**$0.74**	$15,273	*$5.18*	
Disposal Haul	764	CY	**$14.79**	$11,298	*$3.83*	Assumed haul distance is: 20 miles round trip
Trench Excavation	5,457	CY	**$3.50**	$19,116	*$6.49*	Assumed excavator used is:
Bed + Zone fill	1,511	CY	**$67.89**	$102,585	*$34.81*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	1,238	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	273	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	3,684	CY	**$90.00**	$331,538	*$112.50*	CLSM
Waste if Import Bed, Zone	1,774	CY	**$14.79**	$26,228	*$8.90*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	263	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	20,629	SF	**$6.77**	$139,750	*$47.42*	AC replacement
Excavation Support	59	Day	**$1,000.00**	$59,000	*$20.02*	Slide Rail Trench System assumed--based on quote from Unite
				$0	*$0.00*	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$765,366	*$259.71*	
Pipe						Insert pipe type
21" PVC Sewer SDR 35	2,947	LF	**$31.83**	$93,809	*$31.83*	
Pipe Subtotal				$93,809	*$31.83*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	**$2,541.63**	$2,542	*$0.86*	
60" Precast MH Extra Depth	4	VLF	**$285.41**	$1,142	*$0.39*	
60" MH precast Slab bottom	1	EA	**$577.23**	$577	*$0.20*	
24" Dia MH Frame &Cover	1	EA	**$491.07**	$491	*$0.17*	
Traffic Control	59	Day	**$1,000.00**	$59,000	*$20.02*	
Miscellaneous Subtotal				$63,752	*$21.63*	
TOTAL DIRECT COST:				**$922,926**	***$313.17***	
Indirect Costs						
General Conditions			7.0%	$64,605	*$21.92*	

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Subtotal		**$987,531**	***$335.10***	
Contingency	15.0%	$148,130	*$50.26*	
Subtotal		**$1,135,660**	***$385.36***	
General Contractor Overhead, Profit & Risk	10.0%	$113,566	*$38.54*	Retain this adder here
Subtotal		**$1,249,226**	***$423.90***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$1,249,226**	***$423.90***	
Sales Tax (Based on)	7.3%	$45,284	*$15.37*	
Subtotal		**$1,294,511**	***$439.26***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$371,585**	***$126.09***	
TOTAL ESTIMATED CONSTRUCTION COST		**$1,294,511**	***$439.26***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

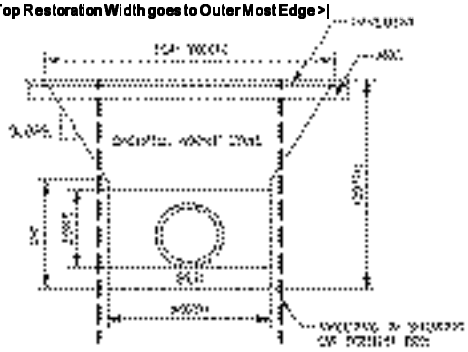
QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **18" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH FUT 37 to MH 98**
:

DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	18.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	3,154.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	12.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

|< Top Restoration Width goes to Outer Most Edge >|



Calculated Values

5.0 ft = Top Trench Width
7.0 ft = Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	**75,696**	**In ft**
Pavement Removal	=	**22,078**	**sq ft**
Trench Excavation	=	**5,841**	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	**1,546**	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	**1,254**	**cu yd**
Bed Only Fill	=	**292**	**cu yd**
Backfill Above Zone	=	**4,089**	**cu yd**
Waste if Import Bed, Zone	=	**1,752**	**cu yd**
Waste if Native Bed, Zone	=	**206**	**cu yd**
Surface Restoration Area	=	**22,078**	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	**NONE**	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	**NONE**	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.0	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	75,696	in FT	**$0.86**	$64,834	*$20.56*	AC Thickness = 12 in
Pavement Removal	22,078	SF	**$0.74**	$16,346	*$5.18*	
Disposal Haul	818	CY	**$14.79**	$12,092	*$3.83*	Assumed haul distance is: 20 miles round trip
Trench Excavation	5,841	CY	**$3.50**	$20,459	*$6.49*	Assumed excavator used is:
Bed + Zone fill	1,546	CY	**$67.89**	$104,939	*$33.27*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	1,254	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	292	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	4,089	CY	**$90.00**	$367,967	*$116.67*	CLSM
Waste if Import Bed, Zone	1,752	CY	**$14.79**	$25,911	*$8.22*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	206	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	22,078	SF	**$6.77**	$149,566	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	63	Day	**$1,000.00**	$63,000	*$19.97*	Slide Rail Trench System assumed--based on quote from Unite
				$0	*$0.00*	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$825,112	*$261.61*	
Pipe						
18" PVC Sewer SDR 35	3,154	LF	**$24.54**	$77,388	*$24.54*	
Pipe Subtotal				$77,388	*$24.54*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	**$2,541.63**	$2,542	*$0.81*	
60" Precast MH Extra Depth	4	VLF	**$285.41**	$1,142	*$0.36*	
60" MH precast Slab bottom	1	EA	**$577.23**	$577	*$0.18*	
24" Dia MH Frame &Cover	1	EA	**$491.07**	$491	*$0.16*	
Miscellaneous Subtotal				$4,752	*$1.51*	
TOTAL DIRECT COST:				**$907,251**	***$287.65***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						

General Conditions	7.0%	$63,508	*$20.14*	
Subtotal		**$970,759**	***$307.79***	
Contingency	15.0%	$145,614	*$46.17*	
Subtotal		**$1,116,372**	***$353.95***	
General Contractor Overhead, Profit & Risk	10.0%	$111,637	*$35.40*	Retain this adder here
Subtotal		**$1,228,010**	***$389.35***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$1,228,010**	***$389.35***	
Sales Tax (Based on)	7.3%	$44,515	*$14.11*	
Subtotal		**$1,272,525**	***$403.46***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$365,274**	***$115.81***	
TOTAL ESTIMATED CONSTRUCTION COST		**$1,272,525**	***$403.46***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

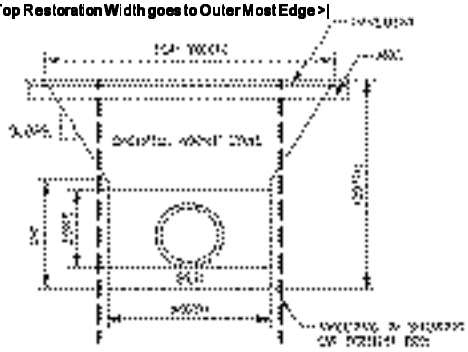
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **15" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH 99 to MH 98**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	15.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	533.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	12.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	12,792	**In ft**
Pavement Removal	=	3,731	**sq ft**
Trench Excavation	=	987	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	247	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	198	**cu yd**
Bed Only Fill	=	49	**cu yd**
Backfill Above Zone	=	716	**cu yd**
Waste if Import Bed, Zone	=	271	**cu yd**
Waste if Native Bed, Zone	=	24	**cu yd**
Surface Restoration Area	=	3,731	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	NONE	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	NONE	**sq ft**

= For driven solid shoring

INPUT VARIABLES			
Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	2.8	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	12,792	in FT	$0.86	$10,956	*$20.56*	AC Thickness = 12 in
Pavement Removal	3,731	SF	$0.74	$2,762	*$5.18*	
Disposal Haul	138	CY	$14.79	$2,043	*$3.83*	Assumed haul distance is: 20 miles round trip
Trench Excavation	987	CY	$3.50	$3,457	*$6.49*	Assumed excavator used is:
Bed + Zone fill	247	CY	$67.89	$16,782	*$31.49*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	198	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	49	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	716	CY	$90.00	$64,404	*$120.83*	Native confined material from trench used
Waste if Import Bed, Zone	271	CY	$14.79	$4,014	*$7.53*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	24	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	3,731	SF	$6.77	$25,276	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	11	Day	$1,000.00	$11,000	*$20.64*	Slide Rail Trench System assumed--based on quote from Unite
				$0	*$0.00*	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$140,695	*$263.97*	
Pipe						Insert pipe type
15" PVC Sewer SDR 35	533	LF	$22.77	$12,135	*$22.77*	
Pipe Subtotal				$12,135	*$22.77*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	$2,541.63	$2,542	*$4.77*	
60" Precast MH Extra Depth	4	VLF	$285.41	$1,142	*$2.14*	
60" MH precast Slab bottom	1	EA	$577.23	$577	*$1.08*	
24" Dia MH Frame &Cover	1	EA	$491.07	$491	*$0.92*	
Miscellaneous Subtotal				$4,752	*$8.91*	
TOTAL DIRECT COST:				**$157,581**	***$295.65***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						
General Conditions			7.0%	$11,031	*$20.70*	

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Subtotal		**$168,612**	***$316.35***	
Contingency	15.0%	$25,292	*$47.45*	
Subtotal		**$193,904**	***$363.80***	
General Contractor Overhead, Profit & Risk	10.0%	$19,390	*$36.38*	Retain this adder here
Subtotal		**$213,294**	***$400.18***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$213,294**	***$400.18***	
Sales Tax (Based on)	7.3%	$7,732	*$14.51*	
Subtotal		**$221,026**	***$414.68***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$63,445**	***$119.03***	
TOTAL ESTIMATED CONSTRUCTION COST		**$221,026**	***$414.68***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

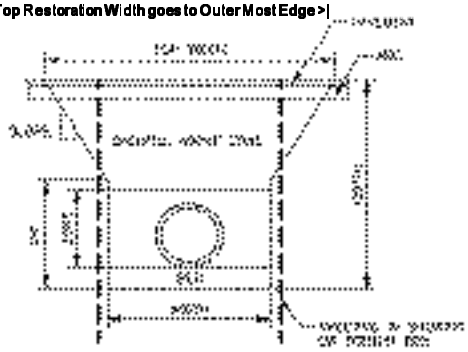
QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **18" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH 98 to MH FUT 34**
:

DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	18.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	898.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

|< Top Restoration Width goes to Outer Most Edge >|



Calculated Values

5.0 ft = Top Trench Width
7.0 ft = Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE		
Pavement Cutting (per Inch Depth x Length)	=	**7,184 In ft**
Pavement Removal	=	**6,286 sq ft**
Trench Excavation	=	**1,663 cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	**440 cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	**357 cu yd**
Bed Only Fill	=	**83 cu yd**
Backfill Above Zone	=	**1,164 cu yd**
Waste if Import Bed, Zone	=	**499 cu yd**
Waste if Native Bed, Zone	=	**59 cu yd**
Surface Restoration Area	=	**6,286 sq ft**
Shoring Area (Optional): Trench Shored Area	=	**NONE sq ft**
Shoring Area (Optional): With 30% Toe-In	=	**NONE sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.0	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	7,184	in FT	**$0.86**	$6,153	*$6.85*	AC Thickness = 4 in
Pavement Removal	6,286	SF	**$0.74**	$4,654	*$5.18*	
Disposal Haul	78	CY	**$14.79**	$1,148	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	1,663	CY	**$3.50**	$5,825	*$6.49*	Assumed excavator used is:
Bed + Zone fill	440	CY	**$67.89**	$29,878	*$33.27*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	357	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	83	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	1,164	CY	**$27.92**	$32,497	*$36.19*	Native confined material from trench used
Waste if Import Bed, Zone	499	CY	**$14.79**	$7,377	*$8.22*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	59	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	6,286	SF	**$6.77**	$42,584	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	18	Day	**$1,000.00**	$18,000	*$20.04*	Slide Rail Trench System assumed--based on quote from Unite
				$0	*$0.00*	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$148,116	*$164.94*	
Pipe						Insert pipe type
18" PVC Sewer SDR 35	898	LF	**$24.54**	$22,034	*$24.54*	
Pipe Subtotal				$22,034	*$24.54*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	**$2,541.63**	$2,542	*$2.83*	
60" Precast MH Extra Depth	4	VLF	**$285.41**	$1,142	*$1.27*	
60" MH precast Slab bottom	1	EA	**$577.23**	$577	*$0.64*	
24" Dia MH Frame &Cover	1	EA	**$491.07**	$491	*$0.55*	
Miscellaneous Subtotal				$4,752	*$5.29*	
TOTAL DIRECT COST:				**$174,901**	***$194.77***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

General Conditions	7.0%	$12,243	*$13.63*	
Subtotal		**$187,144**	***$208.40***	
Contingency	15.0%	$28,072	*$31.26*	
Subtotal		**$215,216**	***$239.66***	
General Contractor Overhead, Profit & Risk	10.0%	$21,522	*$23.97*	Retain this adder here
Subtotal		**$236,737**	***$263.63***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$236,737**	***$263.63***	
Sales Tax (Based on)	7.3%	$8,582	*$9.56*	
Subtotal		**$245,319**	***$273.18***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$70,418**	***$78.42***	
TOTAL ESTIMATED CONSTRUCTION COST		**$245,319**	***$273.18***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

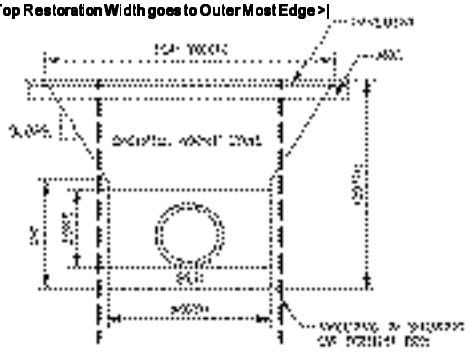
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **15" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH FUT 34 to MH FUT 33**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT		
Pipe Diameter (Nom.)	15.00	inches	
Average **Total** Exc **Depth**	10.00	feet	(Include Bed Thickness)
Length	837.00	feet	
Trench Slope: 1 Vert. to	0.00	Horiz.	
Pavement Thickness:	4.00	inches	
ABC Depth:	12.00	inches	
No.of Pavement Cuts	2.00	Each	

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	6,696	**In ft**
Pavement Removal	=	5,859	**sq ft**
Trench Excavation	=	1,550	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	388	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	311	**cu yd**
Bed Only Fill	=	78	**cu yd**
Backfill Above Zone	=	1,124	**cu yd**
Waste if Import Bed, Zone	=	426	**cu yd**
Waste if Native Bed, Zone	=	38	**cu yd**
Surface Restoration Area	=	5,859	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	NONE	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	NONE	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	2.8	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	6,696	in FT	$0.86	$5,735	*$6.85*	AC Thickness = 4 in
Pavement Removal	5,859	SF	$0.74	$4,338	*$5.18*	
Disposal Haul	72	CY	$14.79	$1,070	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	1,550	CY	$3.50	$5,429	*$6.49*	Assumed excavator used is:
Bed + Zone fill	388	CY	$67.89	$26,354	*$31.49*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	311	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	78	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	1,124	CY	$27.92	$31,371	*$37.48*	Native confined material from trench used
Waste if Import Bed, Zone	426	CY	$14.79	$6,303	*$7.53*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	38	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	5,859	SF	$6.77	$39,692	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	17	Day	$1,000.00	$17,000	*$20.31*	Slide Rail Trench System assumed--based on quote from Unite
				$0	*$0.00*	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$137,292	*$164.03*	
Pipe						Insert pipe type
15" PVC Sewer SDR 35	837	LF	$22.77	$19,056	*$22.77*	
Pipe Subtotal				$19,056	*$22.77*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	$2,541.63	$2,542	*$3.04*	
60" Precast MH Extra Depth	4	VLF	$285.41	$1,142	*$1.36*	
60" MH precast Slab bottom	1	EA	$577.23	$577	*$0.69*	
24" Dia MH Frame &Cover	1	EA	$491.07	$491	*$0.59*	
Miscellaneous Subtotal				$4,752	*$5.68*	
TOTAL DIRECT COST:				**$161,099**	***$192.47***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						

General Conditions	7.0%	$11,277	*$13.47*	(Separated 3% for bonds at 90%) Retain this adder here, unles
Subtotal		**$172,376**	***$205.95***	
Contingency	15.0%	$25,856	*$30.89*	
Subtotal		**$198,233**	***$236.84***	
General Contractor Overhead, Profit & Risk	10.0%	$19,823	*$23.68*	Retain this adder here
Subtotal		**$218,056**	***$260.52***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$218,056**	***$260.52***	
Sales Tax (Based on)	7.3%	$7,905	*$9.44*	
Subtotal		**$225,960**	***$269.96***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$64,861**	***$77.49***	
TOTAL ESTIMATED CONSTRUCTION COST		**$225,960**	***$269.96***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

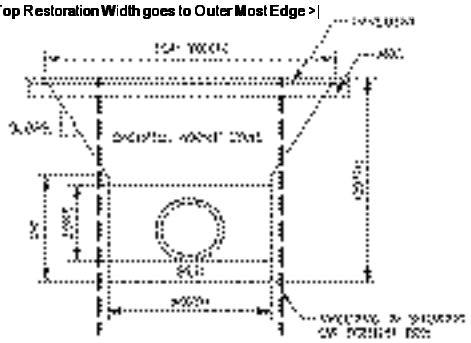
QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **8" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH FUT 33 to MH GG1**
:

DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	8.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	34.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

|< Top Restoration Width goes to Outer Most Edge >|



Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	272	**In ft**
Pavement Removal	=	238	**sq ft**
Trench Excavation	=	63	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	13	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	10	**cu yd**
Bed Only Fill	=	3	**cu yd**
Backfill Above Zone	=	49	**cu yd**
Waste if Import Bed, Zone	=	14	**cu yd**
Waste if Native Bed, Zone	=	0	**cu yd**
Surface Restoration Area	=	238	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	NONE	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	NONE	**sq ft**

= For driven solid shoring

INPUT VARIABLES			
Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	2.2	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	$/LF	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	272	in FT	$0.86	$233	$6.85	AC Thickness = 4 in
Pavement Removal	238	SF	$0.74	$176	$5.18	
Disposal Haul	3	CY	$14.79	$43	$1.28	Assumed haul distance is: 20 miles round trip
Trench Excavation	63	CY	$3.50	$221	$6.49	Assumed excavator used is:
Bed + Zone fill	13	CY	$67.89	$896	$26.36	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	10	CY		$0	$0.00	Imported confined material used
Bed Only Fill	3	CY		$0	$0.00	Imported confined material used
Backfill Above Zone	49	CY	$27.92	$1,377	$40.50	Native confined material from trench used
Waste if Import Bed, Zone	14	CY	$14.79	$202	$5.93	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	0	CY		$0	$0.00	Assumed haul distance is:
Surface Restoration Area	238	SF	$6.77	$1,612	$47.42	AC replacement
Shoring Area		SF		$0	$0.00	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	1	Day	$1,000.00	$1,000	$29.41	Slide Rail Trench System assumed--based on quote from United
				$0	$0.00	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$5,760	$169.42	
Pipe						Insert pipe type
8" PVC Sewer SDR 35	34	LF	$13.92	$473	$13.92	
				$0	$0.00	
				$0	$0.00	Add in Allowances for Fittings, etc., if needed.
Pipe Subtotal				$473	$13.92	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	$2,541.63	$2,542	$74.75	
60" Precast MH Extra Depth	4	VLF	$285.41	$1,142	$33.58	
				$0	$0.00	
Traffic Control	1	Day	$1,000.00	$1,000	$29.41	
Miscellaneous Subtotal				$4,683	$137.74	
TOTAL DIRECT COST:				**$10,917**	***$321.09***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

General Conditions	7.0%	$764	*$22.48*	
Subtotal		**$11,681**	***$343.56***	
Contingency	15.0%	$1,752	*$51.53*	
Subtotal		**$13,433**	***$395.10***	
General Contractor Overhead, Profit & Risk	10.0%	$1,343	*$39.51*	Retain this adder here
Subtotal		**$14,777**	***$434.60***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$14,777**	***$434.60***	
Sales Tax (Based on)	7.3%	$536	*$15.75*	
Subtotal		**$15,312**	***$450.36***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$4,395**	***$129.27***	
TOTAL ESTIMATED CONSTRUCTION COST		**$15,312**	***$450.36***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

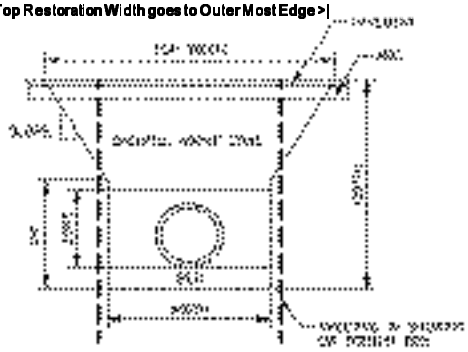
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **15" PVC Gravity Sewer** Proj Mgr:: **Tim Taylor**
Notes: **MH FUT 33 to MH JJ1**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	15.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	1,705.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	13,640	**In ft**
Pavement Removal	=	11,935	**sq ft**
Trench Excavation	=	3,157	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	791	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	633	**cu yd**
Bed Only Fill	=	158	**cu yd**
Backfill Above Zone	=	2,289	**cu yd**
Waste if Import Bed, Zone	=	868	**cu yd**
Waste if Native Bed, Zone	=	77	**cu yd**
Surface Restoration Area	=	11,935	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	NONE	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	NONE	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	2.8	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	13,640	in FT	$0.86	$11,683	*$6.85*	AC Thickness = 4 in
Pavement Removal	11,935	SF	$0.74	$8,836	*$5.18*	
Disposal Haul	147	CY	$14.79	$2,179	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	3,157	CY	$3.50	$11,060	*$6.49*	Assumed excavator used is:
Bed + Zone fill	791	CY	$67.89	$53,684	*$31.49*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	633	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	158	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	2,289	CY	$27.92	$63,904	*$37.48*	Native confined material from trench used
Waste if Import Bed, Zone	868	CY	$14.79	$12,840	*$7.53*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	77	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	11,935	SF	$6.77	$80,853	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	$1,000.00	$34,000	*$19.94*	Slide Rail Trench System assumed--based on quote from Unite
				$0	*$0.00*	Add in Allowances for Dewatering, etc. that might apply.
Earthwork Subtotal				$279,039	*$163.66*	
Pipe						Insert pipe type
15" PVC Sewer SDR 35	1,705	LF	$22.77	$38,818	*$22.77*	
Pipe Subtotal				$38,818	*$22.77*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	1	EA	$2,541.63	$2,542	*$1.49*	
60" Precast MH Extra Depth	4	VLF	$285.41	$1,142	*$0.67*	
60" MH precast Slab bottom	1	EA	$577.23	$577	*$0.34*	
24" Dia MH Frame &Cover	1	EA	$491.07	$491	*$0.29*	
Miscellaneous Subtotal				$4,752	*$2.79*	
TOTAL DIRECT COST:				**$322,608**	***$189.21***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

General Conditions	7.0%	$22,583	*$13.24*	
Subtotal		**$345,191**	***$202.46***	
Contingency	15.0%	$51,779	*$30.37*	
Subtotal		**$396,969**	***$232.83***	
General Contractor Overhead, Profit & Risk	10.0%	$39,697	*$23.28*	Retain this adder here
Subtotal		**$436,666**	***$256.11***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$436,666**	***$256.11***	
Sales Tax (Based on)	7.3%	$15,829	*$9.28*	
Subtotal		**$452,495**	***$265.39***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$129,887**	***$76.18***	
TOTAL ESTIMATED CONSTRUCTION COST		**$452,495**	***$265.39***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

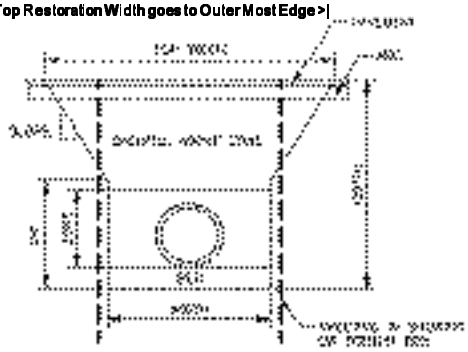
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **12" PVC Gravity Sewer residential** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	12.00	inches
Average **Total** Exc **Depth**	6.00	feet (Include Bed Thickness)
Length	1,569.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	12,552	In ft
Pavement Removal	=	10,983	sq ft
Trench Excavation	=	1,743	cu yd
Bed + Zone fill (Excludes Pipe Volume)	=	681	cu yd
Zone Only Fill (Excludes Pipe Volume)	=	535	cu yd
Bed Only Fill	=	145	cu yd
Backfill Above Zone	=	1,017	cu yd
Waste if Import Bed, Zone	=	726	cu yd
Waste if Native Bed, Zone	=	46	cu yd
Surface Restoration Area	=	10,983	sq ft
Shoring Area (Optional): Trench Shored Area	=	NONE	sq ft
Shoring Area (Optional): With 30% Toe-In	=	NONE	sq ft

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	2.5	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	12,552	in FT	$0.86	$10,751	*$6.85*	AC Thickness = 4 in
Pavement Removal	10,983	SF	$0.74	$8,131	*$5.18*	
Disposal Haul	136	CY	$14.79	$2,005	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	1,743	CY	$3.50	$6,106	*$3.89*	Assumed excavator used is:
Bed + Zone fill	681	CY	$67.89	$46,214	*$29.45*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	535	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	145	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	1,017	CY	$27.92	$28,390	*$18.09*	Native confined material from trench used
Waste if Import Bed, Zone	726	CY	$14.79	$10,741	*$6.85*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	46	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	10,983	SF	$6.77	$74,404	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	$1,000.00	$34,000	*$21.67*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$220,742	*$140.69*	
Pipe						Insert pipe type
12" PVC Sewer SDR 35	1,569	LF	$20.63	$32,361	*$20.63*	
Pipe Subtotal				$32,361	*$20.63*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	5	EA	$2,541.63	$12,708	*$8.10*	
60" Precast MH Extra Depth	20	VLF	$285.41	$5,708	*$3.64*	
60" MH precast Slab bottom	5	EA	$577.23	$2,886	*$1.84*	
24" Dia MH Frame &Cover	5	EA	$491.07	$2,455	*$1.56*	
Remove and dispose existing I	5	EA	$2,000.00	$10,000	*$6.37*	
Remove and dispose existing	1,569	LF	$40.00	$62,760	*$40.00*	
Miscellaneous Subtotal				$96,518	*$61.52*	
TOTAL DIRECT COST:				**$349,621**	***$222.83***	

Include/exclude adders as needed for report (except as noted)

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Indirect Costs				
General Conditions	7.0%	$24,473	*$15.60*	
Subtotal		**$374,095**	***$238.43***	
Contingency	15.0%	$56,114	*$35.76*	
Subtotal		**$430,209**	***$274.19***	
General Contractor Overhead, Profit & Risk	10.0%	$43,021	*$27.42*	Retain this adder here
Subtotal		**$473,230**	***$301.61***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$473,230**	***$301.61***	
Sales Tax (Based on)	7.3%	$17,155	*$10.93*	
Subtotal		**$490,384**	***$312.55***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$140,763**	***$89.72***	
TOTAL ESTIMATED CONSTRUCTION COST		**$490,384**	***$312.55***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

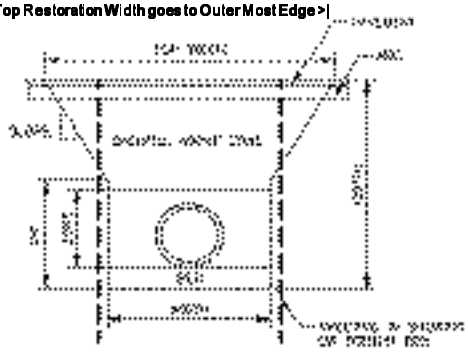
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **15" PVC Gravity Sewer residential** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	15.00	inches
Average **Total** Exc **Depth**	6.00	feet (Include Bed Thickness)
Length	1,977.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	**15,816**	**In ft**
Pavement Removal	=	**13,839**	**sq ft**
Trench Excavation	=	**2,197**	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	**917**	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	**734**	**cu yd**
Bed Only Fill	=	**183**	**cu yd**
Backfill Above Zone	=	**1,190**	**cu yd**
Waste if Import Bed, Zone	=	**1,007**	**cu yd**
Waste if Native Bed, Zone	=	**90**	**cu yd**
Surface Restoration Area	=	**13,839**	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	**NONE**	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	**NONE**	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	2.8	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	15,816	in FT	**$0.86**	$13,546	*$6.85*	AC Thickness = 4 in
Pavement Removal	13,839	SF	**$0.74**	$10,246	*$5.18*	
Disposal Haul	171	CY	**$14.79**	$2,526	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	2,197	CY	**$3.50**	$7,694	*$3.89*	Assumed excavator used is:
Bed + Zone fill	917	CY	**$67.89**	$62,248	*$31.49*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	734	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	183	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	1,190	CY	**$27.92**	$33,217	*$16.80*	Native confined material from trench used
Waste if Import Bed, Zone	1,007	CY	**$14.79**	$14,888	*$7.53*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	90	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	13,839	SF	**$6.77**	$93,752	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	**$1,000.00**	$34,000	*$17.20*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$272,118	*$137.64*	
Pipe						Insert pipe type
15" PVC Sewer SDR 35	1,977	LF	**$22.77**	$45,011	*$22.77*	
Pipe Subtotal				$45,011	*$22.77*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	8	EA	**$2,541.63**	$20,333	*$10.28*	
60" Precast MH Extra Depth	32	VLF	**$285.41**	$9,133	*$4.62*	
60" MH precast Slab bottom	8	EA	**$577.23**	$4,618	*$2.34*	
24" Dia MH Frame &Cover	8	EA	**$491.07**	$3,929	*$1.99*	
Remove and dispose existing I	8	EA	**$2,000.00**	$16,000	*$8.09*	
Remove and dispose existing	1,977	LF	**$40.00**	$79,080	*$40.00*	
Miscellaneous Subtotal				$133,093	*$67.32*	
TOTAL DIRECT COST:				**$450,221**	***$227.73***	

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

Include/exclude adders as needed for report (except as noted)

Indirect Costs				
General Conditions	7.0%	$31,515	*$15.94*	
Subtotal		**$481,737**	***$243.67***	
Contingency	15.0%	$72,260	*$36.55*	
Subtotal		**$553,997**	***$280.22***	
General Contractor Overhead, Profit & Risk	10.0%	$55,400	*$28.02*	Retain this adder here
Subtotal		**$609,397**	***$308.24***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$609,397**	***$308.24***	
Sales Tax (Based on)	7.3%	$22,091	*$11.17*	
Subtotal		**$631,487**	***$319.42***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$181,266**	***$91.69***	
TOTAL ESTIMATED CONSTRUCTION COST		**$631,487**	***$319.42***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

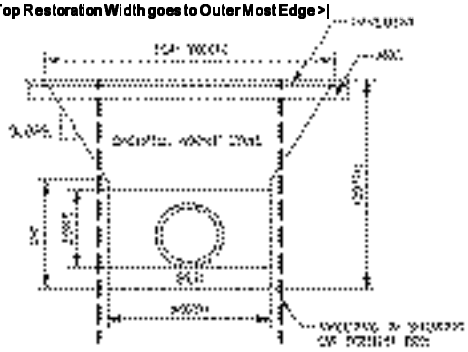
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **18" PVC Gravity Sewer residential** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	18.00	inches
Average **Total** Exc **Depth**	6.00	feet (Include Bed Thickness)
Length	2,921.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	23,368	In ft
Pavement Removal	=	20,447	sq ft
Trench Excavation	=	3,246	cu yd
Bed + Zone fill (Excludes Pipe Volume)	=	1,432	cu yd
Zone Only Fill (Excludes Pipe Volume)	=	1,161	cu yd
Bed Only Fill	=	270	cu yd
Backfill Above Zone	=	1,623	cu yd
Waste if Import Bed, Zone	=	1,623	cu yd
Waste if Native Bed, Zone	=	191	cu yd
Surface Restoration Area	=	20,447	sq ft
Shoring Area (Optional): Trench Shored Area	=	NONE	sq ft
Shoring Area (Optional): With 30% Toe-In	=	NONE	sq ft

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.0	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	23,368	in FT	$0.86	$20,015	*$6.85*	AC Thickness = 4 in
Pavement Removal	20,447	SF	$0.74	$15,138	*$5.18*	
Disposal Haul	252	CY	$14.79	$3,733	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	3,246	CY	$3.50	$11,368	*$3.89*	Assumed excavator used is:
Bed + Zone fill	1,432	CY	$67.89	$97,186	*$33.27*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	1,161	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	270	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	1,623	CY	$27.92	$45,302	*$15.51*	Native confined material from trench used
Waste if Import Bed, Zone	1,623	CY	$14.79	$23,997	*$8.22*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	191	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	20,447	SF	$6.77	$138,517	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	$1,000.00	$34,000	*$11.64*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$389,256	*$133.26*	
Pipe						Insert pipe type
18" PVC Sewer SDR 35	2,921	LF	$24.54	$71,671	*$24.54*	
Pipe Subtotal				$71,671	*$24.54*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	10	EA	$2,541.63	$25,416	*$8.70*	
60" Precast MH Extra Depth	40	VLF	$285.41	$11,416	*$3.91*	
60" MH precast Slab bottom	10	EA	$577.23	$5,772	*$1.98*	
24" Dia MH Frame &Cover	10	EA	$491.07	$4,911	*$1.68*	
Remove and dispose existing I	10	EA	$2,000.00	$20,000	*$6.85*	
Remove and dispose existing	2,921	LF	$40.00	$116,840	*$40.00*	
Miscellaneous Subtotal				$184,356	*$63.11*	
TOTAL DIRECT COST:				**$645,283**	***$220.91***	

Include/exclude adders as needed for report (except as noted)

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Indirect Costs				
General Conditions	7.0%	$45,170	*$15.46*	
Subtotal		**$690,453**	***$236.38***	
Contingency	15.0%	$103,568	*$35.46*	
Subtotal		**$794,020**	***$271.83***	
General Contractor Overhead, Profit & Risk	10.0%	$79,402	*$27.18*	Retain this adder here
Subtotal		**$873,422**	***$299.01***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$873,422**	***$299.01***	
Sales Tax (Based on)	7.3%	$31,662	*$10.84*	
Subtotal		**$905,084**	***$309.85***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$259,801**	***$88.94***	
TOTAL ESTIMATED CONSTRUCTION COST		**$905,084**	***$309.85***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

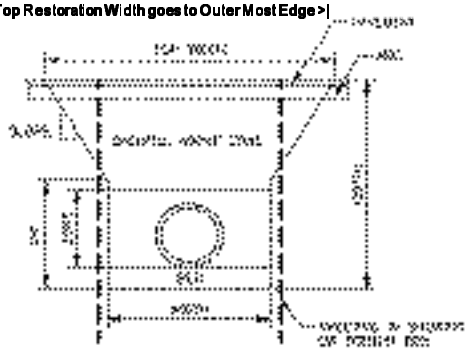
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **18" PVC Gravity Sewer Caltrans ROV** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	18.00	inches
Average **Total** Exc **Depth**	6.00	feet (Include Bed Thickness)
Length	533.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	12.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	12,792	In ft
Pavement Removal	=	3,731	sq ft
Trench Excavation	=	592	cu yd
Bed + Zone fill (Excludes Pipe Volume)	=	261	cu yd
Zone Only Fill (Excludes Pipe Volume)	=	212	cu yd
Bed Only Fill	=	49	cu yd
Backfill Above Zone	=	296	cu yd
Waste if Import Bed, Zone	=	296	cu yd
Waste if Native Bed, Zone	=	35	cu yd
Surface Restoration Area	=	3,731	sq ft
Shoring Area (Optional): Trench Shored Area	=	NONE	sq ft
Shoring Area (Optional): With 30% Toe-In	=	NONE	sq ft

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.0	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	12,792	in FT	$0.86	$10,956	*$20.56*	AC Thickness = 12 in
Pavement Removal	3,731	SF	$0.74	$2,762	*$5.18*	
Disposal Haul	138	CY	$14.79	$2,043	*$3.83*	Assumed haul distance is: 20 miles round trip
Trench Excavation	592	CY	$3.50	$2,074	*$3.89*	Assumed excavator used is:
Bed + Zone fill	261	CY	$90.00	$23,510	*$44.11*	CLSM
Zone Only Fill	212	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	49	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	296	CY	$27.92	$8,266	*$15.51*	Native confined material from trench used
Waste if Import Bed, Zone	296	CY	$14.79	$4,379	*$8.22*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	35	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	3,731	SF	$6.77	$25,276	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	$1,000.00	$34,000	*$63.79*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$113,267	*$212.51*	
Pipe						Insert pipe type
18" PVC Sewer SDR 35	533	LF	$24.54	$13,078	*$24.54*	
Pipe Subtotal				$13,078	*$24.54*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	2	EA	$2,541.63	$5,083	*$9.54*	
60" Precast MH Extra Depth	8	VLF	$285.41	$2,283	*$4.28*	
60" MH precast Slab bottom	2	EA	$577.23	$1,154	*$2.17*	
24" Dia MH Frame &Cover	2	EA	$491.07	$982	*$1.84*	
Remove and dispose existing I	2	EA	$2,000.00	$4,000	*$7.50*	
Remove and dispose existing	533	LF	$40.00	$21,320	*$40.00*	
Miscellaneous Subtotal				$34,823	*$65.33*	
TOTAL DIRECT COST:				**$161,168**	***$302.38***	

Include/exclude adders as needed for report (except as noted)

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Indirect Costs				
General Conditions	7.0%	$11,282	*$21.17*	
Subtotal		**$172,450**	***$323.55***	
Contingency	15.0%	$25,868	*$48.53*	
Subtotal		**$198,318**	***$372.08***	
General Contractor Overhead, Profit & Risk	10.0%	$19,832	*$37.21*	Retain this adder here
Subtotal		**$218,149**	***$409.29***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$218,149**	***$409.29***	
Sales Tax (Based on)	7.3%	$7,908	*$14.84*	
Subtotal		**$226,057**	***$424.12***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$64,889**	***$121.74***	
TOTAL ESTIMATED CONSTRUCTION COST		**$226,057**	***$424.12***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

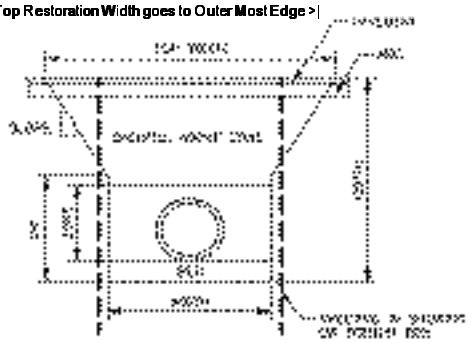
QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **21" PVC Gravity Sewer--Caltrans ROV** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	21.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	100.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	12.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

|< Top Restoration Width goes to Outer Most Edge >|



Calculated Values

5.0 ft = Top Trench Width
7.0 ft = Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	2,400	**In ft**
Pavement Removal	=	700	**sq ft**
Trench Excavation	=	185	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	51	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	42	**cu yd**
Bed Only Fill	=	9	**cu yd**
Backfill Above Zone	=	125	**cu yd**
Waste if Import Bed, Zone	=	60	**cu yd**
Waste if Native Bed, Zone	=	9	**cu yd**
Surface Restoration Area	=	700	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	NONE	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	NONE	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.3	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	$/LF	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	2,400	in FT	$0.86	$2,056	$20.56	AC Thickness = 12 in
Pavement Removal	700	SF	$0.74	$518	$5.18	
Disposal Haul	26	CY	$14.79	$383	$3.83	Assumed haul distance is: 20 miles round trip
Trench Excavation	185	CY	$3.50	$649	$6.49	Assumed excavator used is:
Bed + Zone fill	51	CY	$90.00	$4,615	$46.15	CLSM
Zone Only Fill	42	CY		$0	$0.00	Imported confined material used
Bed Only Fill	9	CY		$0	$0.00	Imported confined material used
Backfill Above Zone	125	CY	$27.92	$3,490	$34.90	Native confined material from trench used
Waste if Import Bed, Zone	60	CY	$14.79	$890	$8.90	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	9	CY		$0	$0.00	Assumed haul distance is:
Surface Restoration Area	700	SF	$6.77	$4,742	$47.42	AC replacement
Shoring Area		SF		$0	$0.00	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	$1,000.00	$34,000	$340.00	Slide Rail Trench System assumed--based on quote from United
Earthwork Subtotal				$51,342	$513.42	
Pipe						Insert pipe type
21" PVC Sewer SDR 35	100	LF	$31.83	$3,183	$31.83	
Pipe Subtotal				$3,183	$31.83	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	4	EA	$2,541.63	$10,167	$101.67	
60" Precast MH Extra Depth	16	VLF	$285.41	$4,567	$45.67	
60" MH precast Slab bottom	4	EA	$577.23	$2,309	$23.09	
24" Dia MH Frame &Cover	4	EA	$491.07	$1,964	$19.64	
Remove and dispose existing M	4	EA	$2,000.00	$8,000	$80.00	
Remove and dispose existing pi	100	LF	$40.00	$4,000	$40.00	
Miscellaneous Subtotal				$31,006	$310.06	
TOTAL DIRECT COST:				**$85,532**	***$855.32***	
						Include/exclude adders as needed for report (except as noted)
Indirect Costs						
General Conditions			7.0%	$5,987	$59.87	

Subtotal		**$91,519**	***$915.19***	
Contingency	15.0%	$13,728	*$137.28*	
Subtotal		**$105,247**	***$1,052.47***	
General Contractor Overhead, Profit & Risk	10.0%	$10,525	*$105.25*	Retain this adder here
Subtotal		**$115,772**	***$1,157.72***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$115,772**	***$1,157.72***	
Sales Tax (Based on)	7.3%	$4,197	*$41.97*	
Subtotal		**$119,968**	***$1,199.68***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$34,437**	***$344.37***	
TOTAL ESTIMATED CONSTRUCTION COST		**$119,968**	***$1,199.68***	

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

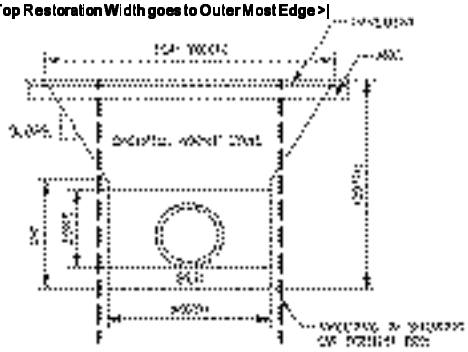
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **21" PVC Gravity Sewer thru Field** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	**21.00**	inches
Average **Total** Exc **Depth**	**10.00**	feet (Include Bed Thickness)
Length	**1,066.00**	feet
Trench Slope: 1 Vert. to	**0.00**	Horiz.
Pavement Thickness:	**0.00**	inches
ABC Depth:	**0.00**	inches
No.of Pavement Cuts	**0.00**	Each

Calculated Values

5.0 ft = Top Trench Width
7.0 ft = Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE		
Pavement Cutting (per Inch Depth x Length)	=	**0 In ft**
Pavement Removal	=	**7,462 sq ft**
Trench Excavation	=	**1,974 cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	**547 cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	**448 cu yd**
Bed Only Fill	=	**99 cu yd**
Backfill Above Zone	=	**1,333 cu yd**
Waste if Import Bed, Zone	=	**642 cu yd**
Waste if Native Bed, Zone	=	**95 cu yd**
Surface Restoration Area	=	**7,462 sq ft**
Shoring Area (Optional): Trench Shored Area	=	**NONE sq ft**
Shoring Area (Optional): With 30% Toe-In	=	**NONE sq ft**

= For driven solid shoring

INPUT VARIABLES			
Bed Depth =	**6.0**	in	Default = 6"
Zone Depth Above Pipe =	**12.0**	in	Default = 6"
Min. Width =	**60.0**	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	**0.0**	in	Default @ 12" per side
Pit Depth =	**3.3**	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	0	in FT	**$0.86**	$0	*$0.00*	AC Thickness = 0 in
Pavement Removal	7,462	SF	**$0.74**	$5,525	*$5.18*	
Disposal Haul	0	CY	**$14.79**	$0	*$0.00*	Assumed haul distance is: 20 miles round trip
Trench Excavation	1,974	CY	**$3.50**	$6,915	*$6.49*	Assumed excavator used is:
Bed + Zone fill	547	CY	**$67.89**	$37,107	*$34.81*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	448	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	99	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	1,333	CY	**$27.92**	$37,199	*$34.90*	Native confined material from trench used
Waste if Import Bed, Zone	642	CY	**$14.79**	$9,487	*$8.90*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	95	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	7,462	SF	**$6.77**	$50,551	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	**$1,000.00**	$34,000	*$31.89*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$180,784	*$169.59*	
Pipe						Insert pipe type
21" PVC Sewer SDR 35	1,066	LF	**$31.83**	$33,933	*$31.83*	
Pipe Subtotal				$33,933	*$31.83*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	2	EA	**$2,541.63**	$5,083	*$4.77*	
60" Precast MH Extra Depth	8	VLF	**$285.41**	$2,283	*$2.14*	
60" MH precast Slab bottom	2	EA	**$577.23**	$1,154	*$1.08*	
24" Dia MH Frame &Cover	2	EA	**$491.07**	$982	*$0.92*	
Remove and dispose existing I	2	EA	**$2,000.00**	$4,000	*$3.75*	
Remove and dispose existing	1,066	LF	**$40.00**	$42,640	*$40.00*	
Miscellaneous Subtotal				$56,143	*$52.67*	
TOTAL DIRECT COST:				**$270,860**	***$254.09***	

Include/exclude adders as needed for report (except as noted)

Indirect Costs

General Conditions	7.0%	$18,960	*$17.79*	
Subtotal		**$289,820**	***$271.88***	
Contingency	15.0%	$43,473	*$40.78*	
Subtotal		**$333,293**	***$312.66***	
General Contractor Overhead, Profit & Risk	10.0%	$33,329	*$31.27*	Retain this adder here
Subtotal		**$366,622**	***$343.92***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$366,622**	***$343.92***	
Sales Tax (Based on)	7.3%	$13,290	*$12.47*	
Subtotal		**$379,912**	***$356.39***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$109,052**	***$102.30***	
TOTAL ESTIMATED CONSTRUCTION COST		**$379,912**	***$356.39***	

Disclaimer: The calculated **quantities** represent "reasonable quantities to perform the work" in Bank Measure. They are not intended to provide "absolute" or "exact" volumes. The execution of earthwork is highly variable due to the unknowns of soil conditions and contractors procedures. The calculated quantities are intended to be used as a general guide ONLY for the basis of the scope of work under consideration. The **cost estimate** herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Carollo Engineers have no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices or bidding strategies. Carollo Engineers cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

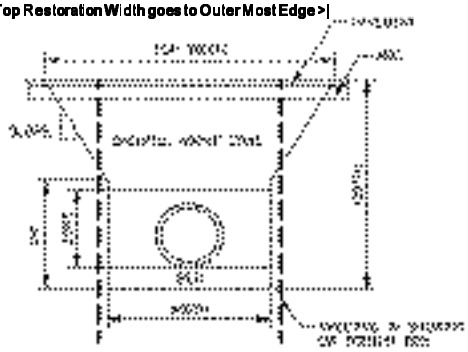
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **21" PVC Gravity Sewer residential** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	21.00	inches
Average **Total** Exc **Depth**	6.00	feet (Include Bed Thickness)
Length	791.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	4.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	6,328	**In ft**
Pavement Removal	=	5,537	**sq ft**
Trench Excavation	=	879	**cu yd**
Bed + Zone fill (Excludes Pipe Volume)	=	406	**cu yd**
Zone Only Fill (Excludes Pipe Volume)	=	332	**cu yd**
Bed Only Fill	=	73	**cu yd**
Backfill Above Zone	=	403	**cu yd**
Waste if Import Bed, Zone	=	476	**cu yd**
Waste if Native Bed, Zone	=	70	**cu yd**
Surface Restoration Area	=	5,537	**sq ft**
Shoring Area (Optional): Trench Shored Area	=	NONE	**sq ft**
Shoring Area (Optional): With 30% Toe-In	=	NONE	**sq ft**

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.3	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	6,328	in FT	$0.86	$5,420	*$6.85*	AC Thickness = 4 in
Pavement Removal	5,537	SF	$0.74	$4,099	*$5.18*	
Disposal Haul	68	CY	$14.79	$1,011	*$1.28*	Assumed haul distance is: 20 miles round trip
Trench Excavation	879	CY	$3.50	$3,079	*$3.89*	Assumed excavator used is:
Bed + Zone fill	406	CY	$67.89	$27,535	*$34.81*	Imported confined material used Type 1 AB (Type A)
Zone Only Fill	332	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	73	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	403	CY	$27.92	$11,245	*$14.22*	Native confined material from trench used
Waste if Import Bed, Zone	476	CY	$14.79	$7,040	*$8.90*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	70	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	5,537	SF	$6.77	$37,510	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	34	Day	$1,000.00	$34,000	*$42.98*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$130,939	*$165.54*	
Pipe						Insert pipe type
21" PVC Sewer SDR 35	791	LF	$31.83	$25,179	*$31.83*	
Pipe Subtotal				$25,179	*$31.83*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	4	EA	$2,541.63	$10,167	*$12.85*	
60" Precast MH Extra Depth	16	VLF	$285.41	$4,567	*$5.77*	
60" MH precast Slab bottom	4	EA	$577.23	$2,309	*$2.92*	
24" Dia MH Frame &Cover	4	EA	$491.07	$1,964	*$2.48*	
Remove and dispose existing I	4	EA	$2,000.00	$8,000	*$10.11*	
Remove and dispose existing	791	LF	$40.00	$31,640	*$40.00*	
				$0	*$0.00*	
Miscellaneous Subtotal				$58,646	*$74.14*	

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

TOTAL DIRECT COST:		**$214,764**	***$271.51***	
				Include/exclude adders as needed for report (except as noted)
Indirect Costs				
General Conditions	7.0%	$15,033	*$19.01*	
Subtotal		**$229,797**	***$290.52***	
Contingency	15.0%	$34,470	*$43.58*	
Subtotal		**$264,267**	***$334.09***	
General Contractor Overhead, Profit & Risk	10.0%	$26,427	*$33.41*	Retain this adder here
Subtotal		**$290,694**	***$367.50***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$290,694**	***$367.50***	
Sales Tax (Based on)	7.3%	$10,538	*$13.32*	
Subtotal		**$301,231**	***$380.82***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$86,467**	***$109.31***	
TOTAL ESTIMATED CONSTRUCTION COST		**$301,231**	***$380.82***	

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CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Version 2.0-4

This template calculates the excavation and backfill volumes for, what we refer to, as **TYPE 1 TRENCHES**, that are either, 1) a totally full height vertical trench, or, 2) a trench with a "vertical pit" (max depth = 4') plus equal unsupported side slopes to the surface. Type 1 Trenchs are usually considered more for "***Urban***" locations because of restricted access and excavation configuration considerations.

The text and numbers in **RED** are the variables to change to fit your project. These are the **ONLY** inputs that need to be changed. All of the other values shown are based on formulas. By using the side slope of: 1 Vert.to **0 Horiz**, a **vertical trench** is obtained. (Refer to Operation Note #4, for complete instructions.). Calculated values appear in the highlighted box with **bold** lettering. These values can be transferred to your estimate worksheet.

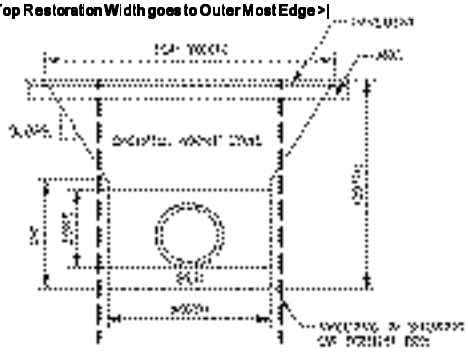
Note: All earthwork quantities are "Bank Measure" volumes without any shrink/swell factors. Operational Notes provided at approximately cell P46.

QUANTITY CALCULATIONS:

TYPE 1 TRENCH

Proj Name/No: **Oroville Dam Blvd Sewer Relief Proje** Date: **08-Feb-12**
Item: **24" PVC Gravity Sewer residential** Proj Mgr:: **Tim Taylor**
Notes: **Project 2**
:

|< Top Restoration Width goes to Outer Most Edge >|



DESCRIPTION	INPUT	
Pipe Diameter (Nom.)	24.00	inches
Average **Total** Exc **Depth**	10.00	feet (Include Bed Thickness)
Length	2,940.00	feet
Trench Slope: 1 Vert. to	0.00	Horiz.
Pavement Thickness:	12.00	inches
ABC Depth:	12.00	inches
No.of Pavement Cuts	2.00	Each

Calculated Values

5.0	ft	= Top Trench Width
7.0	ft	= Top Resoration Width

CALCULATED QUANTITIES for ESTIMATE			
Pavement Cutting (per Inch Depth x Length)	=	70,560	In ft
Pavement Removal	=	20,580	sq ft
Trench Excavation	=	5,444	cu yd
Bed + Zone fill (Excludes Pipe Volume)	=	1,563	cu yd
Zone Only Fill (Excludes Pipe Volume)	=	1,291	cu yd
Bed Only Fill	=	272	cu yd
Backfill Above Zone	=	3,539	cu yd
Waste if Import Bed, Zone	=	1,906	cu yd
Waste if Native Bed, Zone	=	342	cu yd
Surface Restoration Area	=	20,580	sq ft
Shoring Area (Optional): Trench Shored Area	=	NONE	sq ft
Shoring Area (Optional): With 30% Toe-In	=	NONE	sq ft

= For driven solid shoring

INPUT VARIABLES

Bed Depth =	6.0	in	Default = 6"
Zone Depth Above Pipe =	12.0	in	Default = 6"
Min. Width =	60.0	in	Indicate Practical Bucket Width
Side Width (per side x 2) =	0.0	in	Default @ 12" per side
Pit Depth =	3.5	ft	**See Note #2, #3 and #4**
	1.0	ft	Add'l **allowance** for surface restoration per side **(see Note #5)**

ESTIMATED COSTS:

DESCRIPTION	QTY	UNIT	$/UNIT	TOTAL	*$/LF*	COMMENTS
Earthwork	(Important Note: Not all of the quantities generated above will be used in your estimate. See "Example".)					
Pavement Cutting	70,560	in FT	$0.86	$60,435	*$20.56*	AC Thickness = 12 in
Pavement Removal	20,580	SF	$0.74	$15,237	*$5.18*	
Disposal Haul	762	CY	$14.79	$11,271	*$3.83*	Assumed haul distance is: 20 miles round trip
Trench Excavation	5,444	CY	$3.50	$19,070	*$6.49*	Assumed excavator used is:
Bed + Zone fill	1,563	CY	$90.00	$140,712	*$47.86*	CLSM
Zone Only Fill	1,291	CY		$0	*$0.00*	Imported confined material used
Bed Only Fill	272	CY		$0	*$0.00*	Imported confined material used
Backfill Above Zone	3,539	CY	$27.92	$98,794	*$33.60*	Native confined material from trench used
Waste if Import Bed, Zone	1,906	CY	$14.79	$28,178	*$9.58*	Assumed haul distance is: 20 miles round trip
Waste if Native Bed, Zone	342	CY		$0	*$0.00*	Assumed haul distance is:
Surface Restoration Area	20,580	SF	$6.77	$139,418	*$47.42*	AC replacement
Shoring Area		SF		$0	*$0.00*	Link qty to appropriate line. Shoring is (define what is used)
Excavation Support	47	Day	$1,000.00	$47,000	*$15.99*	Slide Rail Trench System assumed--based on quote from Unite
Earthwork Subtotal				$560,115	*$190.52*	
Pipe						Insert pipe type
24" PVC Sewer SDR 35	2,940	LF	$39.02	$114,707	*$39.02*	
Pipe Subtotal				$114,707	*$39.02*	
Miscellaneous						Items may include Valve Boxes, Manholes, etc.
60" x 8' Precast Manhole	7	EA	$2,541.63	$17,791	*$6.05*	
60" Precast MH Extra Depth	28	VLF	$285.41	$7,991	*$2.72*	
60" MH precast Slab bottom	7	EA	$577.23	$4,041	*$1.37*	
24" Dia MH Frame &Cover	7	EA	$491.07	$3,438	*$1.17*	
Remove and dispose existing I	7	EA	$2,000.00	$14,000	*$4.76*	
Remove and dispose existing ;	2,940	LF	$40.00	$117,600	*$40.00*	
Miscellaneous Subtotal				$164,861	*$56.08*	
TOTAL DIRECT COST:				**$839,683**	***$285.61***	

Include/exclude adders as needed for report (except as noted)

CONCEPTUAL PIPELINE MODEL - TYPE "1" TRENCH - CONFINED / URBAN

Indirect Costs

General Conditions	7.0%	$58,778	*$19.99*	
Subtotal		**$898,461**	***$305.60***	
Contingency	15.0%	$134,769	*$45.84*	
Subtotal		**$1,033,231**	***$351.44***	
General Contractor Overhead, Profit & Risk	10.0%	$103,323	*$35.14*	Retain this adder here
Subtotal		**$1,136,554**	***$386.58***	
Escalation to Mid-Point	0.0%	$0	*$0.00*	
Subtotal		**$1,136,554**	***$386.58***	
Sales Tax (Based on)	7.3%	$41,200	*$14.01*	
Subtotal		**$1,177,754**	***$400.60***	
Bid Market Allowance	0.0%	$0	*$0.00*	
TOTAL INDIRECT COST:		**$338,070**	***$114.99***	
TOTAL ESTIMATED CONSTRUCTION COST		**$1,177,754**	***$400.60***	

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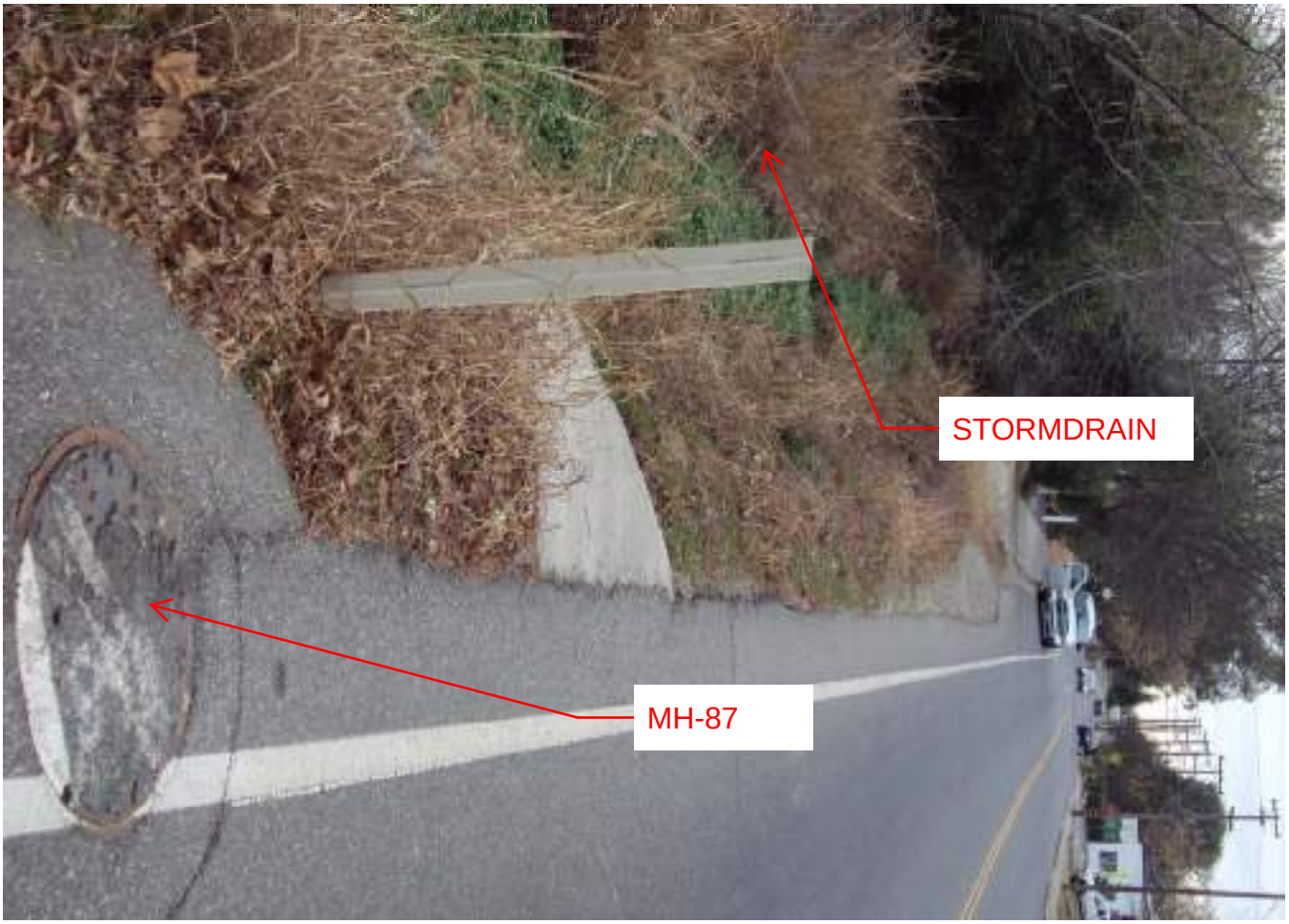
Appendix J

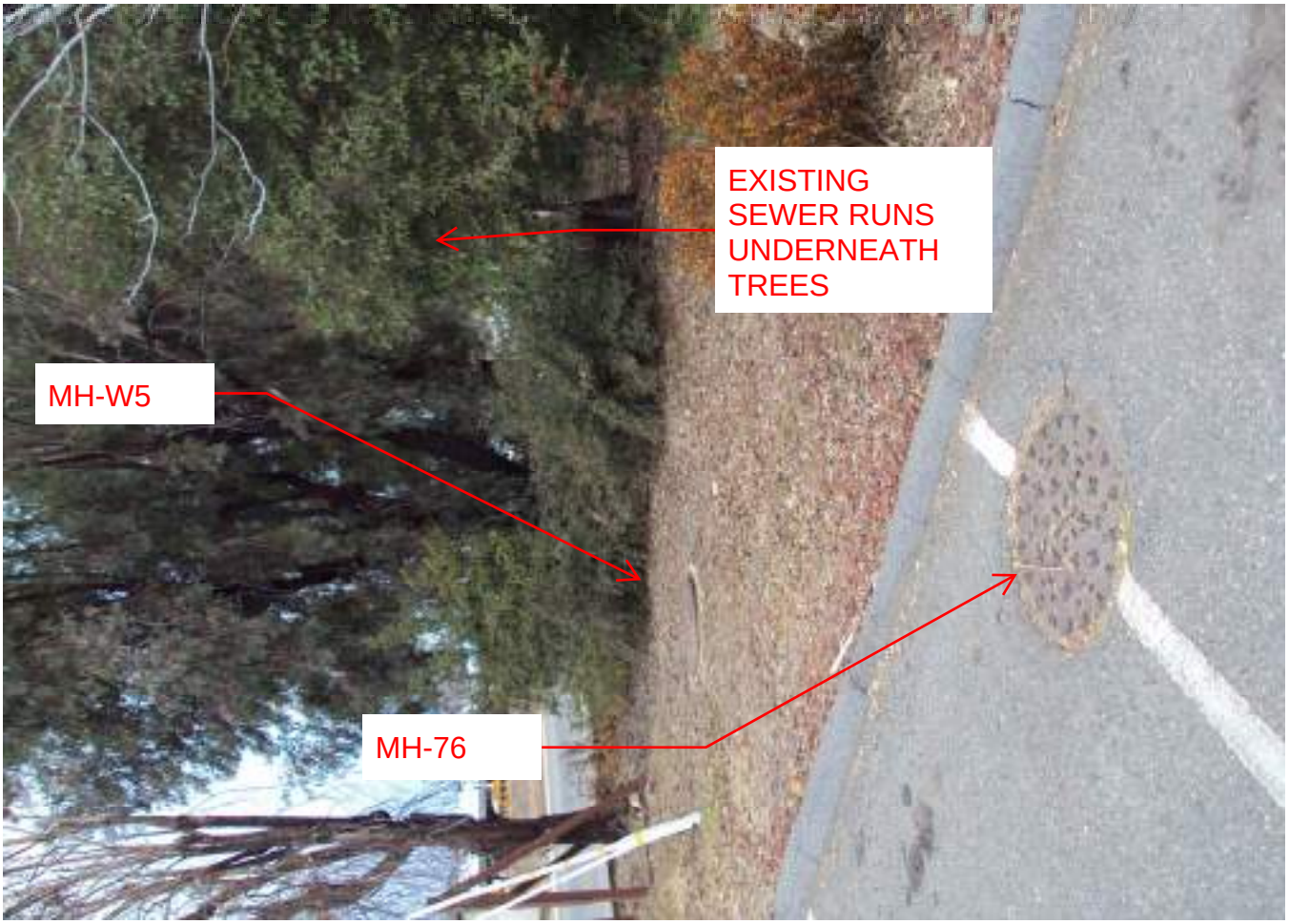
SITE VISIT PHOTOS

GIS DATA AND
AS-BUILTS SHOW THE
SEWER RUNNING
BETWEEN BUILDINGS
MH-FF7

MH-87


STORMDRAIN
MH-87

MH-81


EXISTING SEWER RUNS UNDERNEATH TREES
MH-W5
MH-76

DRY CREEK
EXISTING SEWER BURIED IN OPEN FIELD BETWEEN MH-65, MH-64, AND MH-63. MH-64 & 63 COULD NOT BE LOCATED

PACIFIC
RAILROAD
BRIDGE

DRY CREEK
INLET--UPSTREAM

STORM DRAIN
CULVERT
UNDER
OROVILLE DAM
BLVD NEAR
GILMORE LANE

STORMDRAIN
INLET
MH-JJ1

MH-FF9

EXISTING SEWER LOCATED BETEEN BUILDINGS
BUILDING 1
BUILDING 2
HEAVY BRUSH & STEEP SLOPE BETWEEN MH-FF8 & MH-FF7. CREEK AND STORMDRAIN LOCATED ON HILL.

MH--FF8

DRY CREEK
OUTLET--DOWNSTREA
M