WATERLINE FEASIBILITY STUDY
SANTA MARIA RIVER CROSSING ALTERNATIVES

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Waterline Feasibility Study: Santa Maria River Crossing Alternatives

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1 INTRODUCTION

The Nipomo Community Services District (District) was formed in 1965 and currently provides, primarily, water, wastewater, and solid waste services to some 12,000 Nipomo area residents. The District relies solely on groundwater from the Nipomo Mesa Sub-Area of the Santa Maria groundwater basin for water supply.

Over the years the District has reviewed a number of reports that conclude that the groundwater pumping in the Nipomo Mesa area (of the Greater Santa Maria Groundwater Basin) is in excess of dependable yield. In May 2004, the Local Area Formation Commission (LAFCO), acting on request of the District, performed a Municipal Services Review and updated the District's Sphere of Influence (SOI). LAFCO conditioned future annexations within the updated SOI on, among other things, the District acquiring water resources to supplement the native groundwater on the Nipomo Mesa. Since 1997, the entire Santa Maria groundwater basin, including the Nipomo Mesa sub-area, has been subject of ongoing groundwater adjudication. A preliminary ruling by the courts found the overall basin is not in overdraft yet recognized the need for active management of sub-areas.

In response to ongoing concern for the Nipomo Mesa sub-area sustainability, the need to achieve a diversified water supply, LAFCO requirements, and court mandated management of the sub-area, Nipomo Community Services District entered into a Memorandum of Understanding for the purchase of water in the range of 3000 acre-feet annually (AFY) from the City of Santa Maria. The purchased water will be used to augment current supplies, provide increased reliability of supply, balance the groundwater sub-area, and water new development consistent with the County of San Luis Obispo General Plan for the area.

The Nipomo Community Services District (NCSD) has retained the services of Cannon Associates to perform a feasibility study to review alternatives for construction of a waterline across the Santa Maria River to convey water from the City of Santa Maria to the NCSD. Five river crossing alternatives are considered in this study. The primary focus of this study is to recommend the most feasible of the identified river crossing alternatives.

The results of this study will be conveyed to the California Environmental Quality Act (CEQA) consultant currently under contract to the NCSD to limit the scope of CEQA review to those areas associated with the most feasible alternatives. This study is not intended to provide specific design recommendations. Several agencies, utilities, companies, and individual landowners will need to provide input prior to the final design and/or implementation of this project.

The identified river crossing alternatives include horizontal directional drilling, a pipeline attachment on the Highway 101 bridge, open cut trenching across the river, utilization of an existing pipeline (may require pipe bursting and/or pipe liners) or attachment to a new bridge. The remainder of this study describes the existing conditions of the City of Santa Maria and the NCSD water systems; possible design criteria and constraints identified by NCSD and the City of Santa Maria; an overview of the river crossing alternatives; and, an analysis of each alternative, considering technical risk, cost, environmental/permitting requirements, construction feasibility, economic and scheduling concerns, and other such factors. This study also includes a tabular summary of the alternatives analysis, a recommended alternative, and considerations for future action.

2 EXISTING CONDITIONS

The existing conditions in both the City of Santa Maria and the NCSD water systems must be understood before an appropriate means of connecting these systems can be determined.

2.1 City of Santa Maria Tie-In Points

The City of Santa Maria Utilities Department has determined that the NCSD may tie-in to one of the mains located in the northwest section of City's potable water distribution system. The northwestern area of the city is fed by the following mains:

- 10" main: Blosser Road, oriented north/south
- 10" main: Preisker Lane, oriented north/south (with 10" blow-off valve)
- 12" main: Ebony Street, oriented north/south (with 12" blow-off valve)
- 18" main: Suey Crossing Road

The Blosser, Preisker, and Ebony mains are all located close to the City limit, bordering the Santa Maria River levee on the west side of Highway 101 (Refer to Figure 2-1). The 18" main on Suey Crossing Road is located on the east side of the Highway 101 bridge. Because of the increased distance from Nipomo CSD mains and the necessity of crossing Highway 101 on the other side of the River, the Suey Crossing Road main is not considered a viable alternative and is not further considered in this study. The Suey Crossing Road Santa Maria river crossing is approximately 2 miles east (upstream) from the Hwy 101 bridge.

2.2 Nipomo Community Services District Tie-in Points

NCSD's preferred tie-in point is the 12" main located in Orchard Road (Refer to Figure 2-1). Connection to the Orchard Road main would occur between Joshua Street and Moss Lane. Currently, NCSD owns the main south along Orchard Road to Southland Street. South of Southland Street the Orchard Road main is privately owned. It is assumed that NCSD will acquire ownership of the remainder of the Orchard Road main for inclusion into the NCSD system. In the event this line cannot b obtained, a new line will need to be installed or purchased.

If the new waterline is routed adjacent to Highway 101, tie-in with the NCSD main could occur at either the Hutton Road/Moss Lane intersection or the Hutton Road/Joshua Street intersection. Along this path, Hutton Road will cross the Nipomo Creek. This is a minor crossing which can be achieved by directional drilling or attachment to the bridge.

Figure 2-1 indicates locations of potential City of Santa Maria and NCSD tie-in points.

2.3 Water Source Characteristics

Several characteristics of the water source must be considered in designing the water handling facilities. The characteristics discussed below influence selection of pipe material and pipe sizing.

Pressure

The City of Santa Maria has indicated that it will supply water at a pressure of 85 to 90 PSIG. During project design this figure will be confirmed by the engineering firm responsible for modeling City's potable water system.

Volume / Rate

The volume of water agreed to in the MOU between the City of Santa Maria and the NCSD is in the range of 3000 AFY, which equates to an average rate of 1860 GPM. The City of Santa Maria has indicated that water should be taken at a constant rate versus varied rates at off peak hours or varied rates for large make up volumes. This consistent delivery rate will allow for their system to remain close to a steady state condition, which will provide all users with reliable service and simplify their operations.

Quality

The water supplied by the City of Santa Maria is a composite of State Water and groundwater produced from wells. Because of total organic compounds (TOCs) present in the State Water, the mixture that will be sold to NCSD will also contain low levels of organic matter. This is important because of the potential to form disinfectant byproducts, one of which is Trihalomethane, a known carcinogen. Residual Chloramines will also be present in the water. Though the Environmental Protection Agency (EPA) considers this concentration is safe to drink for the general public, there are special circumstances and users which could be adversely affected.

State Water contains a high enough concentration of organic materials that the risk of forming THM should be considered. According to the 2003 Consumer Confidence Report, the 2002 total Trihalomethanes concentration ranged from ND - 2.7 PPB with an average of 0.54 ppb.

Chloramines / Chlorine

NCSD uses Chlorine as a disinfectant for their potable water system. Chlorine is a common oxidizing biocide because it is very effective and has low cost. It is most effective at a pH below 7. The drawback to using Chlorine is that it may not reach the far ends of the distribution system because it is so fast acting. It may also create an undesirable taste and, as discussed above, has the potential to form THM compounds in water with appreciable organic material concentration.

The City of Santa Maria uses Chloramine as a disinfectant for their system. Chloramine is 69% Chlorine and 31% Ammonia. The Ammonia is added to the water to stabilize the free Chlorine. This is typically done onsite. The optimum pH level is 8.4, but the goal is >7. Chloramine has been used safely since the 1930's. The City of Santa Maria began using Chloramines in 1997 when they began taking State Water. This compound is a weaker disinfectant, but much more stable than Chlorine. Its use is driven primarily by the need to assure a residual amount of disinfectant at the ends of the distribution system. Also, the users prefer the taste because it does not have a chlorine taste or odor. The City of Santa Maria treats to a level of 1.6 to 2.6 mg/L Chloramines (Average of 2.075 mg/L for 2004) which the Environmental Protection Agency (EPA) considers a safe concentration for the general public. See Appendix B for City of Santa Maria quarterly reports on residual disinfectant levels.

The disadvantages of Chlormaine over Chlorine are the longer contact time required for the disinfection process, the presence of Chloramines at the end user, and the increased concentration of dissolved solids as a result of the Chloramine compounds. Also, Chloramines compounds are fairly stable and are difficult to remove with a reverse osmosis process. Chloramine in the water is safe to drink in low concentrations. The Chloramine is neutralized before it reaches the bloodstream.

However, due to the potential for residual Chloramines at the end user, NCSD will need to consider a public awareness program. Uses of ultra-pure water sources such as kidney dialysis patients and some manufacturing processes can be complicated by residual Chloramines. Also, in aquatic species and reptiles, Chloramines can enter the bloodstream directly and can cause detrimental health affects or death. Treatment products are readily available to treat the water for fish tanks. Awareness, education, and treatment options should be the goal of a public awareness program. There are many public awareness programs to use as examples.

3 Design Criteria

This section provides a brief summary of the design criteria for the proposed waterline, based on NCSD and City of Santa Maria requirements (as discussed in Sections 2.1 and 2.3 of this report), consideration of operation and maintenance requirements, demand, and profitability. The information listed below is applicable to each of the alternatives considered. During final design each of these criteria will be verified

3.1 Hydraulic Design Criteria

The specific hydraulic design criteria for the connector pipeline are shown below.

Category	Design Criteria	Additional Notes
Volume:	In the range of 3000 AFY Average 1860 GPM	
Rate:	1767 - 1953 GPM	5% Rate Variance, Based on Steady Rate from City of Santa Maria
Pipe Line Target Velocity:	5 – 7 Ft/Sec	**This criteria is a general design parameter and may be superseded by operating cost parameters. The pipeline may be upsized to reduce hydraulic forces and lower line pressure losses.**
Pipe Line Target Pressure Drop:	≤0.5 PSI/100 Ft	**This criteria is a general design parameter and may be superseded by operating cost parameters. The pipeline may be upsized to reduce hydraulic forces and lower line pressure losses.**
Pressure at tie-in point	85 – 90 PSIG	**If this pressure is used to transfer water across the river to a storage facility, upsizing of the line may be considered to conserve energy.**

3.2 Required Facilities & Location

Storage Tanks

In order provide adequate storage at the rate of 3000 AFY (1,860 GPM), two 1.0MM Gallon tanks will be required. A typical API 650 tank dimension for this size tank is 60' D x 48' H. The tanks would cost is approximately $375,000 each and the cost for foundation construction is approximately $11,000 - $15,000 per tank. Location of tanks on the north or south side of the river is dependent upon meeting system pressure requirements.

Pumps

To allow for operational and maintenance flexibility, three pumps are recommended. Each pump would handle 50% of the steady-state flow rate, creating a 50% standby pump. Assuming 1860 GPM total rate, 500' elevation, 100 PSIG system pressure, 80% pump efficiency, 95%

motor efficiency, and line losses, the required motor size is 225 to 275 horsepower. These slightly smaller pumps will run closer to their optimal efficiency point, which will save operational costs. These pumps will cost roughly $30K each, plus foundations, wiring, piping, etc.

Alternatively, the system can be designed to operate on two pumps rather than three. Fewer pumps would limit the amount of installation costs, but operationally there would less flexibility.

Chlorine Injection

Current Chlorine injection methods can continue to be used. Proportional injection based on rates/volumes will work well in this case because of the steady flow rate from the City of Santa Maria system.

Chloramines Monitoring and Treatment

Due to the inclusion of Chloramines and organic matter in the water from the City of Santa Maria, a program that includes monitoring for Chloramines, disinfectant byproducts (i.e. THM), and TOC should be started or continued. New disinfectant equipment will need to be installed and maintained at the new water facility.

The concentration of Chloramines potentially could be very low or non-existent by the time the water reaches the NCSD facilities and passes through the tanks and equipment. Water analysis at the tie-in points to the City of Santa Maria will quantify the concentration. Still, the end user should be made aware that Chloramines are not rapidly dissipated by allowing the water to stand, nor do they dissipate by boiling.

Distillation, evaporation, reverse osmosis, and ion exchange resins are all not very affective in reducing Chloramines concentration. In the reverse osmosis process, Monochloramine would be difficult to remove because of its low molecular weight. Dichloramine and Trichloramine would have a higher rejection due to their higher molecular weights and higher ionic state. Temperature and pH adjustments will alter the ratio of Chloramine compounds. Thin Film Composite (TFC) membranes appear to have the best results with all Chloramine compounds.

Chloramine concentration can be substantially reduced by passing through a Granulated Activated Carbon (AC) filter. The finer particle beds, for example 12 X 40 mesh, promote a more rapid reaction. Oxidation of the Chloramine compounds prior to the AC process will enhance the performance. Typical reduction in concentration would be 1-2 PPM to 0.1 PPM. A low flux rate is necessary to be affective. Also, a reduction in pH to below 6 can assist in reducing the Chloramine level. A negative aspect of this treatment method is that the granulated bed may provide a breeding ground for bacterial colonies.

UV technology has also been used in the reduction of Chloramine compounds. The capital cost of the UV equipment is comparable to that of an AC filter system. The UV system will require an ongoing electrical cost, but has a large benefit because it does not harbor bacteria. Under certain conditions it is most effective to use an oxidant in combination with the UV to maximize Chloramine removal. Chloramine removal with UV technology may be as high as 85%. Other benefits of UV are that it does not add further chemicals to the water, there is no associated chemical storage for the NCSD, it is relatively easy to maintain, and it also destroys bacteria and organics that may be present in the water.

Blending water from the NCSD system with the water from the City of Santa Maria may provide the most economic and simplest option for reduction of Chloramine concentration. The concentration of Chloramines may be reduced substantially by combining water from the NCSD system with the water supplied by the City of Santa Maria. This alternative is dependent on the concentration at the tie-in, the distance or system covered prior to the blending area, the proximity of an NCSD groundwater source, and the ratio of the blend.

3.3 Required Infrastructure

A conceptual requirement for the basic infrastructure is listed below. The system pressure from the City of Santa Maria is sufficient to deliver water to storage tanks across the river. The line between the tie-in point and the storage tanks could be upsized slightly to further reduce the pressure drop. If this pressure is not available, then a storage tank(s) and/or booster pumps would need to be added near the tie-in point. From there, water would be pressured enough to get to large storage tanks across the river. Then the water would go to distribution pumps, possible Chloramine reduction treatment, metering, disinfection, and to distribution.

Basic required infrastructure includes (Sequentially Listed):

- Tie-In Valve
- Storage Tank(s) (potentially)
- Booster Pumps (potentially)
- Pipe / Fittings
- Facility Location
- Storage Tanks
- Distribution Pumps
- Chloramine Removal (AC Filter, UV) (optional)
- Metering
- Disinfection (Chlorine Injection)
- Electrical
- Communications
- Pipe / Fittings
- Valves

4 Description of River Crossing Alternatives

With an understanding of the existing conditions and design requirements, the alternative means of crossing the river can be evaluated. The five identified alternatives are described below and analyzed in the next section. Detailed descriptions of each of the alternatives are included in Appendix A.

4.1 Alternative 1: Directional Drilling

Horizontal directional drilling (HDD) is a method of installing pipe or conduit utilizing trenchless technology. Typically, directional drilling is used to cross rivers, roads, or other sensitive areas that require very limited impact to the environment or interruption of ongoing systems (such as traffic flow). The drill path direction and depth can be adjusted to maneuver obstacles such as hard rock or existing pipelines, etc.

The Directional Crossing Contractors Association (DCCA) has written several articles on directional drilling and their uses. Appendix A includes reference information describing the entire directional drilling process as well as pipe installation (excerpted from "Guidelines for A Successful Directional Crossing Package", Directional Crossing Contractors Association).

See Figures 4-1A and 4-1B for proposed directional drilling connection alignments.

4.2 Alternative 2: Highway 101 Bridge Attachment

This alternative involves attaching the connecting pipeline to the existing 2,200-foot Highway 101 Bridge spanning the Santa Maria River. Caltrans stated that the current structure would support the necessary retrofitted supports and the new water pipe line. As-built drawings indicate that coring would need to be performed to penetrate the area between the girders and run the pipeline parallel underneath the bridge. Detailed analysis would need to be completed to verify the details.

Caltrans is amenable to this alternative if other alternatives in this study are too costly, or too restrictive from a regulatory perspective.

According to Caltrans, this bridge is scheduled for upgrade and widening by approximately 2012. If attachment of the connector waterline to the current Highway 101 bridge is not pursued, space can be reserved for this water line in the design phase of the bridge upgrade project, scheduled to begin in the year 2006.

See Figure 4-2 for proposed Highway 101 bridge attachment connection alignment.

4.3 Alternative 3: Open Cut Trenching

Open cut trenching is the practice of excavating an open ditch across a river or stream channel. If the channel is actively flowing, water would have to be diverted away form the construction area; however, environmental impact is substantially reduced if trenching can be performed while the river bed is dry.

See Figure 4-3 for proposed open cut trenching alignment.

4.4 Alternative 4: Utilization of Existing Pipeline

Three pipelines cross the Santa Maria River in the vicinity of the proposed project. ConocoPhillips has two pipelines: an 8-inch pipeline just downstream from the Highway 101 bridge; and a 10-inch pipeline approximately one mile downstream from the highway. The third pipeline is owned by Sempra Energy and is located between the ConocoPhillips 8-inch line and the Highway 101 bridge. The Sempra Energy line was replaced in the mid 1990's utilizing directional drilling methods but Sempra representative have not been able to confirm if the old line was removed.

The pipelines discussed above are all currently in service; however, NCSD may be able to negotiate for their use. Further, these lines may not be adequate size or strength to handle the volume or pressure planned for the connector pipeline. Two sub alternatives were identified for upsizing or improving the existing lines to make them suitable for use.

Alternative 4A – Pipe Bursting

This On-line, or In-Situ, process for pipeline replacement is used when there is access to an existing pipeline. The line may be one that has been idled, has inadequate capacity, or poor structural integrity. This process does not involve excavation to install the pipeline, only access to the beginning and end of the section of pipe to be replaced. The existing pipe is used as a pilot hole in which to run a larger pipe.

The most commonly used method for replacing pipe using this process is called pipe bursting. The pipe bursting process involves driving a tool on the front end of the replacement pipe that expands, splits, or cracks the existing pipe to a larger diameter, allowing the new pipe to be pushed through the void. Pipe bursting allows for replacement or upsizing of an existing pipe with little to no excavation. Knowing the condition of the pipe, and information such as whether or not it is encased in concrete, is vital to successful replacement.

Alternative 4B – Slip Lining, Pipe Liners

Slip-Lining, or close-fit lining of pipe is a relatively simple process. The process entails inserting a new line into an existing line by pushing or pulling it into place. This can be done using a fully expanded cylindrical pipe or a folded liner which will then need to be expanded and cured in place. Polyethylene is the most commonly used material for the pipe. Along with the fact that it can be fused into long strands, its abrasion resistance and flexibility are outstanding. Polyethylene is used extensively in potable water applications. Pipe lining is a relatively simple process. It involves pushing or pulling of a pipe or liner into a host pipe. It can be used in both gravity or pressured pipe. There are a wide variety of materials that can be used for the liner, however, these materials would have to be appropriate for potable water. Joints that protrude beyond the pipe barrel are not recommended. Other fittings used in new installations can also be used in this process. The new liner will have a reduced internal diameter. This will be greater for the liner pipe than with the folded liner skin. The liner pipe can be grouted to increase resistance to external loads and the support pressurized pipe. Thin wall liners are usually folded in a "U" shape before insertion and then expanded and cured in place. Some pipe can be compressed before insertion and return to its previous size after being placed in the host pipe.

4.5 Alternative 5: New Bridge Attachment

Similar to attaching a new pipeline to the Highway 101 bridge, this alternative involves a over-river crossing of the pipeline, attached to a bridge structure. This new bridge may be a dedicated pipe line bridge that could suspend the pipe across the river or a multi-purpose bridge (i.e. pedestrian / bicycle). Because the Caltrans upgrade of the Highway 101 bridge will include pedestrian/bicycle access, and because there are other viable alternatives, the scope of work for this study indicates that only a cursory review of this option shall be done. The relative cost of this option compared to the other alternatives would be high. Permitting and public feedback concerning the aesthetic value of the bridge would be substantial. No further analysis of this option is provided. See Figure 4-3.

5 ALTERNATIVES ANALYSIS

This alternatives analysis looks at the identified alternatives in consideration of environmental permitting requirements, access restriction, construction constraints, costs, timing, and operations and maintenance. Conclusions for costs and timing are summarized in a Table 5-1 at the end of this section.

5.1 Environmental Permitting Requirements

This section provides an overview of environmental permitting requirements that may be applicable to the alternatives being considered in this study. The information provided in this environmental permitting review is current as of March, 2005. As permitting requirements change over time, actual permit conditions that will apply at the time of project review and approval may vary to some extent from the information provided in this report.

United States Army Corps of Engineers

The US Army Corps of Engineers (ACOE) has jurisdiction over projects that may impact Waters of the United States, including wetlands. Depending on the type of project, the ACOE issues Nationwide Permits and Individual Permits as required under Section 404 of the Clean Water Act. In this case, a Nationwide Permit may apply, which should simplify the permit process. Under the Nationwide Permit program, the ACOE requires a formal submittal called a Pre-Construction Notification (PCN). The PCN can be in letter form and must include specific information about the proposed activities, including information pertaining to the direct and indirect adverse environmental effects the project would cause and delineation of affected special aquatic sites (including wetlands). Permit applicants may either prepare an independent environmental assessment (to be submitted with the PCN), or defer this analysis to the ACOE. To defer the environmental studies to the ACOE, however, could extend the time required to acquire the permit. In order to avoid delays in the permitting process, and to better understand environmental constraints which may affect the project, it is recommended that environmental assessments of the project route are conducted as soon as the preferred alternative is selected

If the selected alternative does not fit the criteria of any of the Nationwide Permits, an Individual Permit may be required. Individual permit processing is more extensive than that of the Nationwide Permit, and therefore typically requires more time to complete.

If the proposed project may impact an endangered species, the ACOE will conduct either a formal or informal consultation with the appropriate federal agency (such as the U.S. Fish & Wildlife Service, the National Marine Fisheries Service, etc.). If this should be required, the timeline for obtaining project approval may be significantly impacted.

Alternatives 1, 3 and 4 (Directional drilling, open cut trenching, and pipe bursting):
As long as the project design does not alter the preconstruction contours, the likely permit requirement for these project alternatives will be a Nationwide Permit for "utility line activities." The impacts covered under this Nationwide Permit include the associated excavation, backfill and bedding of the water line, as well as temporary excavation sidecast (with certain constraints) and maintenance access roads (with certain constraints). There are additional specific design requirements that must be included (such as pipeline bedding that will not drain Waters of the United States, slope and streambank stabilization, etc.) that must be provided for in the project design.

Alternative 2 (Existing Bridge Attachment):
As long as this route does not impact Waters of the United States/wetlands, a permit from the ACOE should not be necessary.

California Department Fish & Game
Any work resulting in substantial change or potential for impacts within the limits of a riparian area requires a Streambed Alteration Agreement from the California Department of Fish & Game (DFG). If it is not clear whether the project will cause such an impact, the DFG recommends submitting a permit/agreement application to allow the DFG to make the official determination as to the actual permit requirements.

As part of their permitting requirements, the DFG will require the project-specific CEQA documentation. If CEQA information is not available, the DFG will conduct its own CEQA review, which will add time and cost to the DFG permit process.

Alternatives 1, 3 and 4 (Directional drilling, open cut trenching, and pipe bursting):
These alternatives have the potential to result in substantial change to the riparian zone, thus would necessitate a Streambed Alteration Agreement. Additionally, if directional drilling is selected as the preferred alternative for the waterline, the DFG is likely to recommend that a Sediment Transfer Study be prepared to determine the allowable depth for the pipeline.

Alternative 2 (Existing bridge attachment):
If the existing bridge attachment alternative is selected, DFG should be contacted and details of the project discussed. While it is possible that the bridge attachment alternative would not result in a substantial change, DFG may still recommend that an application be submitted to obtain formal confirmation that a Streambed Alteration Agreement is not required.

Regional Water Quality Control Board
The Regional Water Quality Control Board (RWQCB) requires a Water Quality Certification pursuant to Section 401 of the Clean Water Act. This application is required in conjunction with the Section 404 permitting of the ACOE, therefore a copy of the ACOE permit application (or PCN) must be submitted with the Water Quality Certification application. Issuance of the Water Quality Certification is also contingent on approval from the California Department of Fish & Game and evidence of CEQA compliance (discussed above). An application package may be submitted to RWQCB prior to receipt of a Streambed Alteration Agreement (SAA), but the RWQCB will not finalize the permit until they have record of the approved SAA.

401 Water Quality certification will be required for those alternatives that require ACOE permits, as described above.

A second requirement by RWQCB is compliance with the General Permit for Storm Water Discharges Associated with Construction Activities, General Permit No. CAS000002. Coverage under the permit can be obtained by filing a Notice of Intent and filing fee with the State Water Resources Control Board. The General Permit requires that a Storm Water Pollution Prevention Plan be prepared for the project and be kept on-site during construction to prevent sediment and other potential pollutants from entering surface water bodies.

Compliance with the National Pollutant Discharge Elimination System (NPDES) permit will likely be required for any of the alternatives pursued.

5.2 Access and Right-of-Way

Prior to construction , NCSD will require authorization from landowners and possibly other involved parties for the pipeline river crossing. These access considerations are discussed below.

PG&E has two easements crossing the Santa Maria River in the vicinity of the proposed pipeline crossing (see Figure 5-1). Construction within these easement areas may be restricted.

Sempra Energy also has an easement crossing the river for their existing pipeline (discussed above). They have stated that they are not interested in sharing their easement as they feel it would encumber possible maintenance and repair operations.

There is a strip of land between the levee and the northern City of Santa Maria boundary line that falls under the jurisdiction of the County of Santa Barbara. With the proper notification and permitting, this strip of land may be able to be used for lateral piping runs prior to the crossing of the river.

Alternatives 1 and 3: Directional Drilling and Open Cut Trench
This process would require the NCSD to purchase a right-of-way across the river. In the vicinity of the proposed project, there are several landowners that would need to be contacted to negotiate a pipeline right-of-way easement as well as a construction easement. The process of obtaining an easement can be a lengthy and could result in the NCSD needing to utilize eminent domain to obtain the right-of-way.

Consideration of specific pipe routes should include relationship of the waterline to the existing oil pipelines easements. State law requires that a minimum distance be maintained between water and oil pipelines minimize potential for contamination.

Alternative 2: Highway 101 Bridge Attachment
This alternative would require an encroachment permit from Caltrans. Design of the pipeline would require consultation and coordination with Caltrans.

Alternative 4: Utilization of Existing Pipeline
This alternative would require the NCSD to purchase an existing pipeline across the river, along with existing easement rights.

5.3 Construction Constraints

Beyond access and permitting restriction, construction feasibility is a crucial consideration when examining the alternatives.

Alternative 1: Directional Drilling
A large pipe staging area is required to lay out the pipe before insertion into the host pipe for the directional drilling alternative. City streets, the strip of land along the levee, or open land may be options for this purpose. Traffic flow may disrupted while this pipe is laid out and assembled. Mitigation of this problem can be achieved. Blosser Road, Ebony Street, and Preisker Lane all

could handle the drilling operations side of this alternative. Only Preisker Lane and Blosser Road have sufficient room for pipe layout.

There is sufficient room for pipe layout and drilling operations to make connections to either the Preisker Lane main or the Blosser Road main. While drilling operations are possible at the end of Ebony Road, there is not sufficient space for pipe layout. Photos in Appendix D show possible layout areas.

Directional drilling also will have associated equipment that will cause noise during operation. In some cases this equipment will be set up very close to existing houses which may cause public concern. Mitigation of this problem can be achieved.

Alternative 2: Highway 101 Bridge Attachment
According to Caltrans, the current bridge structure would support the necessary retrofitted supports and the new water pipe line. Detailed analysis would need to be completed to verify the details. As-built drawings indicate that coring would be necessary to penetrate the area between the girders and run parallel underneath the bridge.

Caltrans has stated that construction can be conducted from either on top or below the bridge. However, Caltrans is committed to reducing the impact to traffic which will result in limited hours available for construction. This limitation will adversely impact construction costs and schedules. Attaching to the new Hwy 101 bridge/expansion is possible, but the timing may limit the feasibility. At best, the bridge is scheduled to be completed in the year 2012.

Whether the new pipeline attaches to the current bridge or is included in the future upgrade, close coordination with Caltrans will be required during design efforts.

Alternative 3: Open Cut Trenching
Open trenching will create a large area of impact on the environment and the movement of a substantial amount of dirt to achieve the terracing requirement for trench safety. Ideally, the river bottom will be dry, otherwise this creates another issue with the diversion of water flow and the protection of aquatic life during the trenching operation.

Overall, this process is not very attractive because of the large amount of soil that has to be moved, the potential for water influence on the trench, and the increased environmental impact.

Alternative 4: Utilization of Existing Pipeline
In order to consider the pipe lining or the pipe bursting alternatives, an existing pipe has to be available. If another pipe is inserted through the existing host pipe, care must be taken to select the proper materials, and joints to have the tensile strength and clearance needed for the pulling process. Running a smaller pipe as a liner will substantially reduce the internal diameter of the flow area.

A large pipe staging area is required to lay out the pipe before insertion into the host pipe for the pipe bursting alternative. As discussed above for HDD, city streets, the strip of land along the levee, or open land may be options for this purpose. Traffic flow may be disrupted while this pipe is laid out and assembled. Mitigation of this problem can be achieved. Blosser Road, Ebony Street, and Preisker Lane all could handle the drilling operations side of this alternative. Only Preisker Lane and Blosser Road have sufficient room for pipe layout.

Like HDD, pipe bursting, pipe lining will have associated equipment that will cause noise during operation. In some cases this equipment will be set up very close to existing houses which may cause public concern. Mitigation of this problem can be achieved.

Pipe bursting has limitations in that difficulty can arise in expansive soils, close proximity of other service lines, point repairs that reinforce the existing pipe with ductile material, a collapsed pipe at a certain point along the pipe, etc. Knowing the condition of the pipe to be burst, type of pipe, location of fittings and various other items about the surrounding conditions are vital to a successful pipe bursting project.

Another substantial concern with the pipe bursting and pipe lining alternatives comes with the acquisition of the pipe. When the pipe is obtained, the liability for that pipe is usually included. Old pipes may have leaked over time and may require clean up to limit groundwater contamination. Negotiation or mitigation of this issue can make this alternative feasible, but it needs to be understood and accepted before moving forward. The upside to obtaining the line and the right-of-way may outweigh the other concerns.

5.4 Preliminary Opinion of Probable Construction Costs

The preliminary cost estimates in this report represent the cost for the river crossing method only. The additional costs associated with permitting, obtaining easements, routing the pipe, and installing monitoring, treatment or other associates facilities were not included. These numbers are intended for comparison purposes only and not as absolute figures. Material costs are not included in the dollar per foot estimates. The costs are summarized in the table at the end of this section.

Alternative 1: Directional Drilling
Typical costs for the directional drilling process range from $150 to $450 per foot of installed pipe. As the difficulty of the drilling operation increases, so does the price. A soils study would be required prior to bidding to access the underlying conditions.

Alternative 2: Highway 101 Bridge Attachment
Cost would be in the range of $250 to $375 per foot.

Alternative 3: Open Cut Trenching
Typical costs for open cut trenching across the Santa Maria River could range from $150 to $350 per foot of installed pipe depending on the design pipe diameter, type of pipe, and depth required. These costs do not include re-vegetation, dewatering or damages that may occur during the installation.

Alternative 4: Utilization of Existing Pipeline
Typical costs for the pipe bursting or lining processes range from $150 to $450 per foot of installed pipe. As the difficulty of the placement increases so does the price.

5.5 Construction Timing

This study presents anticipated durations for construction only, for comparison purposes. This review does not consider larger scheduling considerations, such as coordination with the dry season prior to work within the river bed, time required to obtain permits prior to construction, etc.

Alternative 1: Directional Drilling
Depending on the final routing of the pipeline the construction schedule could vary significantly. The directional drilling process and installation of the pipe across the river could take 4 to 6 weeks depending on staging areas, pipe to be installed, testing requirements, coating type and various other issues.

Alternative 2: Highway 101 Bridge Attachment
The portion of this alternative associated with the river crossing is estimated to take approximately 6 weeks. The abutment penetrations may take an additional 2 weeks.

Alternative 3: Open Cut Trenching
This river crossing method is estimated to take 6 to 8 weeks to complete.

Alternative 4: Utilization of Existing Pipeline
This river crossing method is estimated to take 6 to 8 weeks to complete.

5.6 Ongoing Access and Maintenance

Access and maintenance of a suspended pipeline is very different than for a buried pipeline. A buried pipeline (Alternatives 1, 3, and 4) allows for only limited access and maintenance, primarily internally. Access from the surface would require deep trenching, limited access during flowing water periods, and permitting constraints. A suspended pipeline (Alternative 2) will allow relatively easier access and maintenance from the river bottom underneath the bridge. Access may require temporary permitting. Disruption of traffic on Hwy 101 will not be a problem if accessed from below.

Table 5-1 Comparison of Alternative Cost & Estimated Project Completion

Item	Liners	Open Trench	Pipe Burst	Directional Drill	Existing Bridge	New Bridge
Preliminary Cost, $	735[3]	1470[1]	1890[1]	1,890[1]	1155[2]	N/A
Estimated Project Completion, Wks.	8	8	8	6	6	N/A

Includes 40% Contingency.

Note:
1) Based on 3000' 2) Based on 2200' 3) Based on 3500'

6 RECOMMENDED ALTERNATIVE

Recommended Alternative(s): Reviewed with Doug Wood of Doug Wood and Associates on 2/22/05.

Based on the NCSD and City of Santa Maria criteria, Hydraulic design, and the planning/permitting considerations, the most feasible alternative is the use of **directional drilling** to cross the Santa Maria River. The disturbance of the affected areas is limited, the project timeline is acceptable and does not substantially delay water deliveries, and the cost can be competitive with the other alternatives.

Attachment to the existing bridge is also an attractive solution to crossing the river, but Caltrans is reluctant to allow use of the bridge if other reasonable alternatives exist. However, they are amenable to this alternative if other alternatives in this study are too costly, or too restrictive from a regulatory perspective. Space can be reserved for this water line in the design phase of the project which is scheduled to begin in the year 2006.

Future Action
Future design considerations for each of the recommended alternatives are described briefly below.

Directional Drilling: A drilling rig will need to be set up at either side of the river crossing, and opposite of the pipe layout. An area for pipe layout will need to be identified equal to the length of the crossing. This is so that the pipe can be laid out and pulled through in one continuous run. Also, it is best to hydrotest the pipe before inserting it in the bore. This will be a loud process. The drilling rig may disturb some residences if positioned on the City of Santa Maria side of the river. It is recommended, based on the soil stability, that drilling continue 24 Hr/Day.

See Figures 4-1A, 1B for likely area of impact. The rig side will require an area of approximately 100' by 150'. Also, pipe will need to be laid out for one continuous pull. This could be 2000' to 3000', or more. Pipe is usually laid out in a field, along a street, or anywhere the full length can be assembled and hydro-tested. The rest of the area will be limited to ditch along a right-of-way.

Existing Bridge Attachment: The visual impact of attaching to the bridge will be limited to machinery in the river bed. Equipment will be needed to deliver the pipe, lift the pipe into place, make the connections, core the concrete between the girders, and hydrotest the pipe. The process of coring will be loud, but the majority of this work will take place away from the houses. Vehicles on the bridge will be unaffected.

See Figure 4-2 for likely area of impact. This area will be somewhat contained to below the bridge and laterally 50' to 100'. Also access roads will need to be available to enter the river bottom. The rest of the area will be limited to penetration through the abutments and the ditch along a right-of-way.

See Appendix E for effected property owners corresponding to each of the recommended alternatives.

APPENDIX A
Alternatives for River Crossing: Technical Information

Alternative 1: Directional Drilling, Guided Boring

TECHNICAL OVERVIEW

DEVELOPMENT AND USES - Originally used in the 1970s, directional crossings are a marriage of conventional road boring and directional drilling of oil wells. The method is now the preferred method of construction. Crossings have been installed for pipelines carrying oil, natural gas, petrochemicals, water, sewerage and other products. Ducts have been installed to carry electric and fiber optic cables. Besides crossing under rivers and waterways, installations have been made crossing under highways, railroads, airport runways, shore approaches, islands, areas congested with buildings, pipeline corridors and future water channels.

TECHNOLOGY LIMITS -The longest crossing to date has been about 6,000 ft. Pipe diameters of up to 48 in. have been installed. Although directional drilling was originally used primarily in the U.S. Gulf Coast through alluvial soils, more and more crossings are being undertaken through gravel, cobble, glacial till and hard rock.

ADVANTAGES - Directional crossings have the least environmental impact of any alternate method. The technology also offers maximum depth of cover under the obstacle thereby, affording maximum protection and minimizing maintenance costs. River traffic is not interrupted, as most of the work is confined to either bank. Directional crossings have a predictable and short construction schedule. Perhaps most significant, directional crossings are in many cases less expensive than other methods.

TECHNIQUE

1. Pilot Hole - A pilot hole is drilled beginning at a prescribed angle from horizontal and continues under and across the obstacle along a design profile made up of straight tangents and long radius arcs. A schematic of the technique is shown in Figure 1. Concurrent to drilling pilot hole, the contractor may elect to run a larger diameter "wash pipe" that will encase the pilot drill string. The wash pipe acts as a conductor casing providing rigidity to the smaller diameter pilot drill string and will also save the drilled hole should it be necessary to retract the pilot string for bit changes. The directional control is brought about by a small bend in the drill string just behind the cutting head. The pilot drill string is not rotated except to orient the bend. If the bend is oriented to the right, the drill path then proceeds in a smooth radius bend to the right. The drill path is monitored by an electronic package housed in the pilot drill string near the cutting head. The electronic package detects the relation of the drill string to the earth's magnetic field and its inclination. This data is transmitted back to the surface where calculations are made as to the location of the cutting head. Surface location of the drill head also can be used where there is reasonable access.

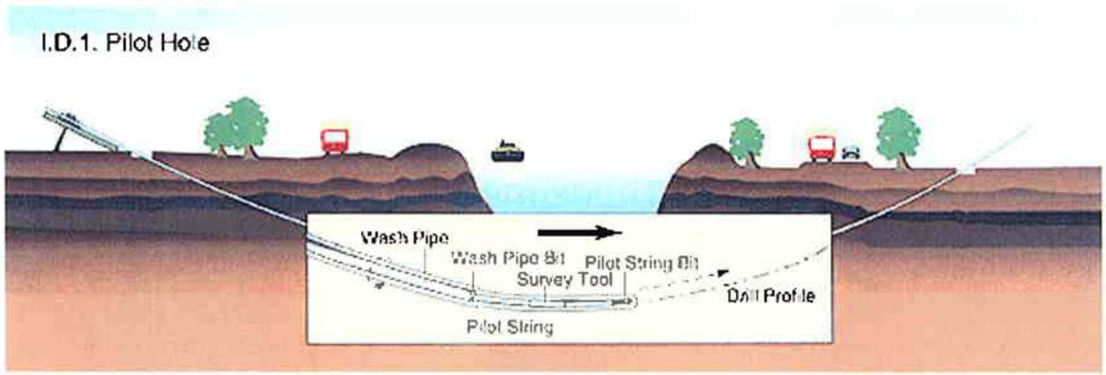

Figure 1

2. Preream - Once the pilot hole is complete, the hole must be enlarged to a suitable diameter for the product pipeline. For instance, if the pipeline to be installed is 36 in. diameter, the hole may be enlarged to 48 in. diameter or larger. This is accomplished by "prereaming" the hole to successively larger diameters. Generally, the reamer is attached to the drill string on the bank opposite the drilling rig and pulled back into the pilot hole. Joints of drill pipe are added as the reamer makes its way back to the drilling rig. Large quantities of slurry are pumped into the hole to maintain the integrity of the hole and to flush out cuttings.

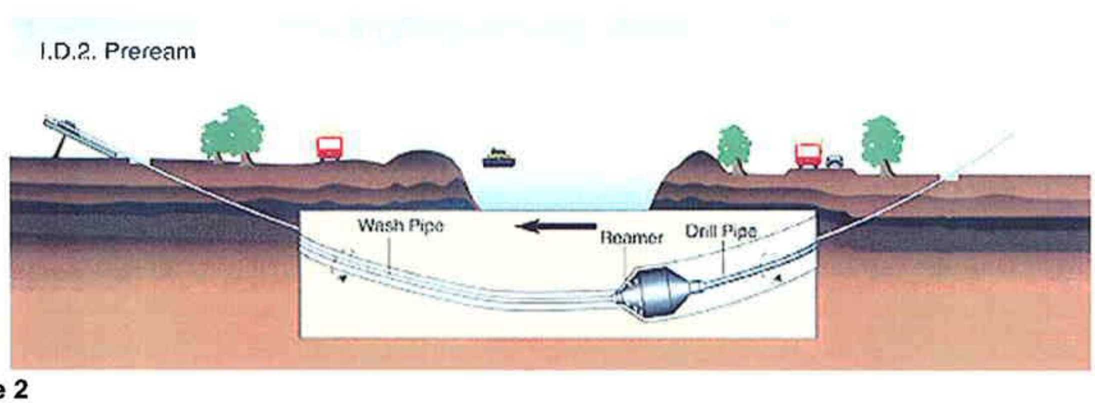

Figure 2

3. Pullback - Once the drilled hole is enlarged, the product pipeline can be pulled through it. The pipeline is prefabricated on the bank opposite the drilling rig. A reamer is attached to the drill string, and then connected to the pipeline pullhead via a swivel. The swivel prevents any translation of the reamer's rotation into the pipeline string allowing for a smooth pull into the drilled hole. The drilling rig then begins the pullback operation, rotating and pulling on the drill string and once again circulating high volumes of drilling slurry. The pullback continues until the reamer and pipeline break ground at the drilling rig.

I.D.3. Pullback

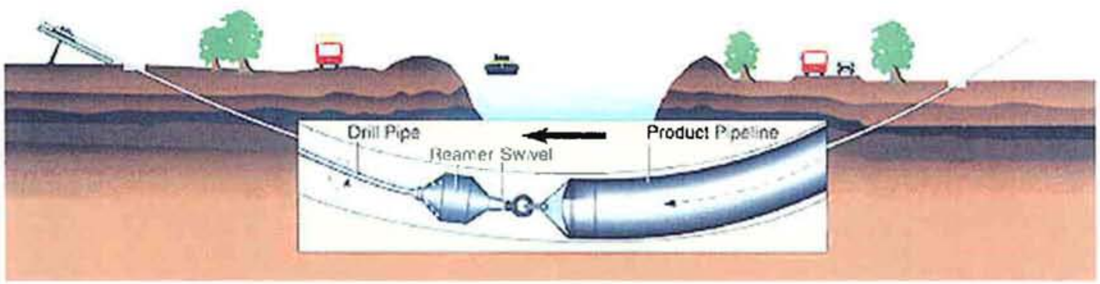

Figure 3

LAYOUT AND DESIGN

ACCESS - Heavy equipment is required on both sides of the crossing. To minimize cost, access to either side of the crossing should be provided with the least distance from an improved road. Often the pipeline right-of-way is used for access. All access agreements should be provided by the owner. It is not practical to negotiate such agreements during the bid process.

WORK SPACE

1. Rig Side -The rig spread requires a minimum 100-ft. wide by 150-ft. long area. This area should extend from the entry point away from the crossing, although the entry point should be at least 10 ft inside the prescribed area. Since many components of the rig spread have no predetermined position, the rig site can be made up of smaller irregular areas. Operations are facilitated if the area is level, hardstanding and clear of overhead obstructions. The drilling operation requires large volumes of water for the mixing of the drilling slurry. A nearby source of water is necessary (Figure 4).

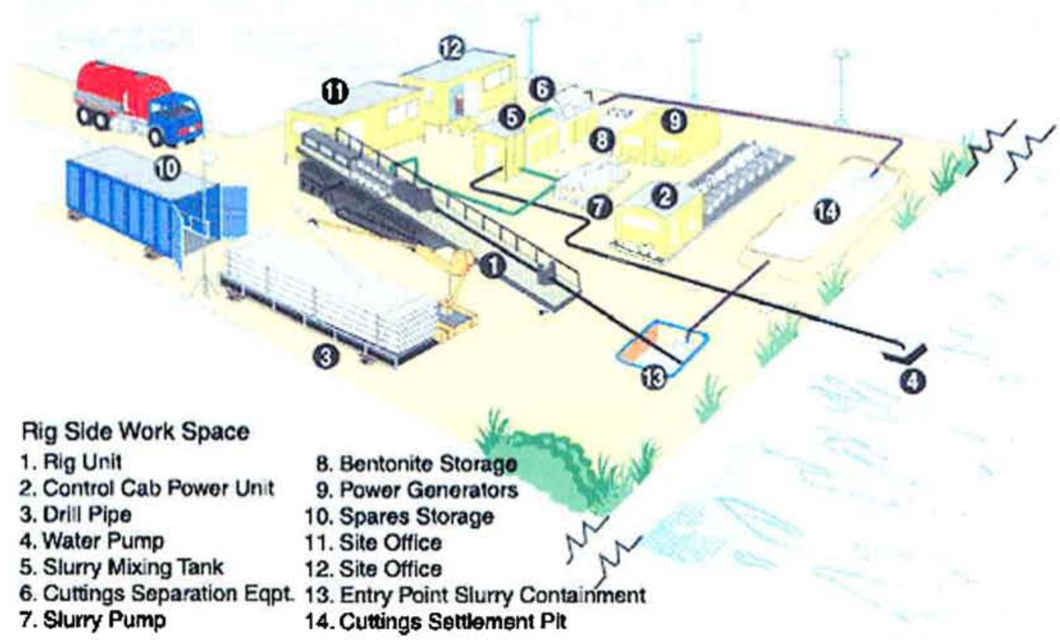

Figure 4

2. Pipe Side - Strong consideration should be given to provide a sufficient length of work space to fabricate the product pipeline into one string. The width will be as necessary for normal pipeline construction although a work space of 100-ft. wide by 150-ft. long should be provided at the exit point itself. The length will assure that during the pullback the pipe can be installed in one uninterrupted operation. Tie-ins of successive strings during the pullback operation increase the risk considerably because the pullback should be continuous (Figure 5).

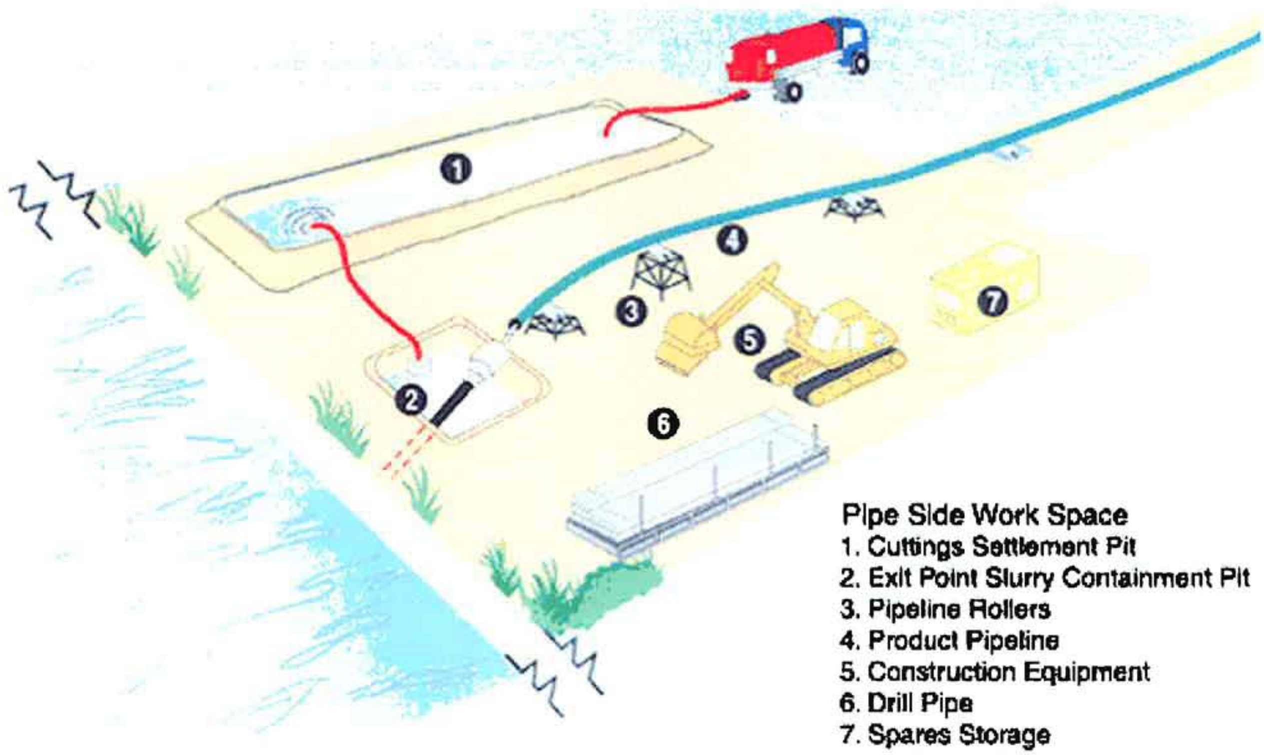

Figure 5

PROFILE SURVEY - Once the work locations have been chosen, the area should be surveyed and detailed drawings prepared. The eventual accuracy of the drill profile and alignment is dependent on the accuracy of the survey information.

PROFILE DESIGN PARAMETERS

1. Depth of Cover -Once the crossing profile has been taken and the geotechnical investigation complete, a determination of the depth of cover under the crossing is made. Factors considered may include flow characteristics of the river, the depth of scour from periodic flooding, future channel widening/deepening, and the existence of existing pipeline or cable crossings at the location. It is normally recommended that the minimum depth of cover be 20 ft. under the lowest section of the crossing. While 20 ft. is a recommended depth of cover on a river crossing, crossings of other obstacles may have differing requirements.

2. Penetration Angles and Radius of Curvature - An entry angle between 8 and 20 can be used for most crossings. It is preferable that straight tangent sections are drilled before the introduction of a long radius curve. The radius of the curve is determined by the bending

characteristic of the product pipeline, increasing with the diameter. A general "rule-of-thumb" for the radius of curvature is 100 ft./1-in. diameter for steel line pipe. The curve usually brings the profile to the elevation providing the design cover of the pipeline under the river. Long horizontal runs can be made at this elevation before curving up towards the exit point. Exit angle should be kept between 5 and 12 to facilitate handling of the product pipeline during pullback.

DRILL SURVEY - Most downhole survey tools are electronic devices that give a magnetic azimuth (for "right/left" control) and inclination (for "up/down" control). Surface locators can also be used in conjunction with the downhole electronic package.

1. Accuracy - The accuracy of the drill profile is largely dependent on variations in the earth's magnetic field. For instance, large steel structures (bridges, pilings, other pipelines, etc.) and electric power transmission lines affect magnetic field readings. However, a reasonable drill target at the pilot hole exit location is 10 ft. left or right, and -10 ft. to +30 ft. in length.

2. As-Built Drawings - Normally, survey calculations are conducted every 30 ft. during pilot hole operations. As-built drawings that are based on these calculations should be provided by the contractor. Alternate methods such as gyro-scoping, ground penetrating radar or "intelligent" pigs may also be used to determine the as-built position.

GEOTECHNICAL INVESTIGATION

NUMBER OF BORINGS - The number of exploration holes is a function of the proposed crossing length and the complexity of the strata. If the crossing is about 1,000 ft. a bore hole made on each side of the crossing may suffice. If an examination of these borings indicates that conditions are likely to be homogeneous on both sides, it may not be necessary to conduct further sampling. If the report indicates anomalies discontinuity in the strata, the presence of rock or large concentrations of gravel it is advisable to make additional borings to better define the strata. Longer crossings (especially large diameter pipelines) that indicate gravel, cobble, boulders or rock should have samples taken about 600-800 ft. apart unless significant anomalies are identified that might necessitate more borings. All borings should be located on the crossing profile along with their surface elevations being properly identified. If possible the borings should be conducted at least 25 ft. off of the proposed centerline. The bore holes should be grouted upon completion. This will help prevent the loss of drilling slurry during the crossing installation.

DEPTH OF BORINGS - All borings should be made to a minimum depth of 40 ft. below the lowest point in the crossing or 20 ft. below the proposed depth of the crossing, whichever is greater. In some instances, it may be beneficial to the owner and the contractor to install the crossing at a greater depth than the owner requires for his permit. It is suggested that all borings be through the same elevation to better determine the consistency of the underlying material and note any patterns which may be present.

STANDARD CLASSIFICATION OF SOILS - A qualified technician or geologist should classify the material in accordance with the Unified Soil Classification System and ASTM Designations D-2487 and D-2488. It is beneficial to have a copy of the field drilling log completed by the field technician or driller. These logs include visual classifications of materials as well as the driller's interpretation of the subsurface conditions between samples.

Alternative 3: Trenching, Open Cut

Due to the instability of the soil in this type of environment, excavation is a major process. The trench has to be stepped out (terraced), or sloped at a minimum of 1.5 to 1 (34° from horizontal), to keep the sides from caving in. This process creates a large area of disturbance in the river bed. The pipe should be buried below the potential scour depth of the river, as well as below the point at which liquefaction could occur. Scour depth should be determined by a river morphologist prior to design of the line, so that required pipe depth is accurately identified. The scour depth could be 10 feet deep, or greater. The pipe would need to be buried at least two feet below the scour depth.

Alternative 4A: Pipe Bursting

TECHNICAL OVERVIEW

A typical diagram of a pipe bursting operation utilizing air is shown below in Figure 6. This operation shows a HDPE pipe being pulled into the host pipe utilizing a winch-line and pipeburster.

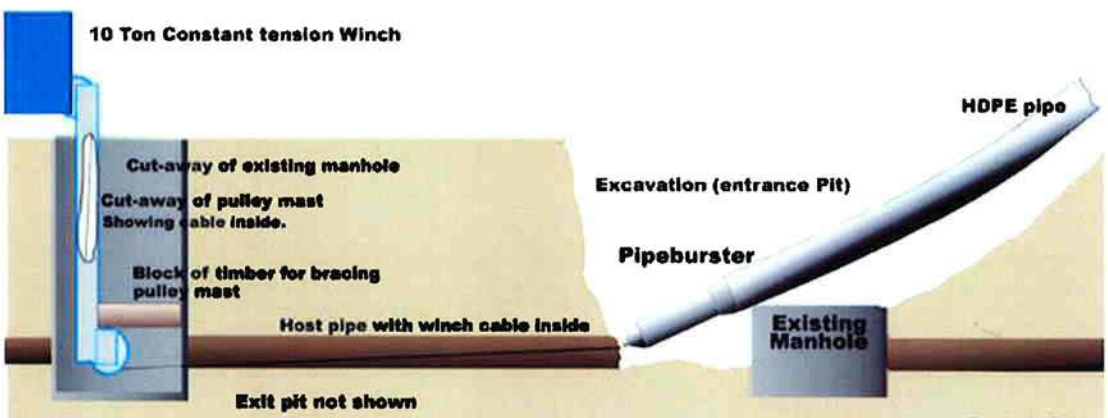

Figure 6

Typical pipe bursting involves the insertion of a conically shaped tool (bursting head) into the old pipe. The head fractures the old pipe and forces its fragments into the surrounding soil. At the same time, a new pipe is pulled or pushed in behind the bursting head. The base of bursting head is larger than the inside diameter of the old pipe to cause the fracturing and slightly larger than the outside diameter of the new pipe, to reduce friction on the new pipe and to provide space for maneuvering the pipe. The rear of the bursting head is connected to the new pipe, while its front end is connected to a cable or pulling rod. The bursting head and the new pipe are launched from the insertion pit, and the cable or pulling rod is pulled from the reception pit. The cable/rod pull together with the shape of the bursting head keeps the head following the existing pipe, and specially designed heads can help to reduce the effects of existing sags or misalignment on the new pipeline.

The size of the pipe currently being replaced by pipe bursting typically ranges from 2 to 36 inches, although the bursting of larger diameters is increasing (pipes up to 48 inches diameter have been replaced). Theoretically there is not a limit in size of pipe to be burst. The limit depends on the cost effectiveness compared to conventional replacement, on the local ground conditions as to the potential for ground movement and vibration, and the ability to provide sufficient energy to break the existing pipe while simultaneously pulling in a new pipe. Pipe bursting is typically carried out in 300 to 400 feet lengths, which corresponds to a typical distance between sewer manholes. However, much longer runs have been replaced. Pipes suitable for pipe bursting are typically made of brittle materials, such as vitrified clay, cast iron, plain concrete, asbestos, or some plastics. Reinforced concrete pipe (RCP) can also be successfully replaced if it is not heavily reinforced or if it is substantially deteriorated. Ductile iron and steel pipes are not suitable for pipe bursting, and can only be replaced with pipe splitting.

Schedule for Completion
This river crossing method is estimated to take 6 to 8 weeks to prepare complete.

Alternative 4B: Slip Lining, Liners
Figure 7 is an example of pulling an undersize PE pipe inside of an existing carrier pipe. Area between new pipe and existing pipe has to be filled with grout

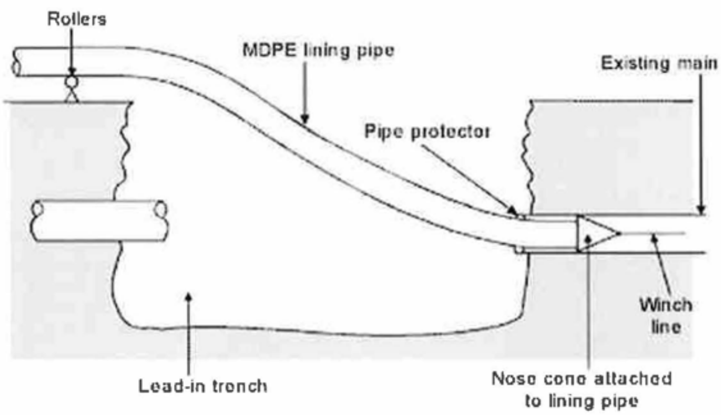

Figure 7

Figure 8 is an example of a Close-fit thermoplastic pipe lining systems, which is achieved by pushing and pulling a liner pipe through one or more sets of rollers, to produce a temporary reduction in its diameter. This enables the liner pipe to enter the host pipe. It is then expanded to give a tight interface between the host pipe and the new pipe.

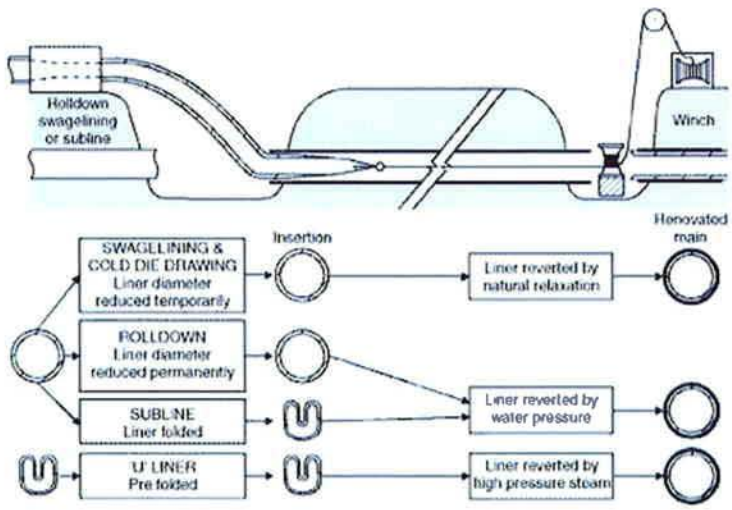

Figure 8

Figure 9 is an example of a "C" shape or "U" shape liner prior to being expanded out utilizing air, water or steam to form a tight interface between the host pipe and the new pipe.

Figure 9

Schedule for Completion

This river crossing method is estimated to take 6 to 8 weeks to prepare complete. Cost would be roughly $150 to $200/Ft.

APPENDIX B
Quarterly Report for Disinfectant Residuals Compliance, 2003 & 2004. City of Santa Maria

State of California
Drinking Water Program

Department of Health Services
Santa Barbara District

Quarterly Report for Disinfectant Residuals Compliance For Systems Using Chlorine or Chloramines

System Name: CITY OF SANTA MARIA

System No.: 4210011

Calendar Year: 2004

Quarter: Fourth

1st Quarter

	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Previous Year	April		2.6
	May		2.5
	June		2.3
	July		2.6
	August		2.5
	September		2.6
	October		2.6
	November		1.6
	December		2.4
Current Year	January	80	2.1
	February	80	2.2
	March	100	2
Running Annual Average (RAA):			2.333333333
Meets standard? (i.e. RAA ≤ MRDL of 4.0 mg/L as Cl_2)			☑ Yes ☐ No

2nd Quarter

	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Previous Year	July		2.6
	August		2.5
	September		2.6
	October		2.6
	November		1.6
	December		2.4
Current Year	January		2.1
	February		2.2
	March		2
	April	80	2.1
	May	80	2.1
	June	100	2.1
Running Annual Average (RAA):			2.241666667
Meets standard? (i.e. RAA ≤ MRDL of 4.0 mg/L as Cl_2)			☑ Yes ☐ No

3rd Quarter

	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Previous Yr	October		2.6
	November		1.6
	December		2.4
Current Year	January		2.1
	February		2.2
	March		2
	April		2.1
	May		2.1
	June		2.1
	July	80	1.9
	August	100	2.1
	September	80	2.2
Running Annual Average (RAA):			2.116666667
Meets standard? (i.e. RAA ≤ MRDL of 4.0 mg/L as Cl_2)			☑ Yes ☐ No

4th Quarter

	Month	Number of Samples Taken	Monthly Ave. Chlorine Level (mg/L)
Current Year	January		2.1
	February		2.2
	March		2
	April		2.1
	May		2.1
	June		2.1
	July		1.9
	August		2.1
	September		2.2
	October	80	2.2
	November	100	1.8
	December	80	2.1
Running Annual Average (RAA):			2.075
Meets standard? (i.e. RAA ≤ MRDL of 4.0 mg/L as Cl_2)			☑ Yes ☐ No

Comments:

Signature: ____________________

Date: 12/28/2004

Alternatives to Provide Water to NCSD
(No support data is associated with these suggested alternatives)

- Charge Santa Maria Ground Water Basin with State Water using existing connection to State Water Pipeline
- Build Reverse Osmosis / Desalination Plant at ConocoPhillips Santa Maria Refinery. Utilize total out-fall capacity. Provide Refinery with required process water (as part of, or total payment) and surplus to NCSD.
- Take water directly from State Water Pipeline to NCSD.
- Drill Directional well from the City of Santa Maria to the groundwater depression in the NCSD area and inject to reduce the depression and recharge the Groundwater Basin.
- Suey Rd. crossing to the east of Hwy 101 in conjunction with the land owner, and developer, Hubert "Herb" Parrot.

APPENDIX D
Reference Photos: Pipeline Route, Tie-in Points, and Easements


State Hwy 1
Cuyama Ln
Nipomo Valley
101
Poplar St
Mayten St
Acacia St
Locust St
Lilac St
© 2004 Keyhole, Inc.
Image © 2004 AirPhotoUSA
Hawthorn St
Riverside Ct
Hidden Pines Way


Josh
Moss Ln
101
Hutton Rd
Wineman Rd
verside Rd
State Hwy 166
Cuyama Ln
Nipomo Valley
Poplar St
Acacia
Ginkgo Ct
Hidden Pines Way
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Nipomo Valley
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Nipomo Valley
KNEZ-AM (Sant
© 2004 Keyhole, Inc.
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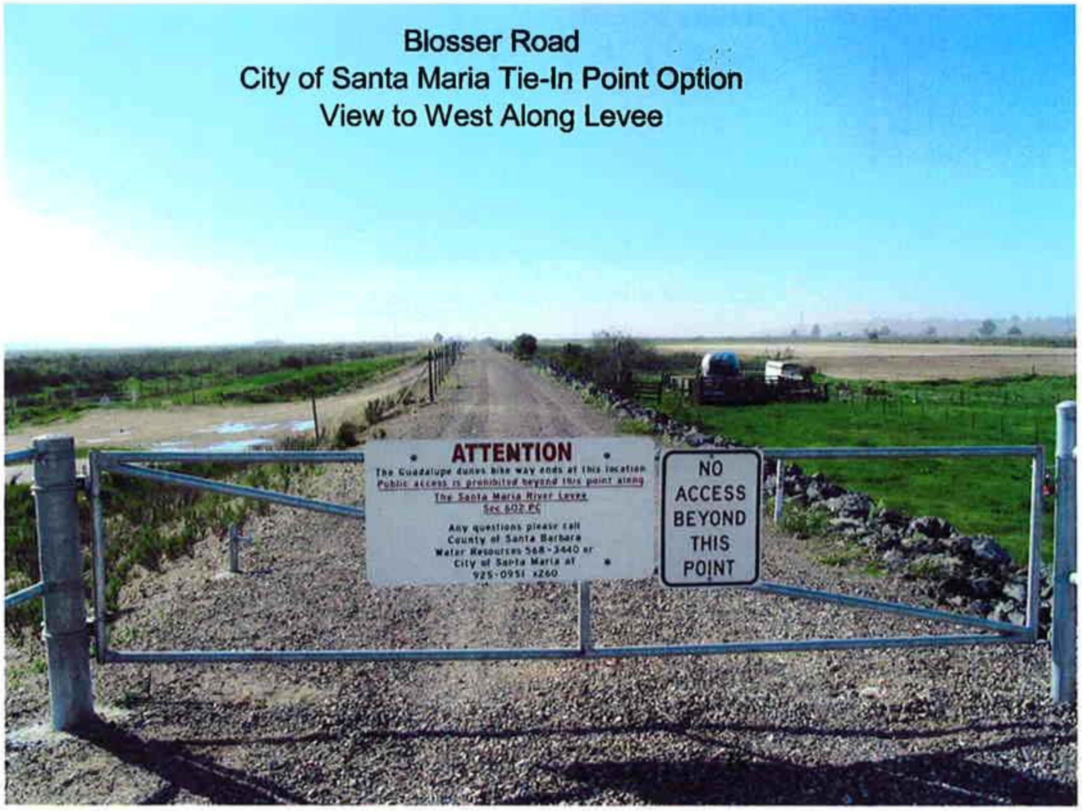
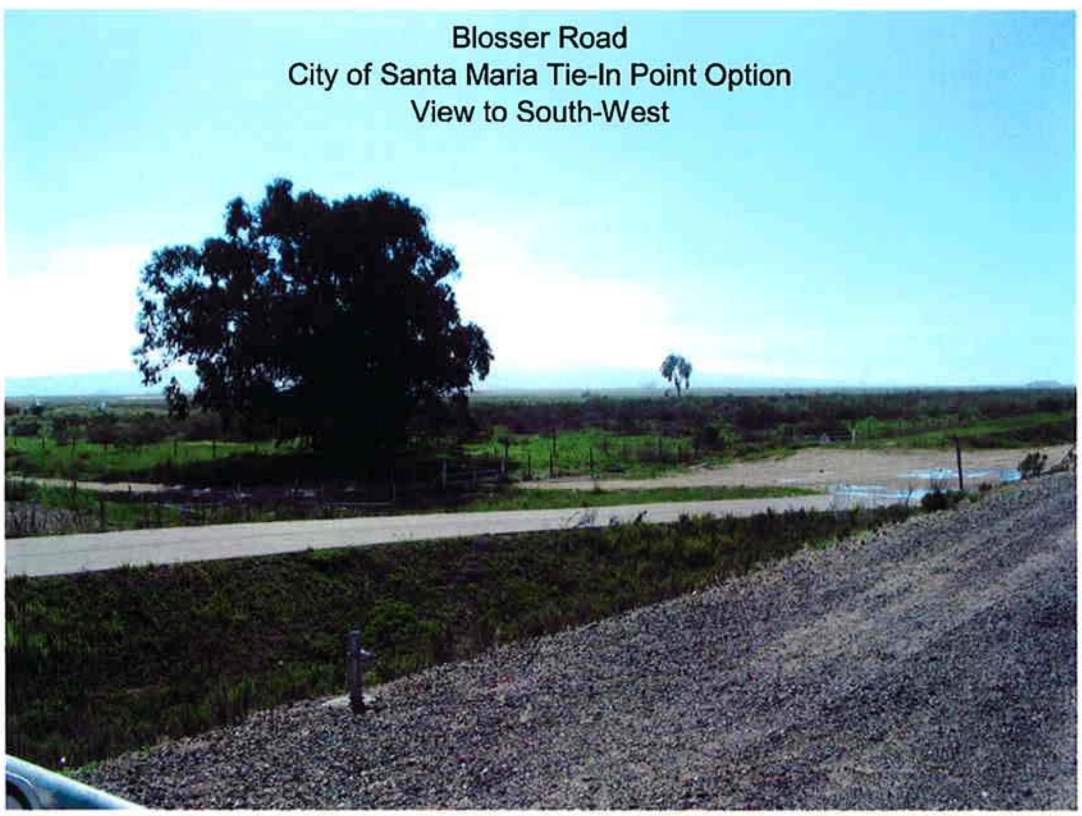
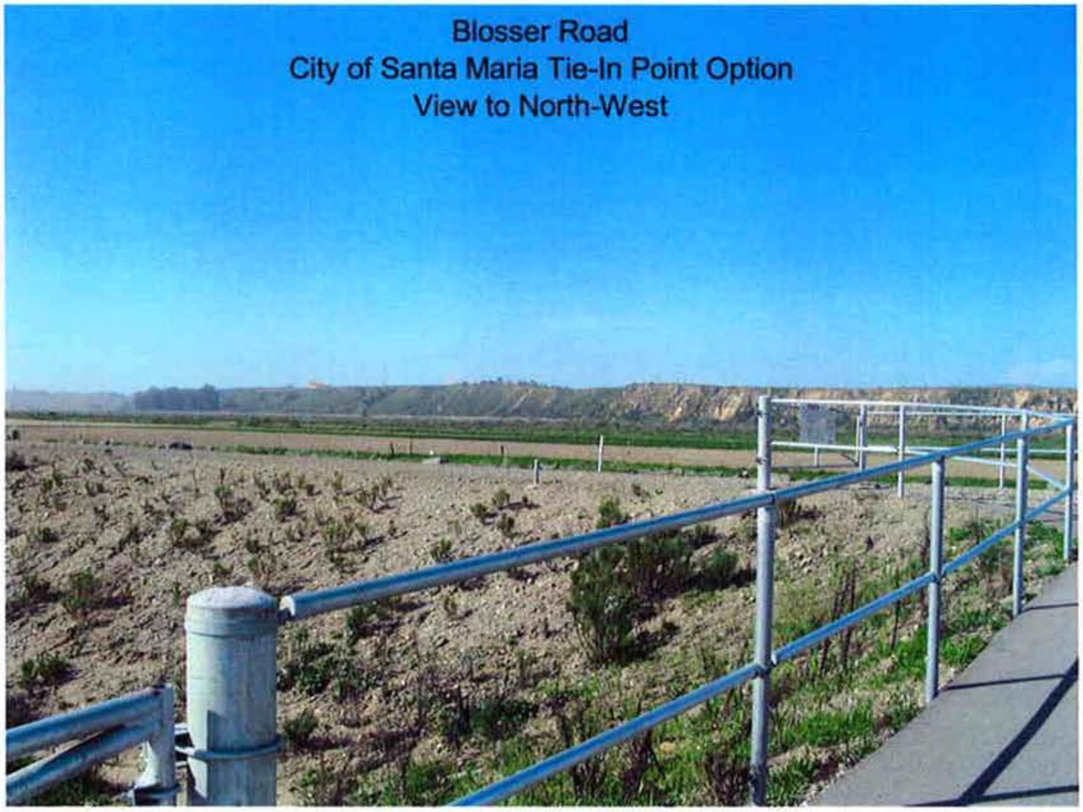


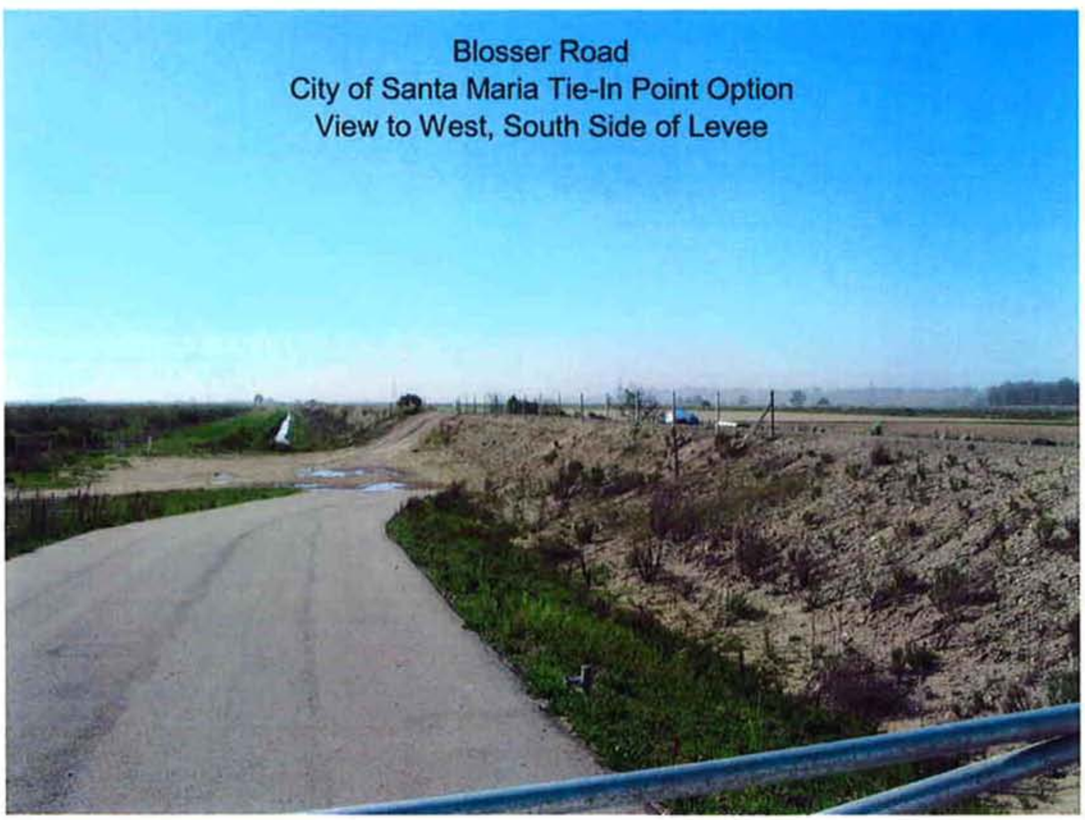
Blosser Road
City of Santa Maria Tie-In Point Option
View to West Along Levee

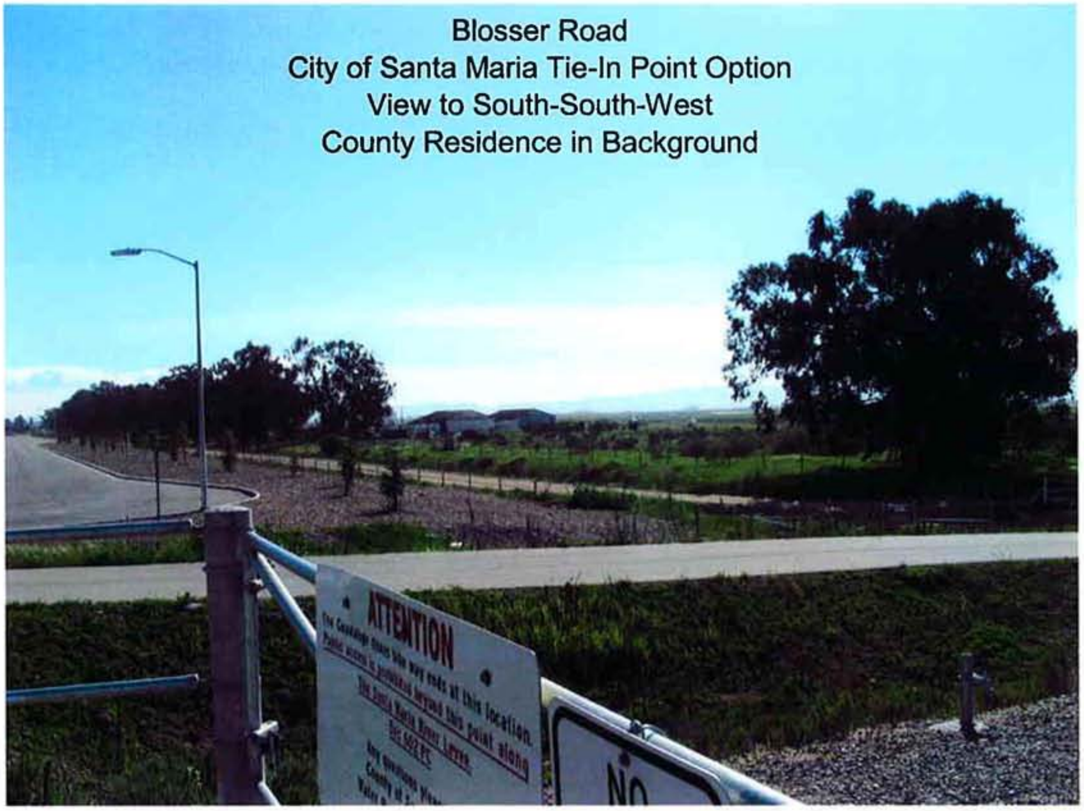


Blosser Road
City of Santa Maria Tie-In Point Option
View to South-West

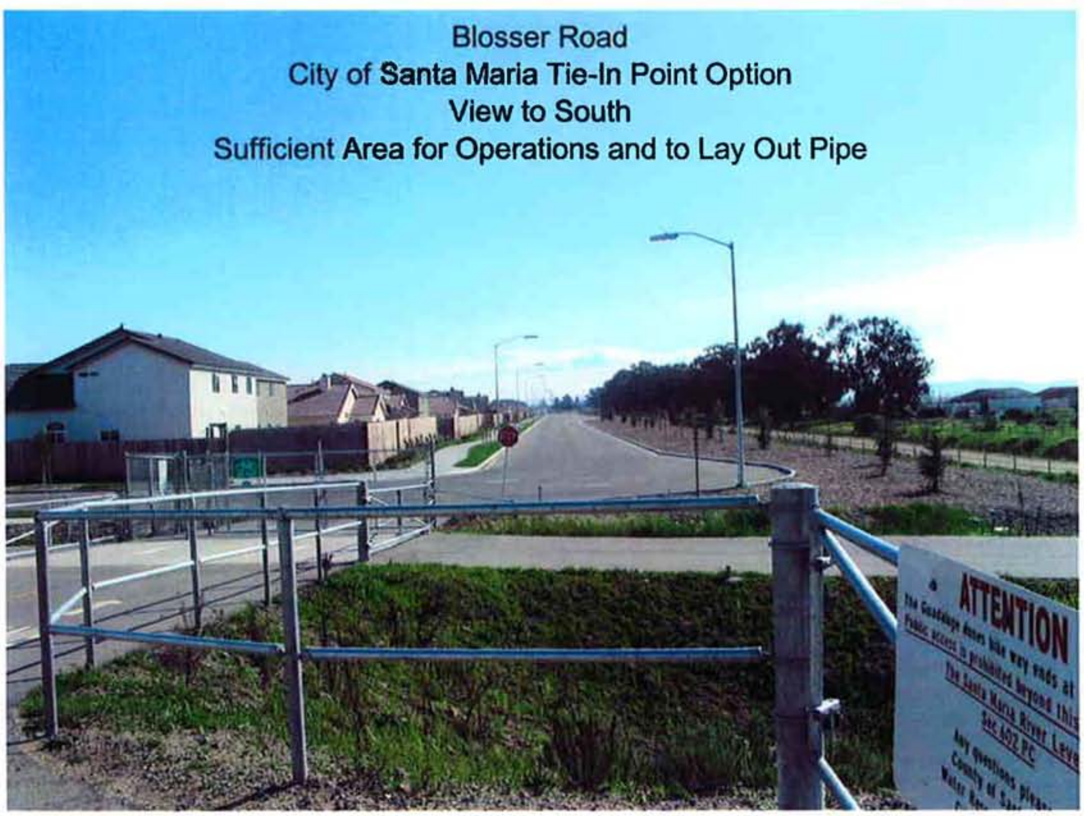
0411075
March 2005


Blosser Road
City of Santa Maria Tie-In Point Option
View to North-West

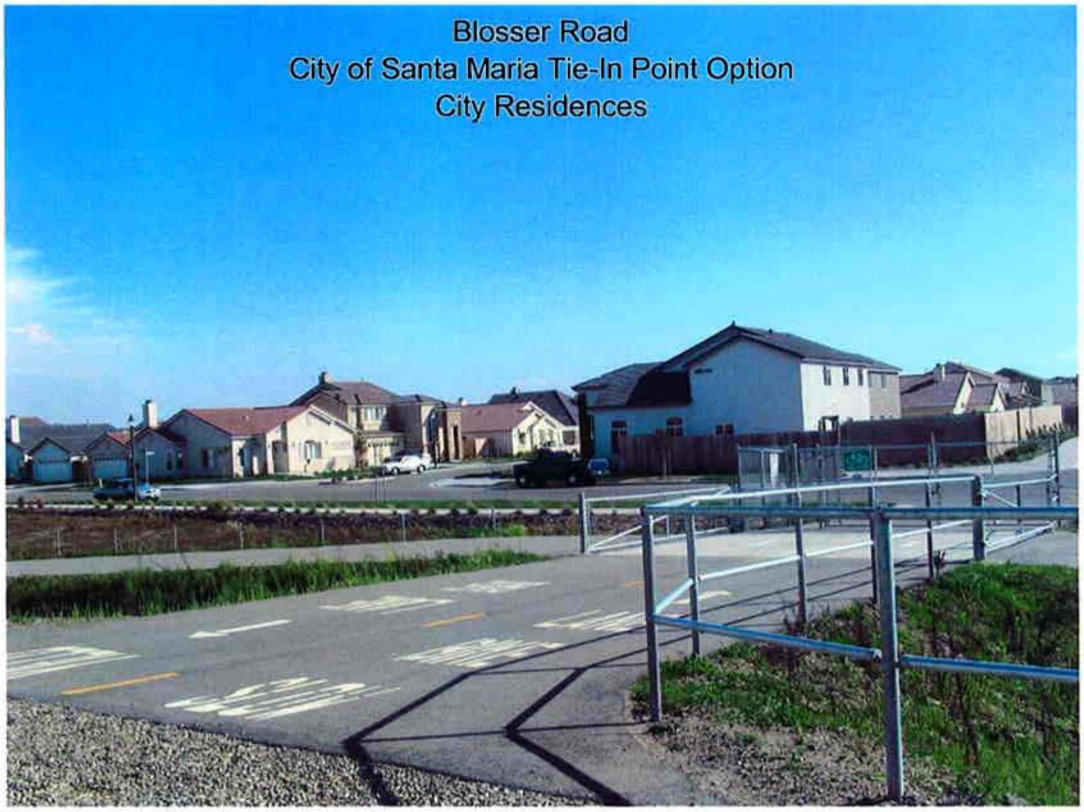

Blosser Road
City of Santa Maria Tie-In Point Option
View to West, South Side of Levee



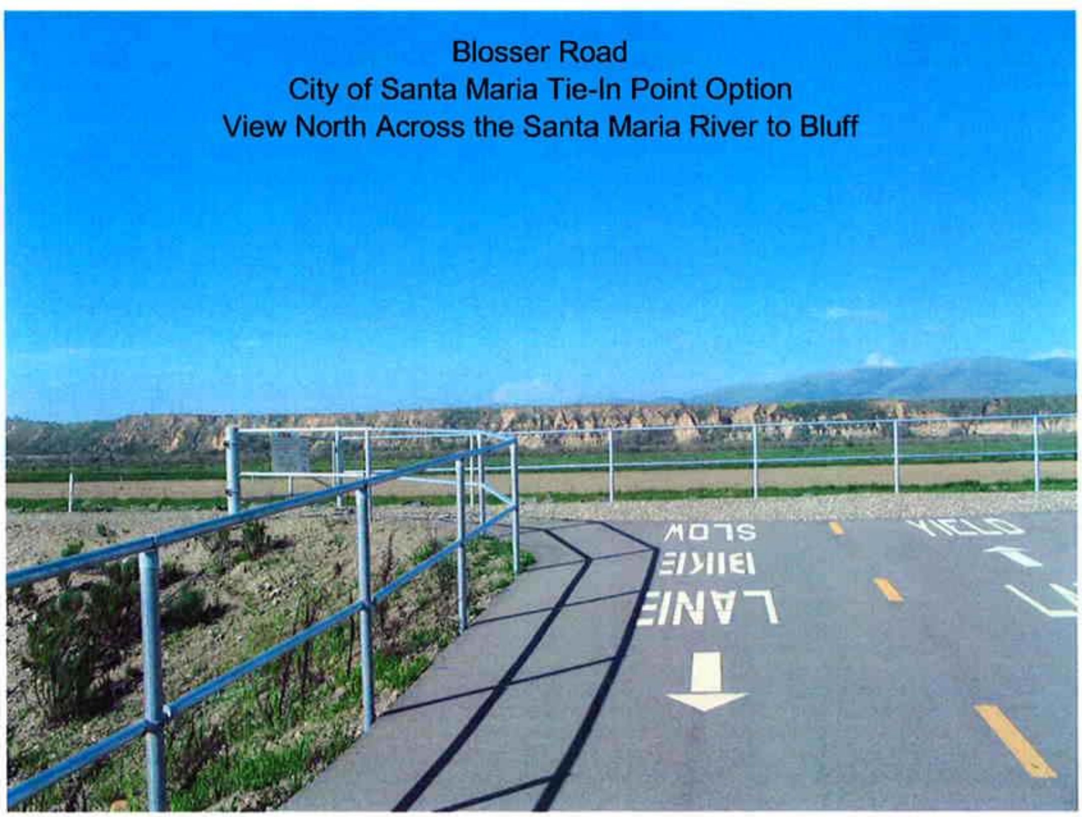
Blosser Road
City of Santa Maria Tie-In Point Option
View to South-South-West
County Residence in Background



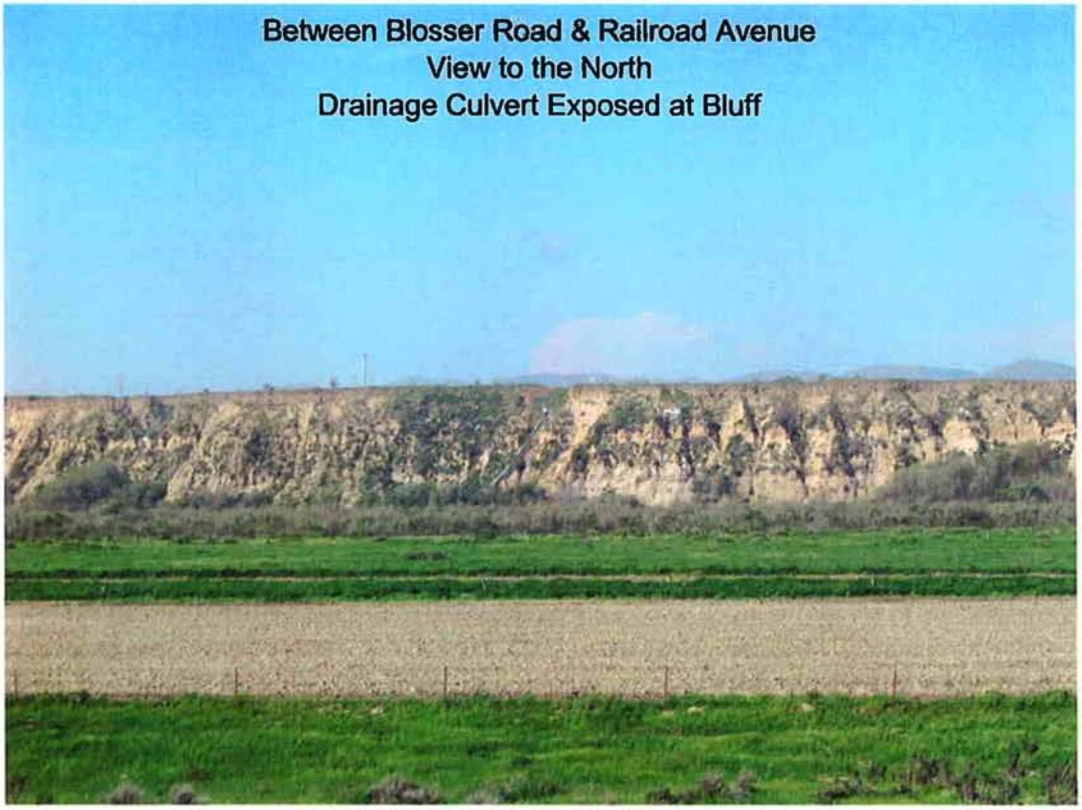
Blosser Road
City of Santa Maria Tie-In Point Option
View to South
Sufficient Area for Operations and to Lay Out Pipe

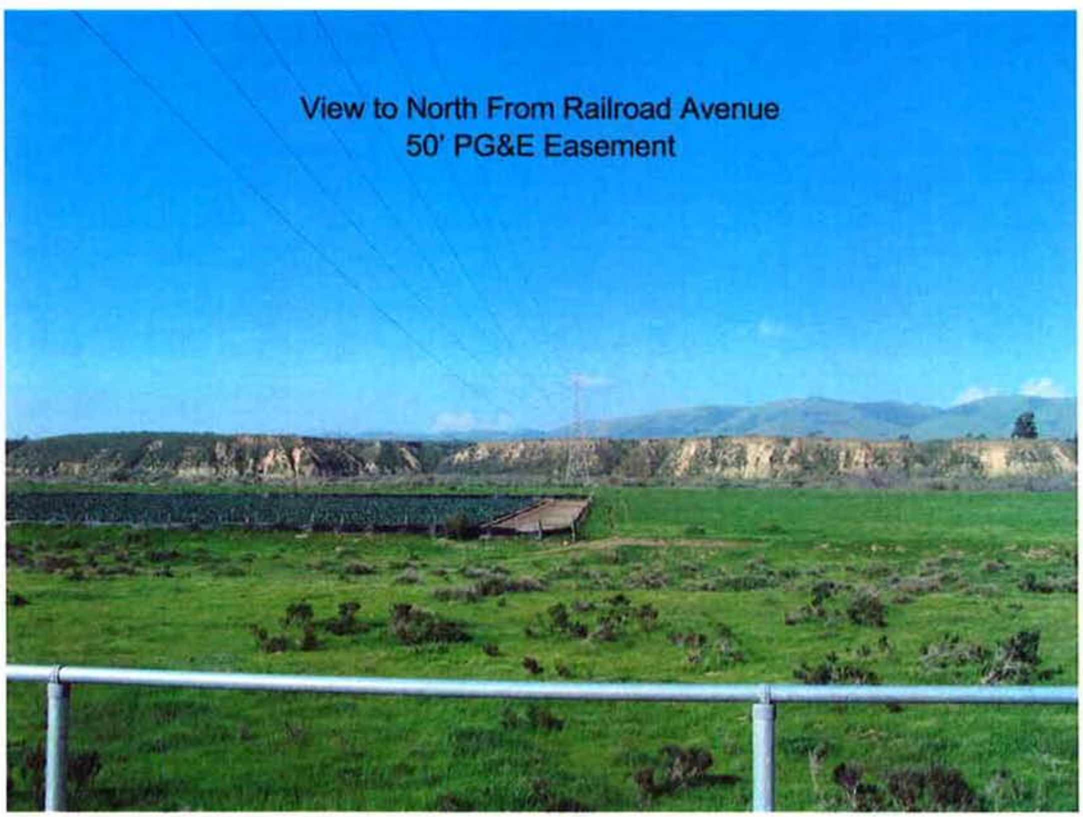


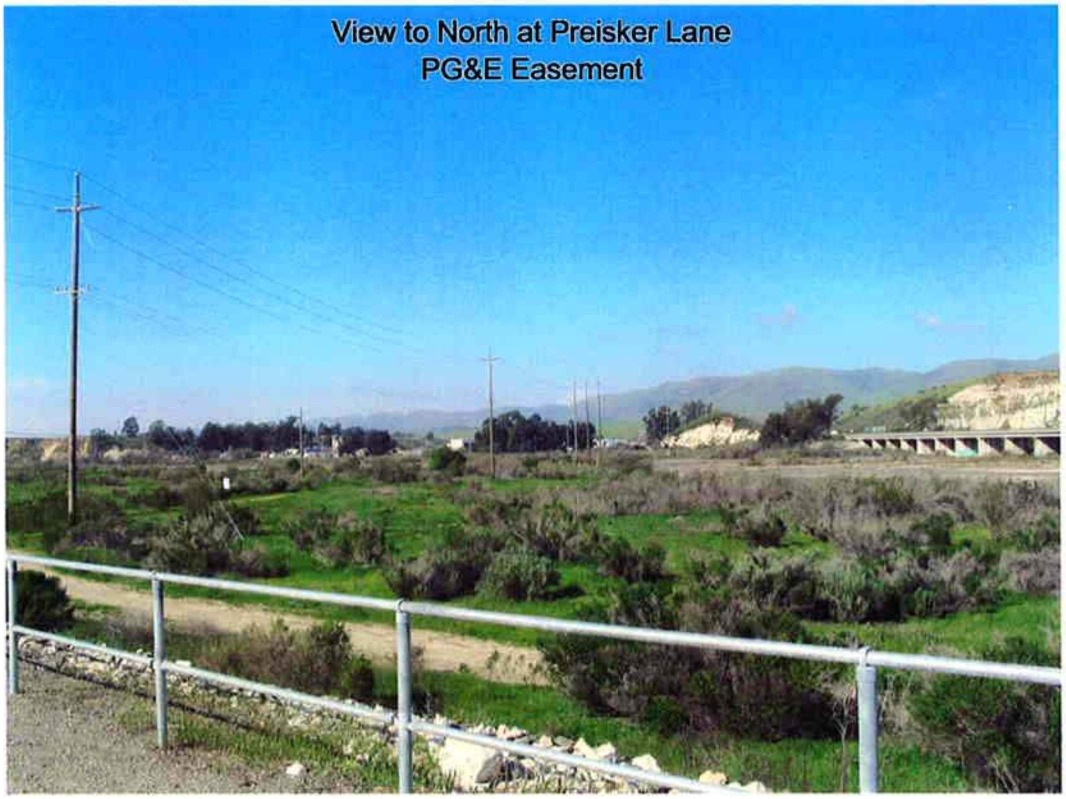
Blosser Road
City of Santa Maria Tie-In Point Option
City Residences

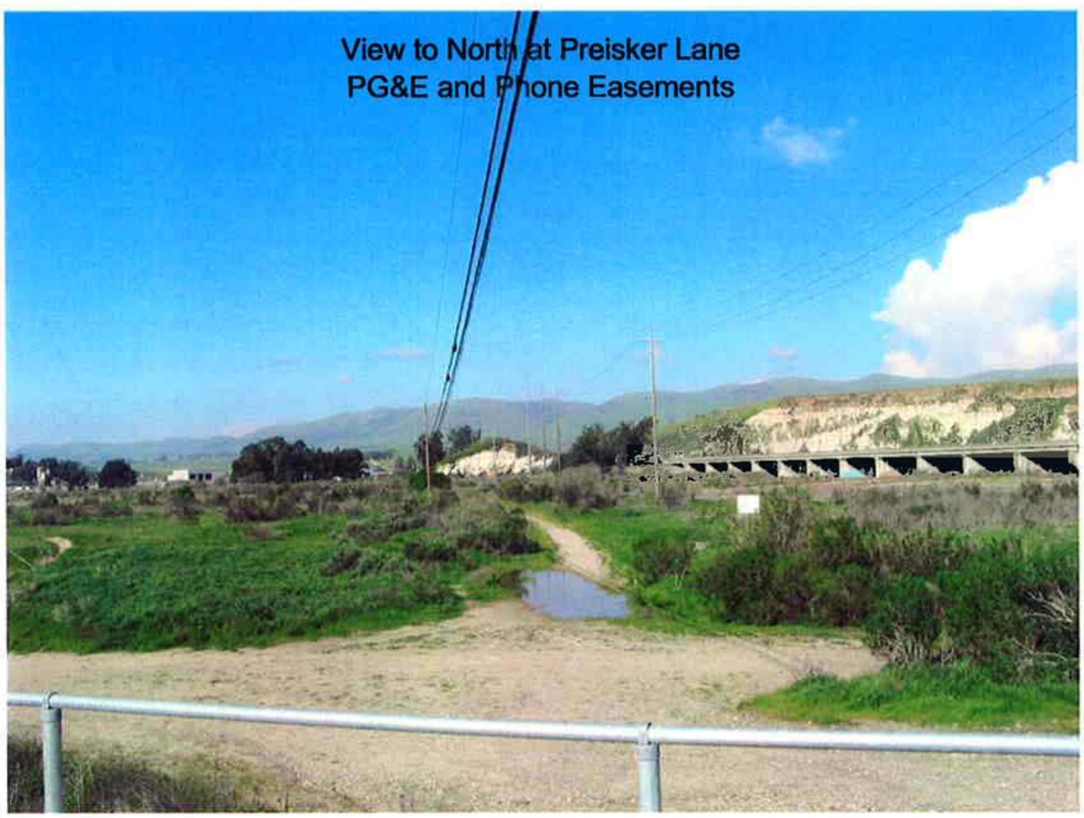


Blosser Road
City of Santa Maria Tie-In Point Option
View North Across the Santa Maria River to Bluff


Between Blosser Road & Railroad Avenue
View to the North
Drainage Culvert Exposed at Bluff

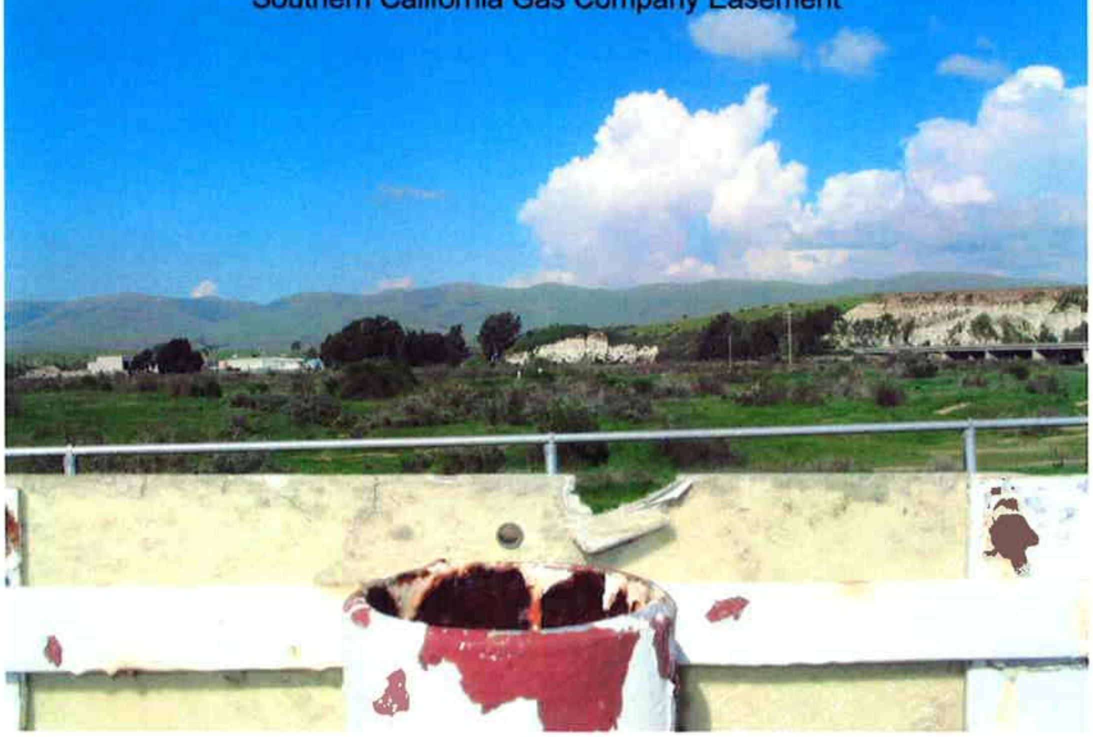

View to North From Railroad Avenue
50' PG&E Easement

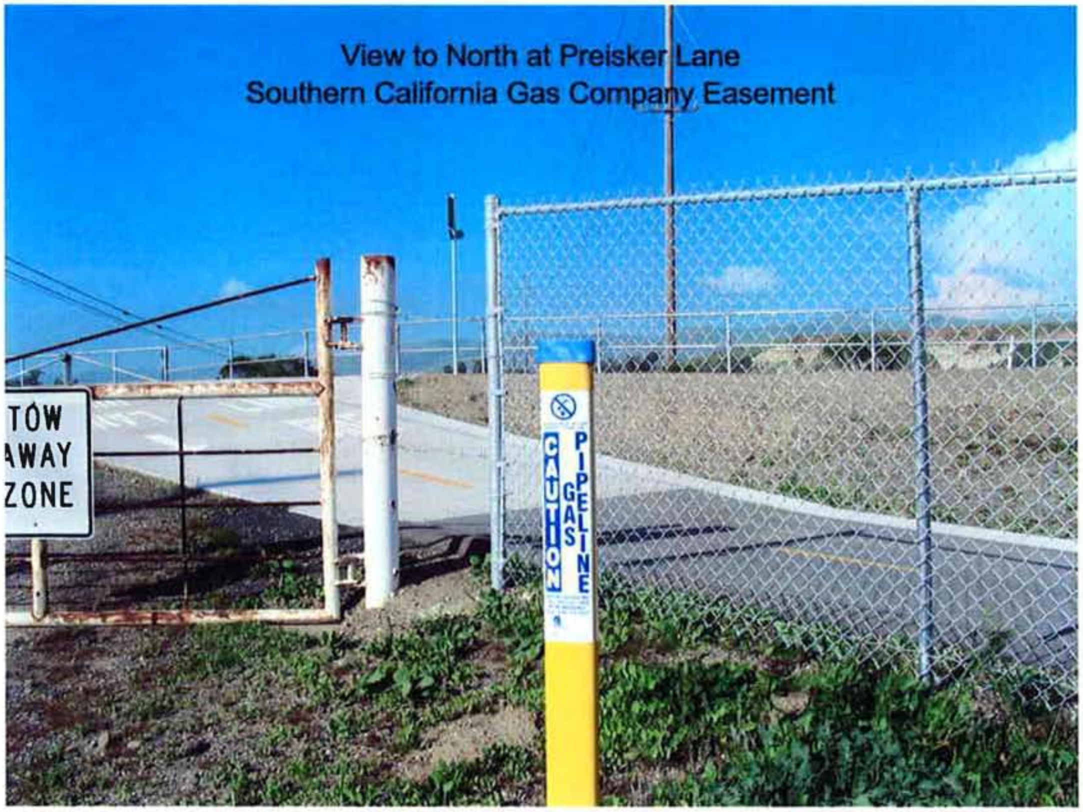

View to North at Preisker Lane
PG&E Easement

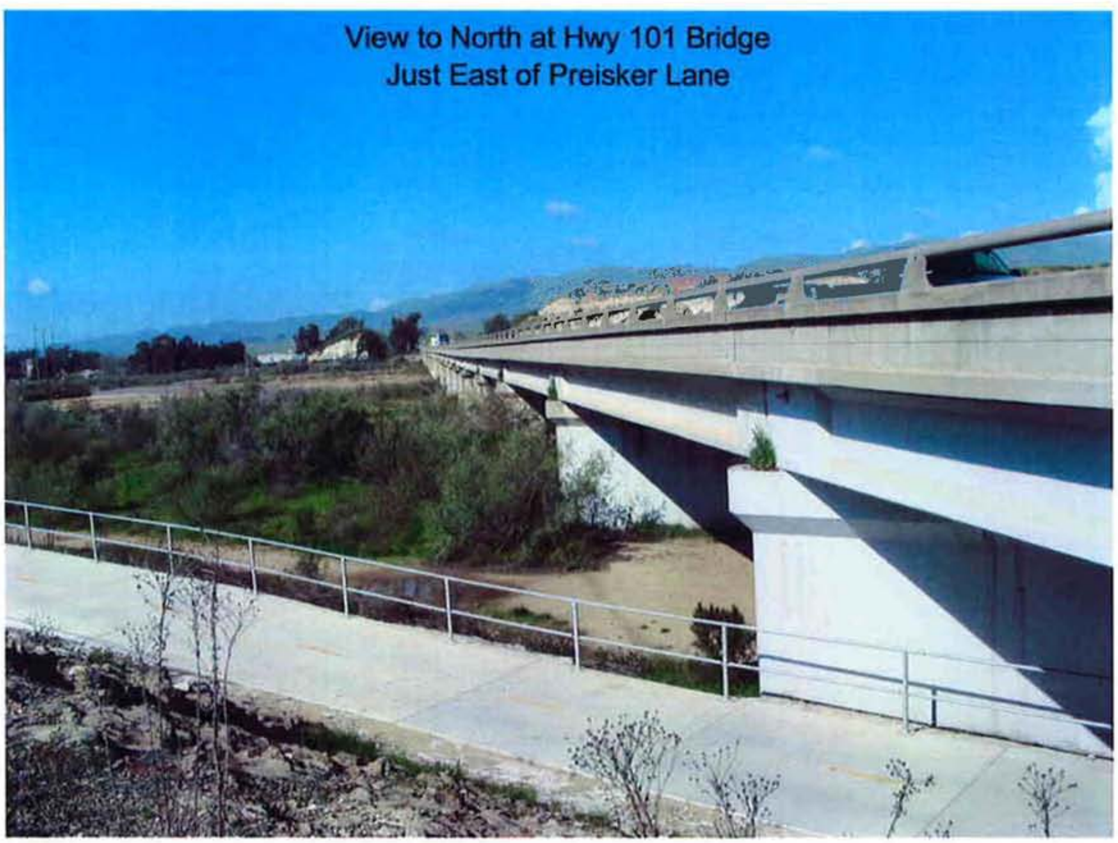

View to North at Preisker Lane
PG&E and Phone Easements

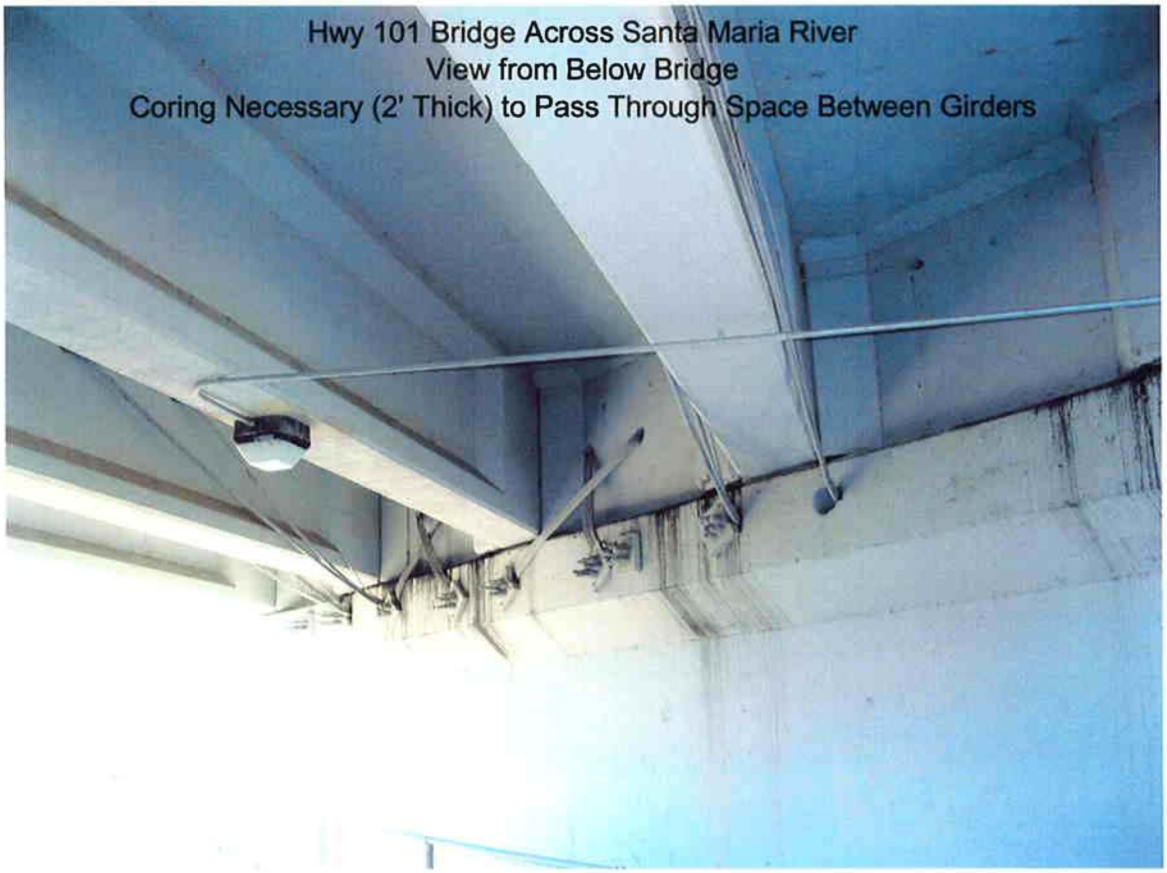
View to South at Ebony Street
City of Santa Maria Tie-In Option
South California Gas Company Easement

View to North at Ebony Street
Southern California Gas Company Easement

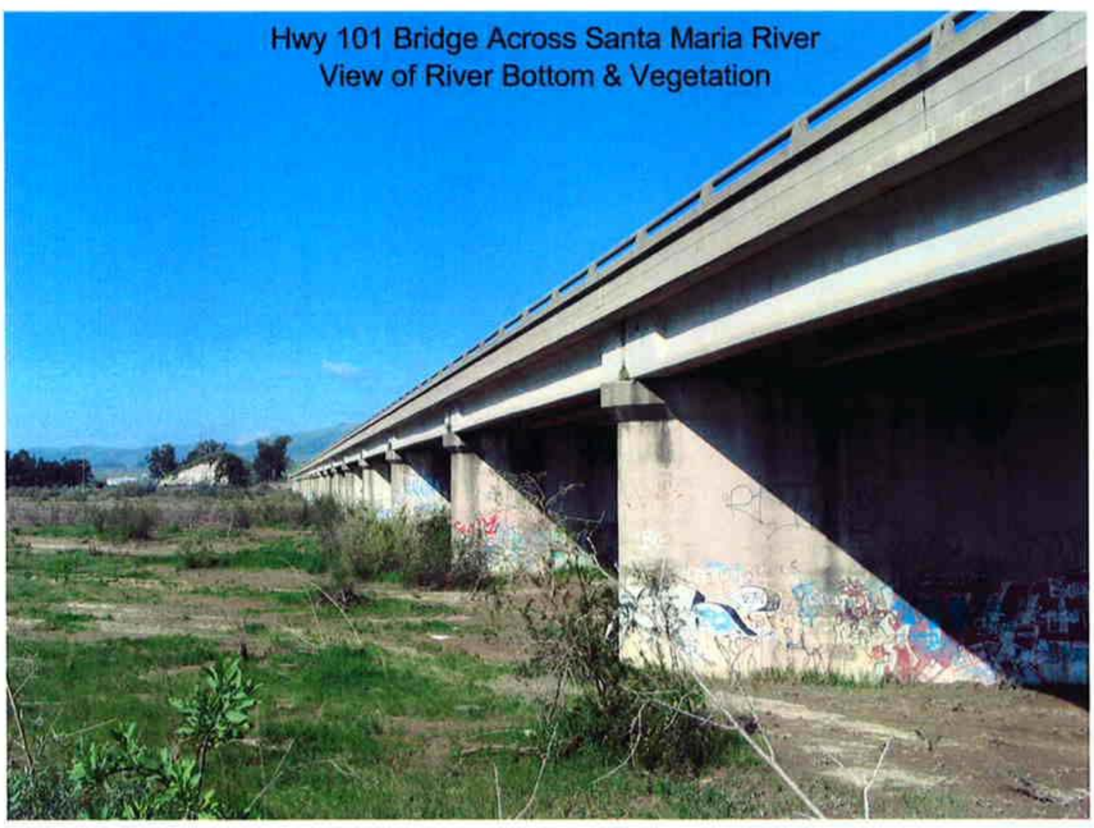



View to North at Preisker Lane
Southern California Gas Company Easement
TOW AWAY ZONE
CAUTION
GAS
PIPELINE


View to North at Hwy 101 Bridge
Just East of Preisker Lane

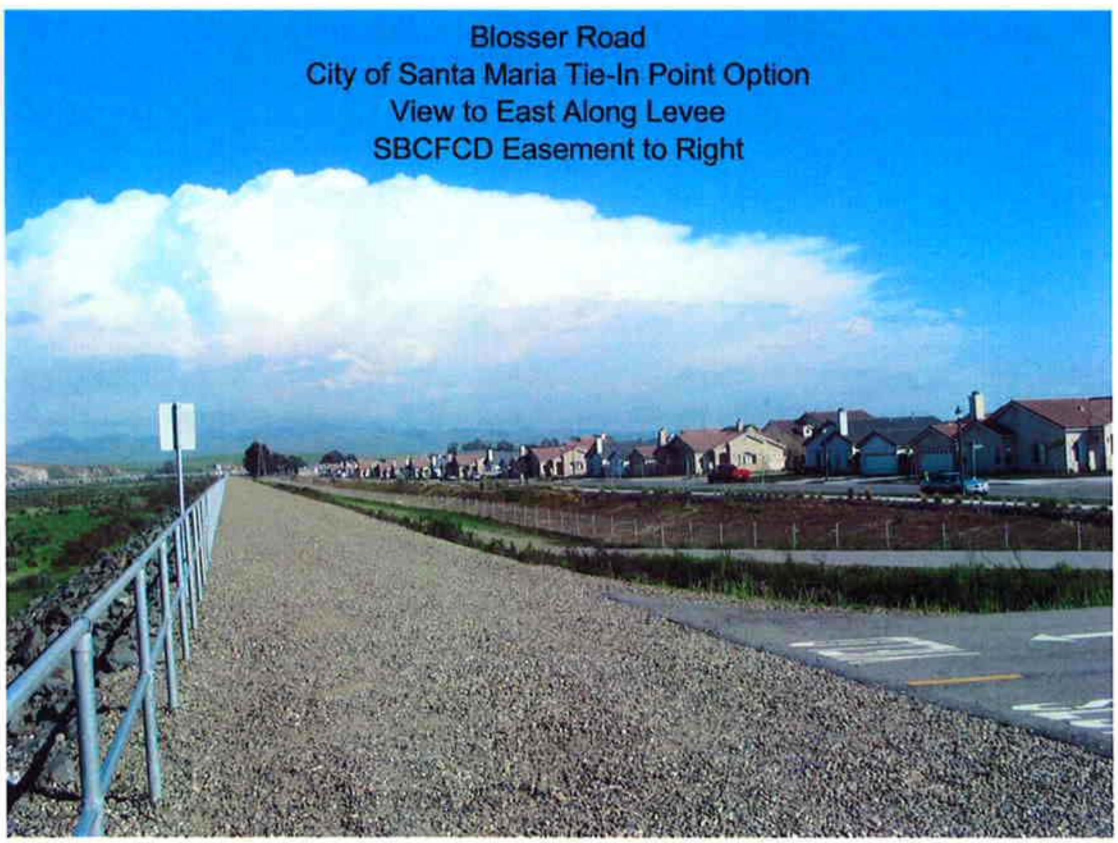


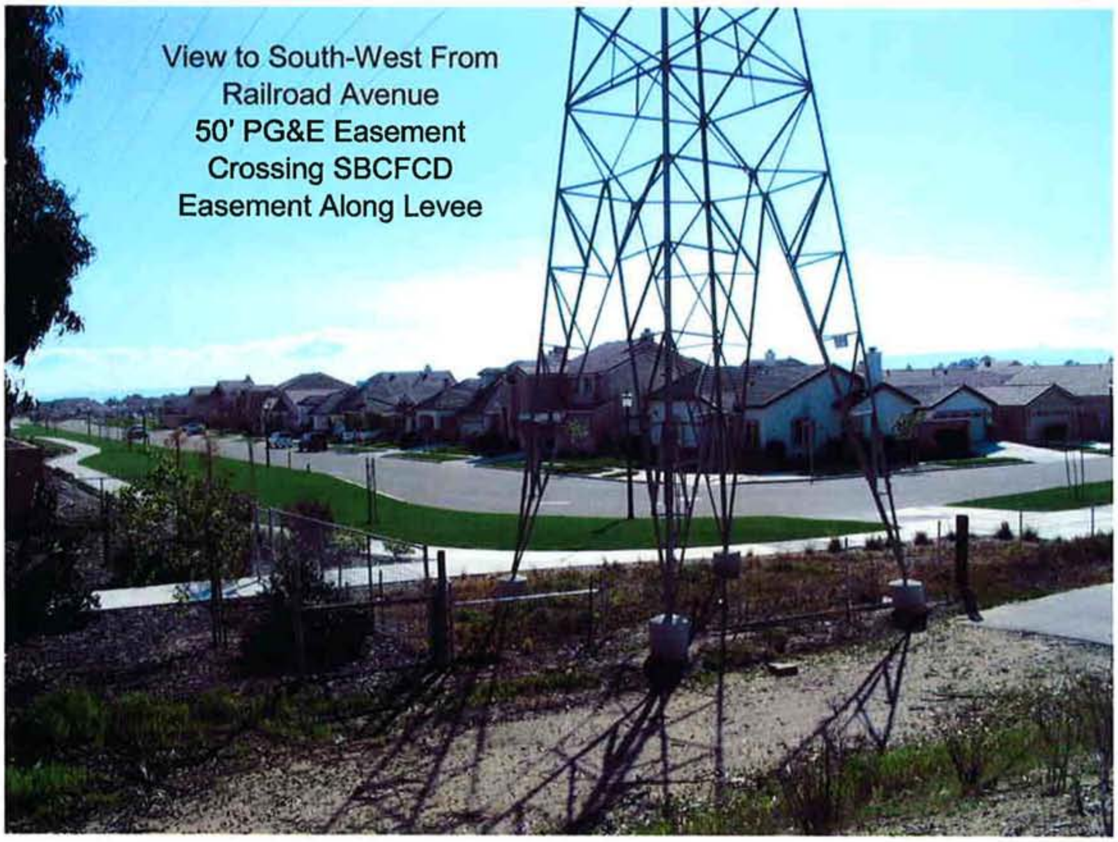
Hwy 101 Bridge Across Santa Maria River
View from Below Bridge
Coring Necessary (2' Thick) to Pass Through Space Between Girders



Hwy 101 Bridge Across Santa Maria River
View of River Bottom & Vegetation

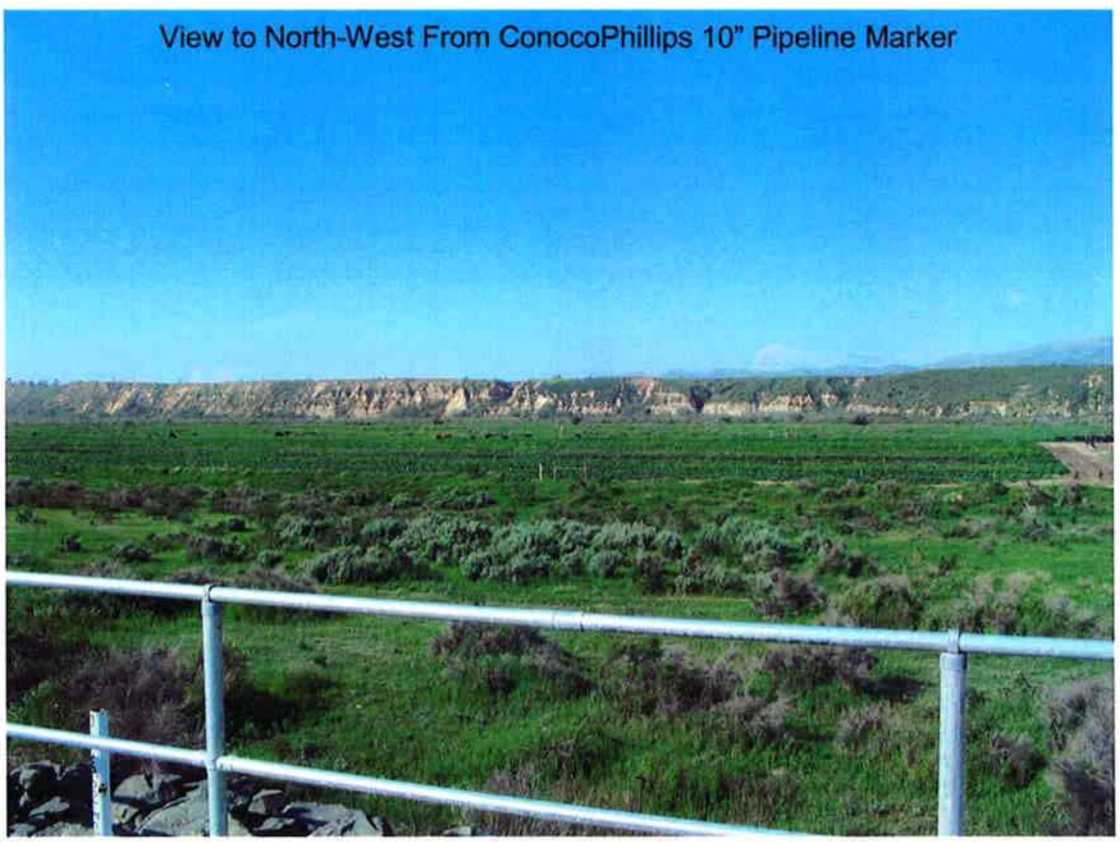

Hwy 101 Bridge
View From Below Bridge
Coring Necessary (2' Thick) to Pass Through Space Between Girders

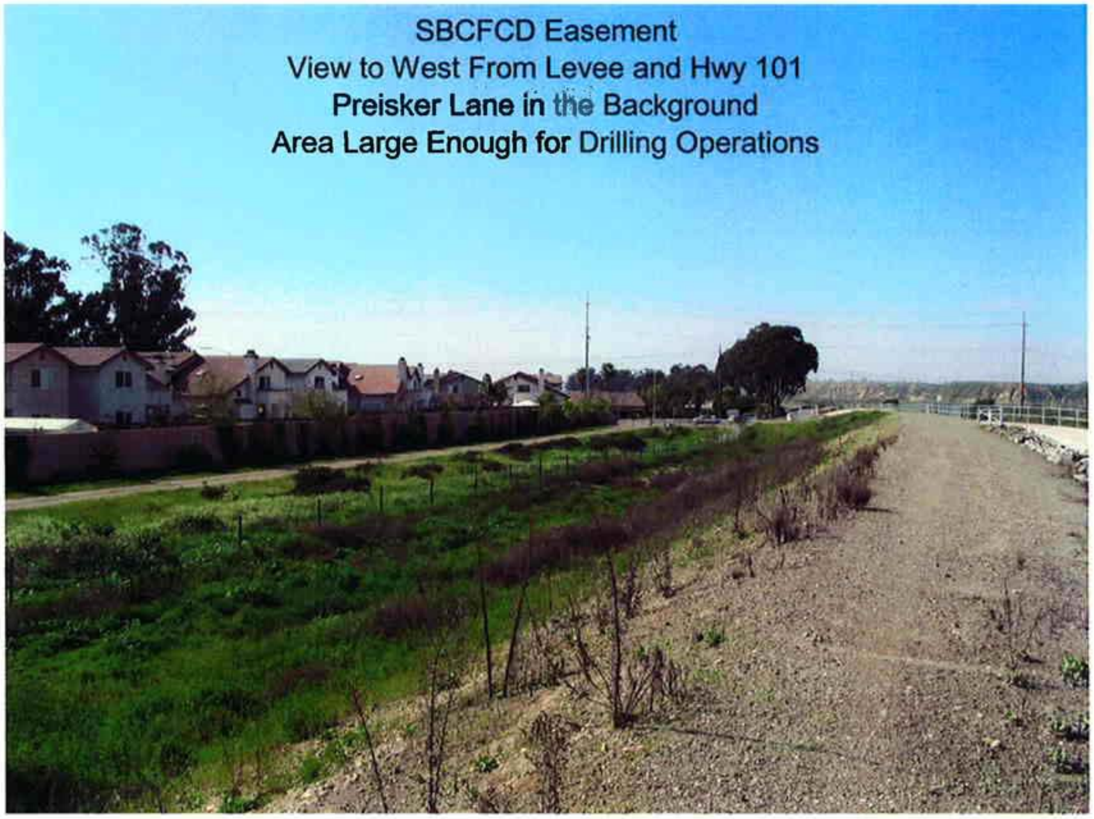

Blosser Road
City of Santa Maria Tie-In Point Option
View to East Along Levee
SBCFCD Easement to Right


View to South-West From
Railroad Avenue
50' PG&E Easement
Crossing SBCFCD
Easement Along Levee


PETROLEUM
PIPELINE
ConocoPhillips 10" Oil
Pipeline
View to South-West

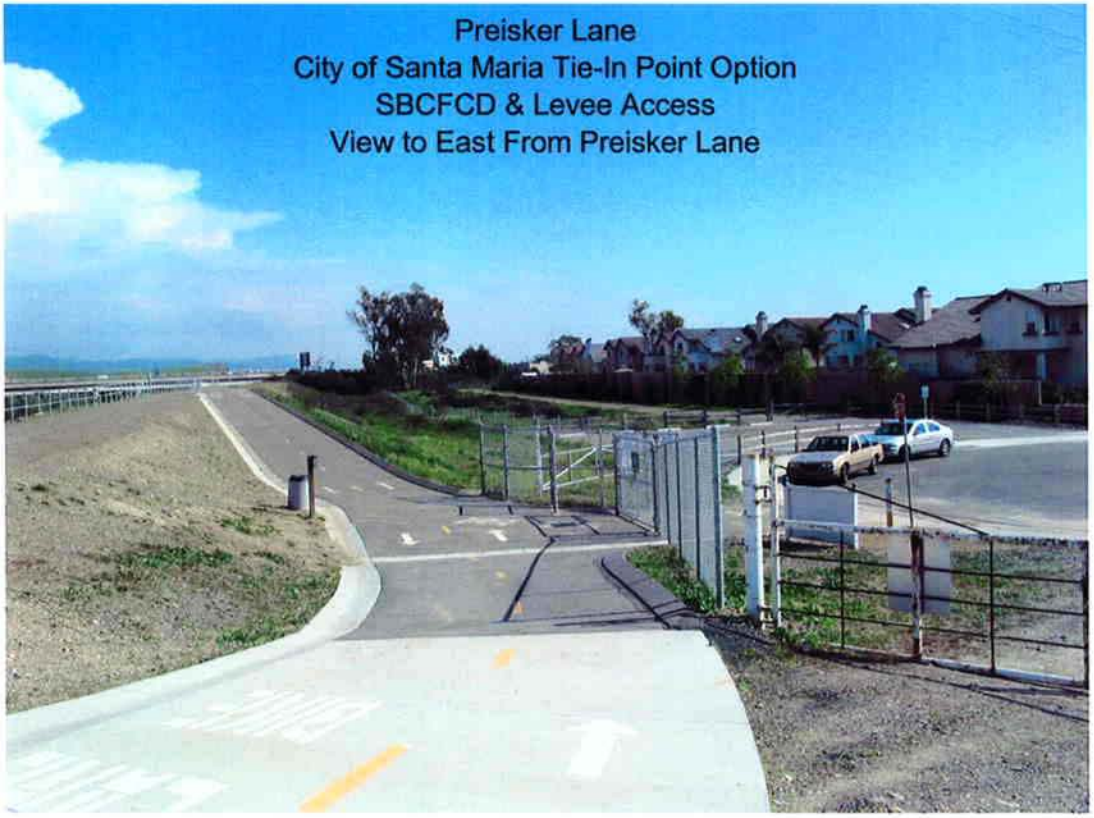

ConocoPhillips 10" Pipeline Marker
View to North Towards Other Easements

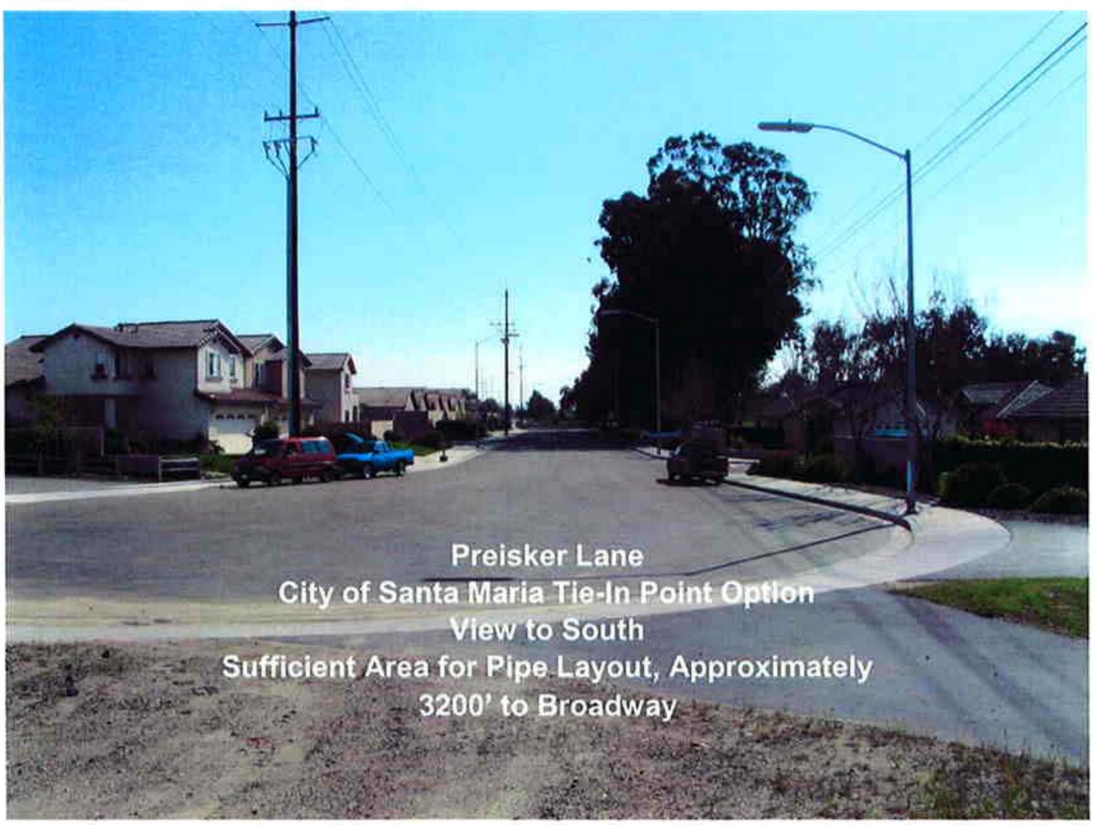

View to North-West From ConocoPhillips 10" Pipeline Marker

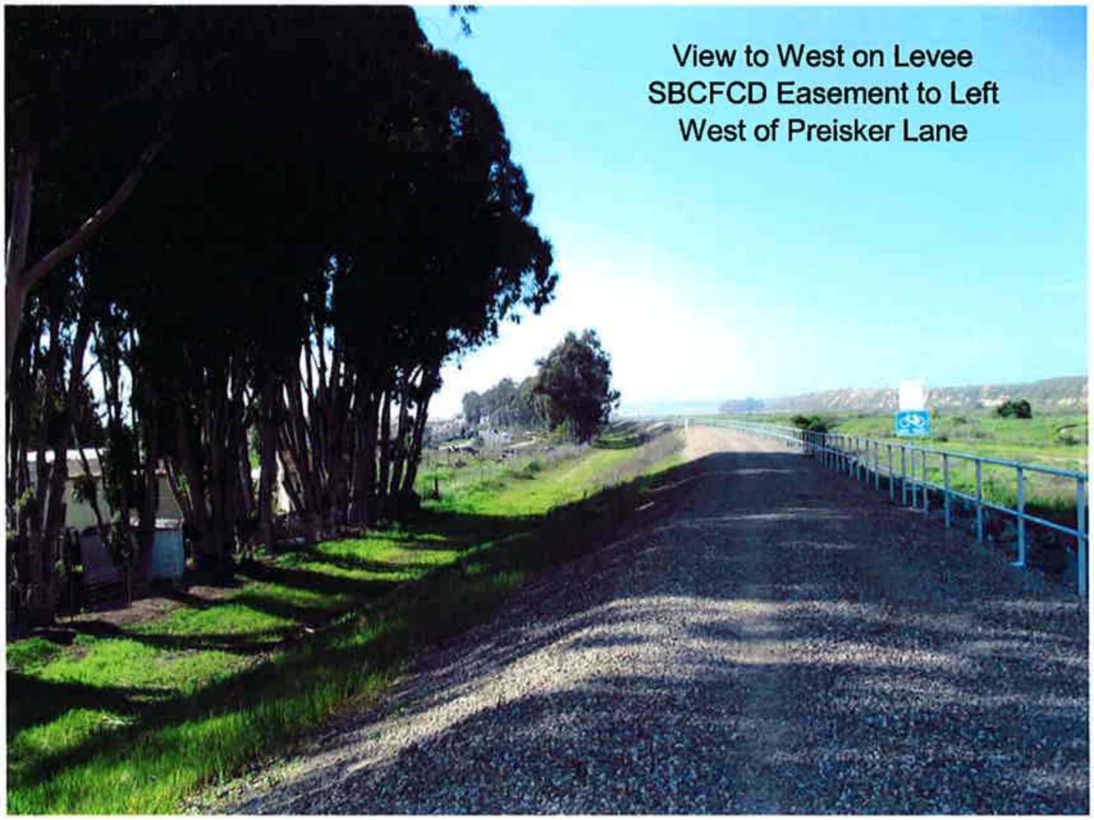


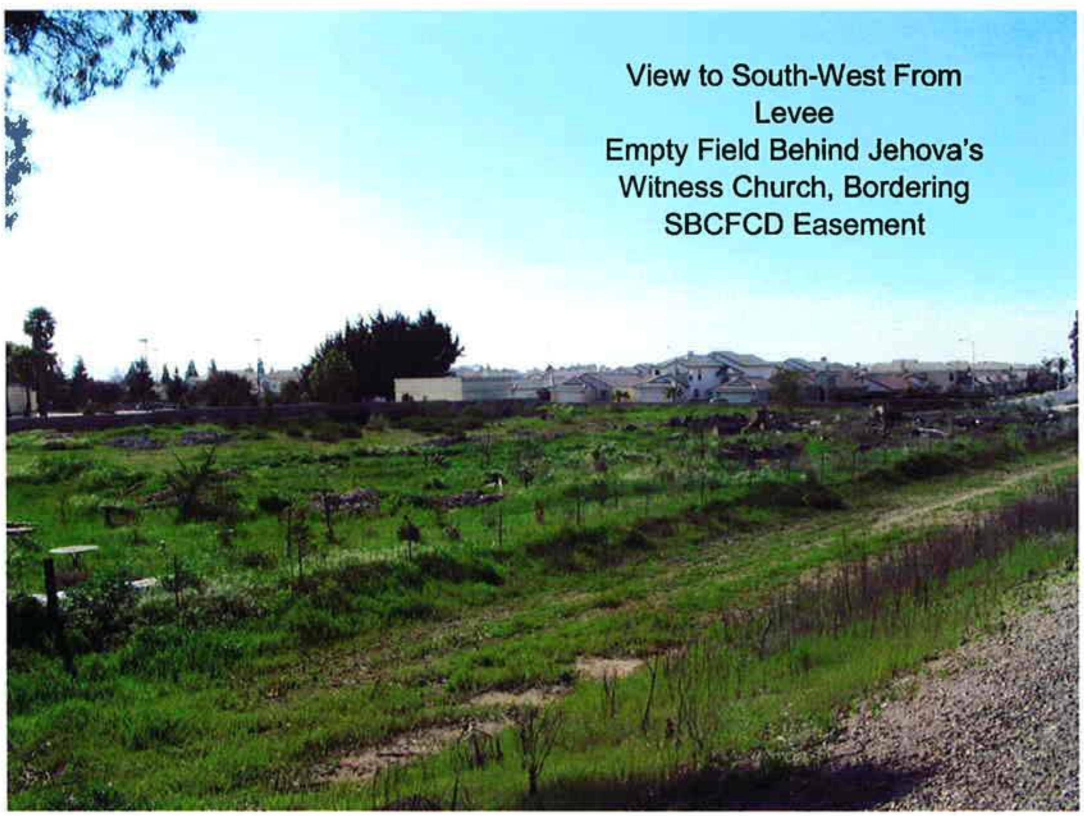
SBCFCD Easement
View to West From Levee and Hwy 101
Preisker Lane in the Background
Area Large Enough for Drilling Operations

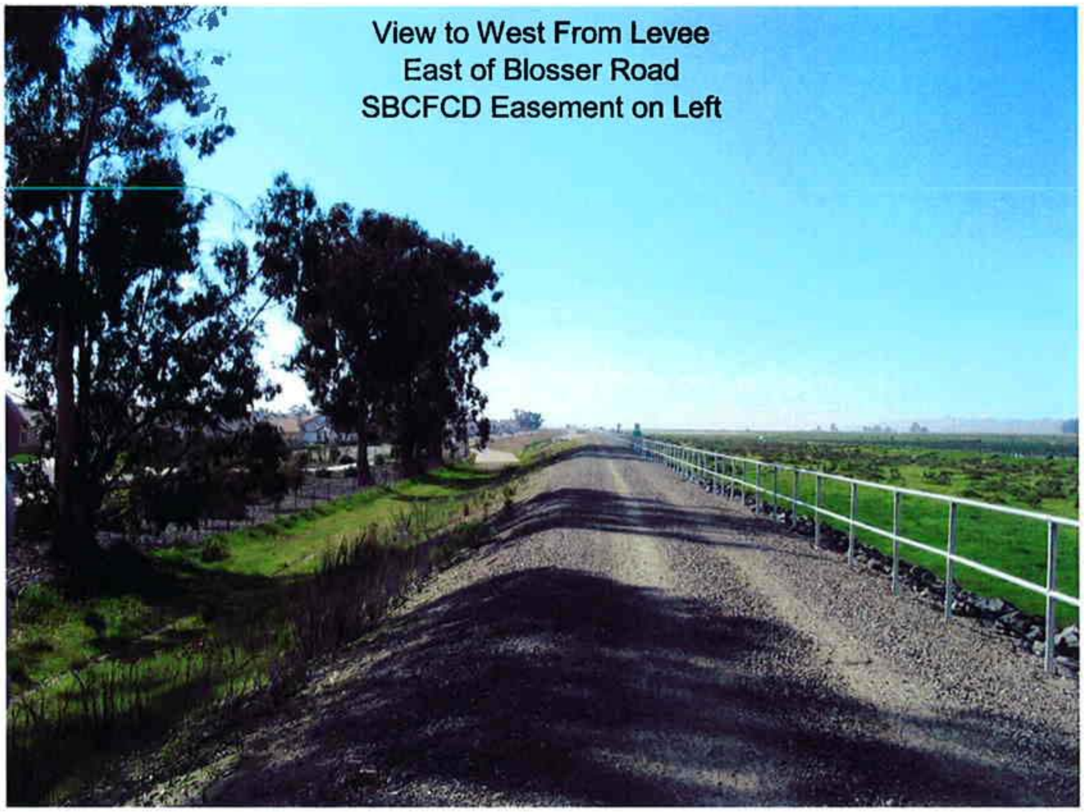
Preisker Lane
City of Santa Maria Tie-In Point Option
SBCFCD Easement
View to West From Preisker Lane


Preisker Lane
City of Santa Maria Tie-In Point Option
SBCFCD & Levee Access
View to East From Preisker Lane

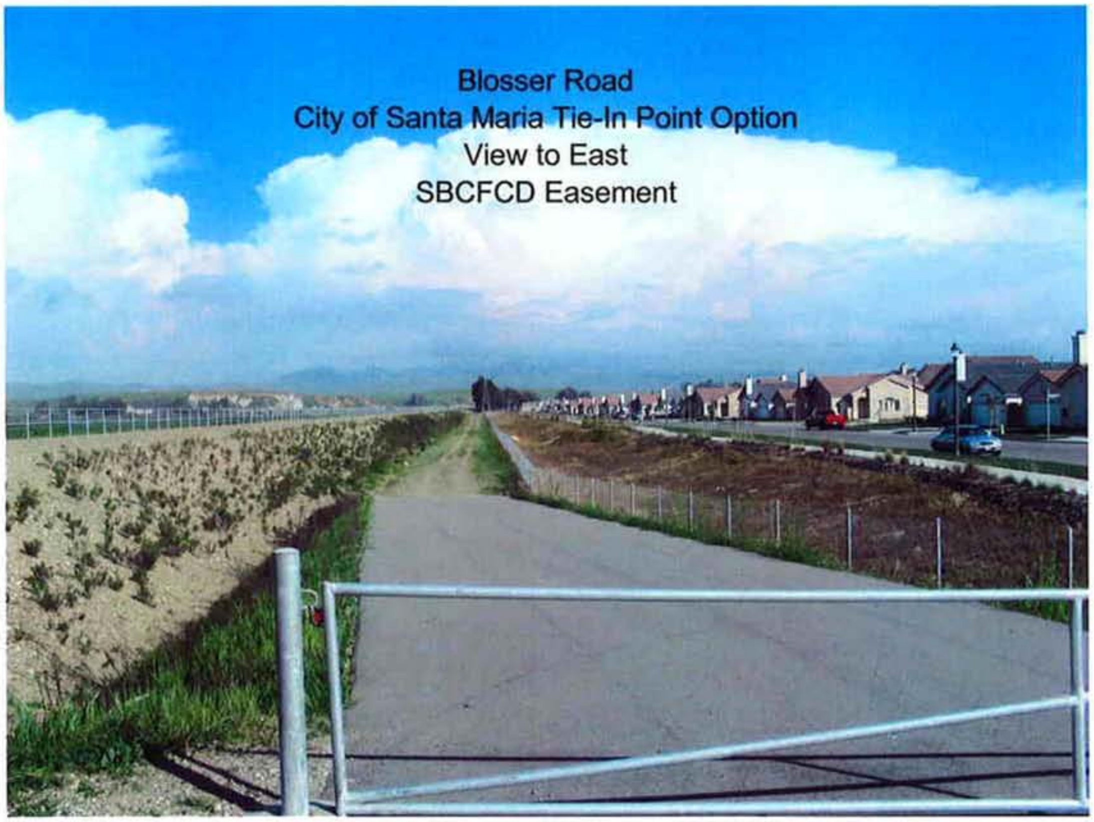

Preisker Lane
City of Santa Maria Tie-In Point Option
View to South
Sufficient Area for Pipe Layout, Approximately
3200' to Broadway


View to West on Levee
SBCFCD Easement to Left
West of Preisker Lane


View to South-West From
Levee
Empty Field Behind Jehova's
Witness Church, Bordering
SBCFCD Easement


View to West From Levee
East of Blosser Road
SBCFCD Easement on Left


View to West From Levee
East of Blosser Road
SBCFCD Easement on Left


Blosser Road
City of Santa Maria Tie-In Point Option
View to East
SBCFCD Easement

APPENDIX E

Possible Effected Property Owners

APN	Owner	Property Address	
090-341-002	Biorn Geraldine M	Hutton	
090-341-019	Mclanahan Patricia P		
090-341-020	Iliff Dale / K Family Trust		
090-341-022	County Of San Luis Obispo (937		
090-341-023	Biorn Geraldine M	Hutton	
090-341-028	State Of California (935)		
090-341-029	County Of San Luis Obispo (937		
090-341-030	C Sanchez / Son Inc A Corp	Preisker	
090-341-032	County Of San Luis Obispo (937		
090-341-033	Biorn Geraldine M	Hutton	
090-341-039	Fox Homer J	2295 Hutton	
090-341-043	County Of San Luis Obispo (937		
090-341-044	Charles A Pratt Construction C	2401 N Preisker	
090-341-046	Hidden Pines Estates A Ca Ltd	Preisker	
090-341-048	Dunlap Floyd E	Preisker	
090-341-049	Johnson Properties A Ca Gen Pt	Preisker	
090-301-006	County Of San Luis Obispo (937		
090-301-010	Pasquini Charles Jr		
090-301-013	River Bluffs Llc A Ca Llc	Moss	Nipomo, CA 93444
090-301-019	Cavazos Elias	644 Moss	Nipomo, CA 93444
090-301-020	Waugh Terry A	640 Moss	Nipomo, CA 93444
090-301-021	Breithaupt Christine	656 Moss	Nipomo, CA 93444
090-301-022	Waugh Terry A	666 Moss	Nipomo, CA 93444
090-301-028	Huitron Leopoldo C	634 Moss	Nipomo, CA 93444
090-301-029	Cavazos Jesus R	606 Moss	Nipomo, CA 93444
090-301-030	Shulman Trust	618 Moss	Nipomo, CA 93444
090-301-035	Biorn Geraldine M	Preisker	
090-301-036	Troesh Steven M	Cuyama	
090-301-039	Pasquini Charles Jr		

APN	Owner	Property Address	
090-301-040	Fort Nettie U	1900 Hutton	Nipomo, CA 93444
090-301-043	Pasquini Charles Jr		
090-301-054	Jimenez Jose	2110 Hutton	Nipomo, CA 93444
090-301-057	Nelson Kenneth D	2090 Hutton	Nipomo, CA 93444
090-301-058	Biorn Geraldine M	250 Winding	Nipomo, CA 93444
090-301-059	Maria Vista Estates A Gen Ptp	Moss	Nipomo, CA 93444
090-301-060	Maria Vista Estates A Gen Ptp	Moss	Nipomo, CA 93444
090-301-061	Maria Vista Estates A Gen Ptp	Moss	Nipomo, CA 93444
090-301-062	Maria Vista Estates A Gen Ptp	Moss	Nipomo, CA 93444
090-301-063	Maria Vista Estates A Gen Ptp	Moss	
090-301-064	Construction Engineering Inc	2126 Hutton	Nipomo, CA 93444
090-301-065	Loomis Daniel R	2116 Hutton	Nipomo, CA 93444
090-301-067	Hinders Steven L	2116 Hutton	Nipomo, CA 93444
090-302-003	Troesh Steven M	2280 Hutton	Nipomo, CA 93444
090-302-004	Haas Erich R	155 Cuyama	Nipomo, CA 93444
090-302-005	Haas Erich R	155 Cuyama	Nipomo, CA 93444
090-302-006	Troesh Steven M	2290 Hutton	Nipomo, CA 93444
090-302-007	Shackelford Family Trust	2170 Hutton	Nipomo, CA 93444
090-302-009	Moles Byron K	115 Cuyama	Nipomo, CA 93444
090-302-010	Ford Charles	109 Cuyama	Nipomo, CA 93444
090-302-011	Oconnor Daniel J		Nipomo, CA 93444
090-302-013	Haas Erich	2250 Hutton	Nipomo, CA 93444
090-302-014	Troesh Steven M	2290 Hutton	Nipomo, CA 93444
090-302-015	Troesh Steven M	2290 Hutton	Nipomo, CA 93444
090-302-016	Troesh Steven M	2290 Hutton	Nipomo, CA 93444
090-302-017	Troesh Steven M	2290 Hutton	Nipomo, CA 93444
090-302-023	Nelson Raymond W Heirs Of	Cuyama	Nipomo, CA 93444
090-302-024	Haas Erich R	155 Cuyama	Nipomo, CA 93444
090-302-025	Haas Erich	2220 Hutton	Nipomo, CA 93444
090-302-026	Biorn Geraldine M	330 Cuyama	Nipomo, CA 93444
090-302-027	Gill Bill W	116 Cuyama	Nipomo, CA 93444
090-302-028	Hilker Daniel T	112 Cuyama	Nipomo, CA 93444

APN	Owner	Property Address	
090-302-029	Cowell Richard Ii	108 Cuyama	Nipomo, CA 93444
090-302-030	Wolsey Trust	104 Cuyama	Nipomo, CA 93444
090-302-031	Fae Company A Gen Ptp	Cuyama	Nipomo, CA 93444
090-302-032	Fae Company A Gen Ptp	Cuyama	Nipomo, CA 93444
090-302-033	Lorencz Lee		
090-302-034	Lorencz Lee	Cuyama	Nipomo, CA 93444
090-302-035	Lorencz Lee	Cuyama	Nipomo, CA 93444

Directional Drill:
4-1A:

City, County, County
Patricia P. McLanahan
Biorn, Geraldine
River Bluffs LLC
Maria Vita Estates
Linda Vista Farms
Troesch, Steven M.
Fort, Nettie U.

4-1B:

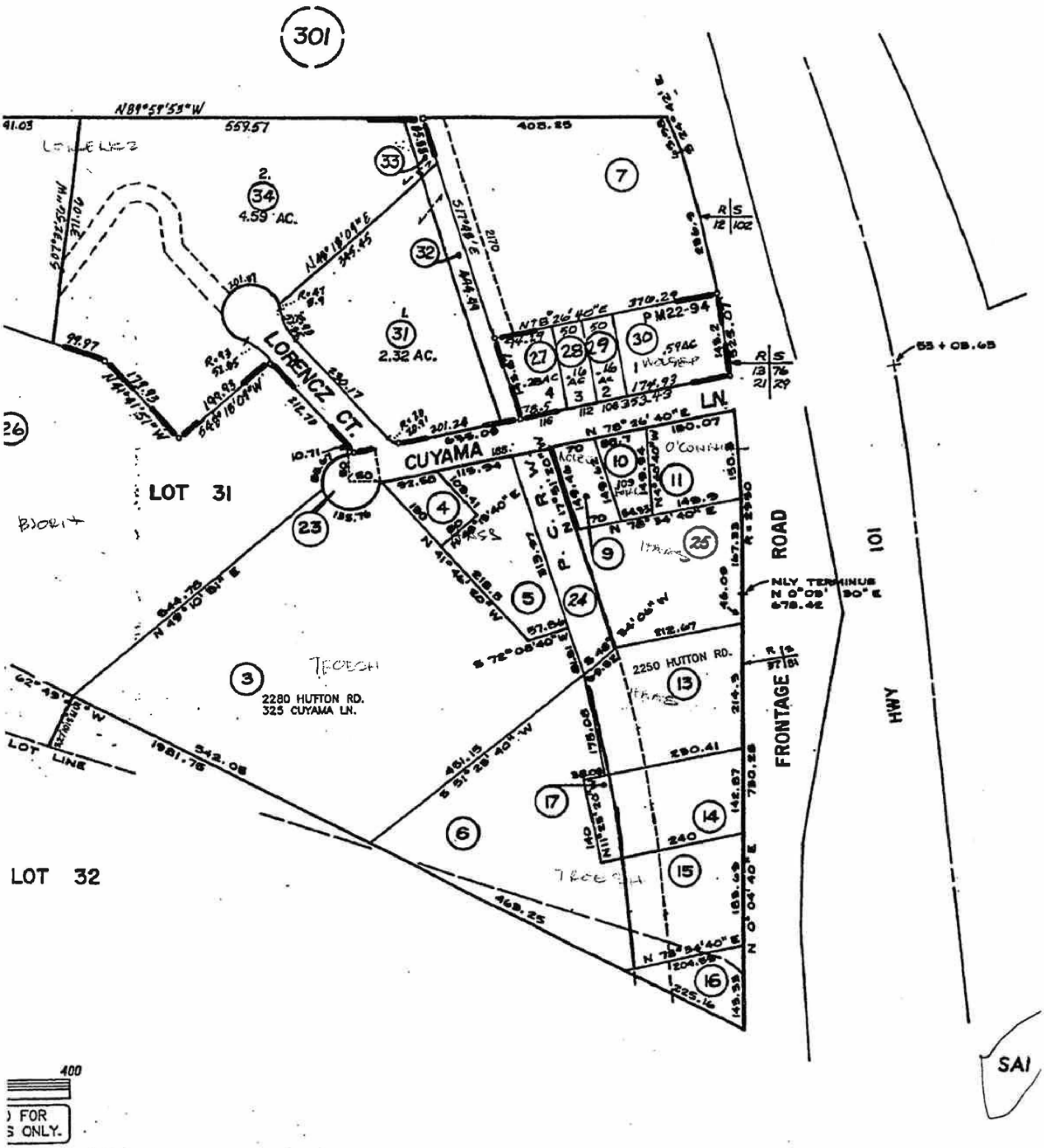
City, County, County
Hines Estates
Pratt
Johnson Properties Trust
Iliff Family Trust
Biorn, Geraldine
Troesh, Steven M.
Construction Eng. Inc.
Loomis, Daniel R.
Hinders, Steven L.
Pasquini, Charles Jr.
Nelson, Kenneth D.
Jimenez, Jose
Fort, Nettie U.

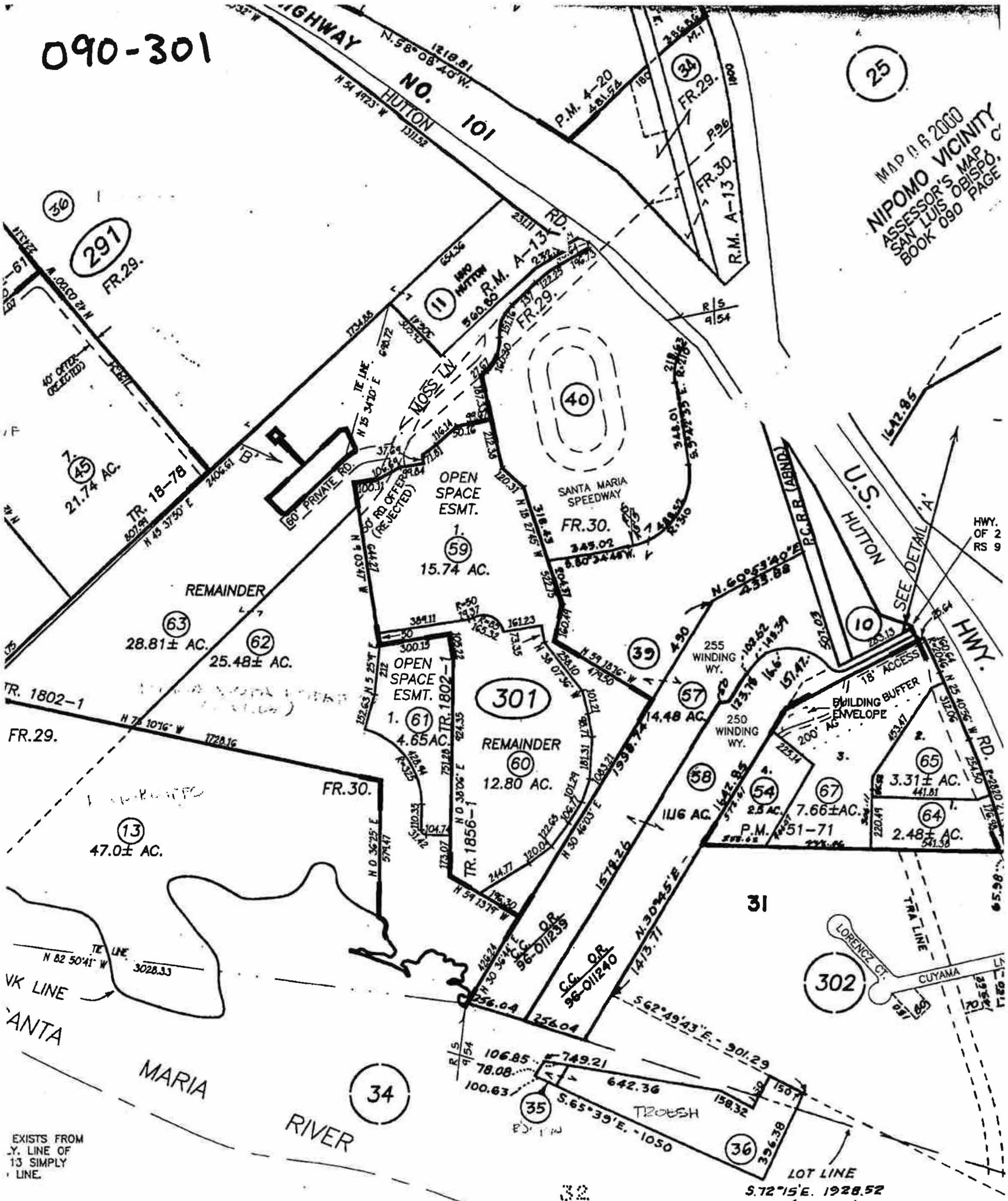
Bridge:

CalTrans
City, County, County
Johnson Properties

Iliff Family Trust
Biorn, Geraldine
Troesh, Steven M.
Construction Engineering Inc.
Loomis, Daniel Rd.
Hinders, Steven L.
Pasquini, Charles Jr.
Nelson, Kenneth D.
Jimenez, Jose
Fort, Nettie U.

090-302

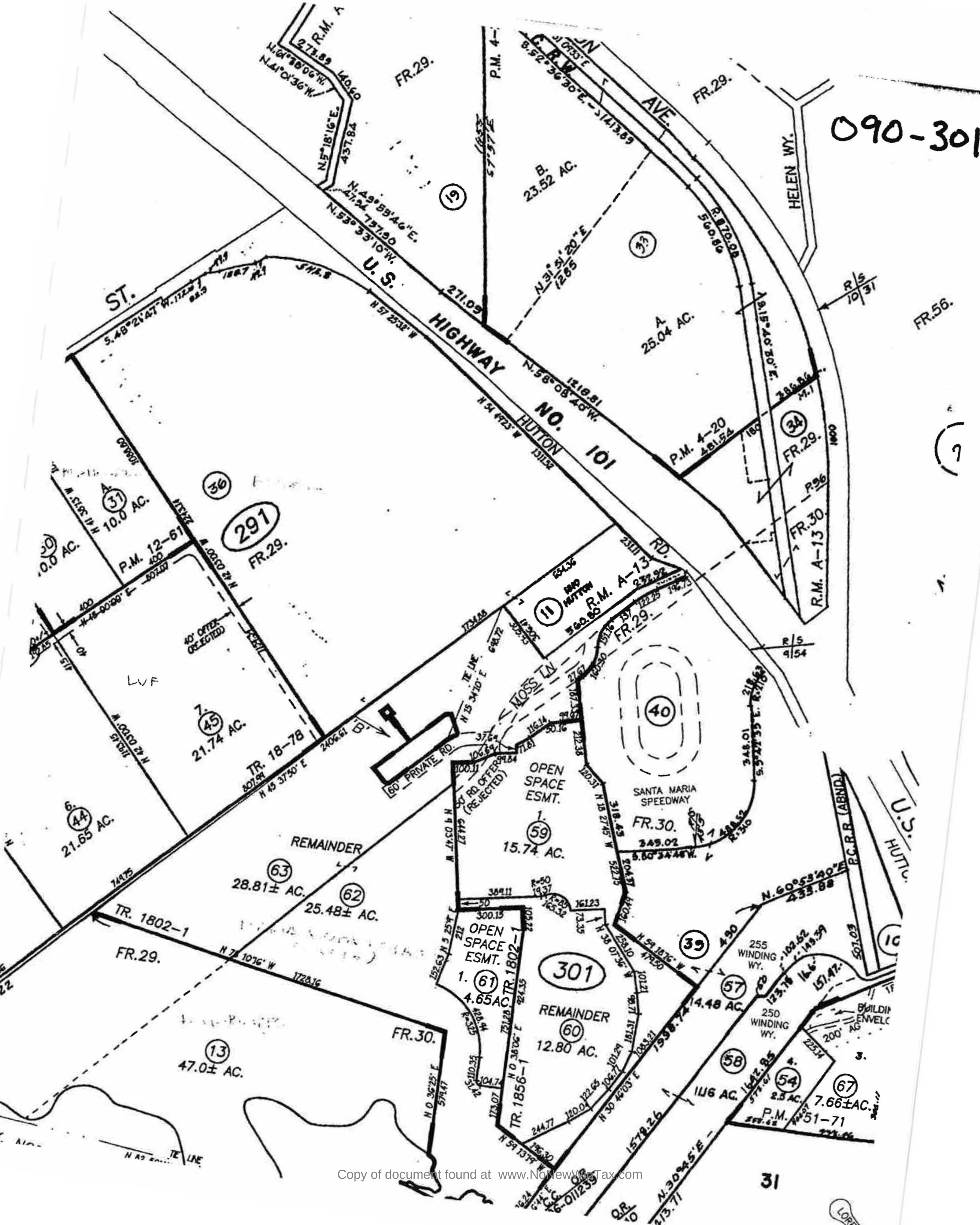

301
N89°59'53"W
559.57
405.25
2.
34
4.59 AC.
33
7
32
31
2.32 AC.
LORENCZ CT.
CUYAMA LN.
PM22-94
27
28
29
30
26
LOT 31
23
4
5
24
9
10
11
25
R/S 12/102
R/S 13/76 21/29
55 + 03.65
NLY TERMINUS N 0°03' 30" E 678.42
3
2280 HUTTON RD.
325 CUYAMA LN.
2250 HUTTON RD.
13
FRONTAGE ROAD
HWY 101
17
6
14
15
16
LOT 32
LOT LINE
N 0°04'40" E
780.28
SAI
400
) FOR
S ONLY.



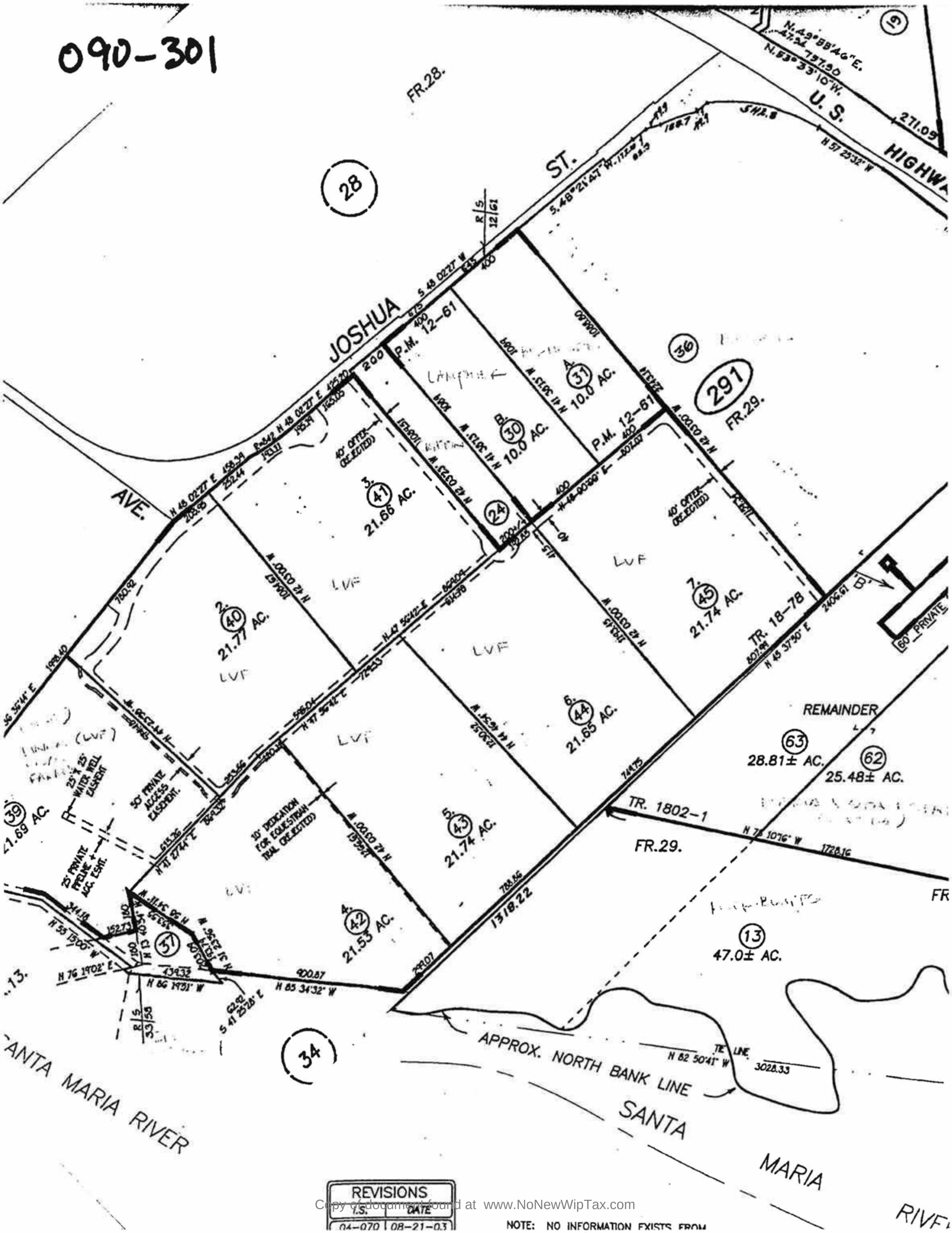
500 1000

TRACT NO. 1802-1, R.M. Bk. 20, Pg. 17.
TRACT NO. 1856-1, R.M. Bk. 20, Pg. 12.
RANCHO NIPOMO, R.M. Bk. A, Pg. 13.

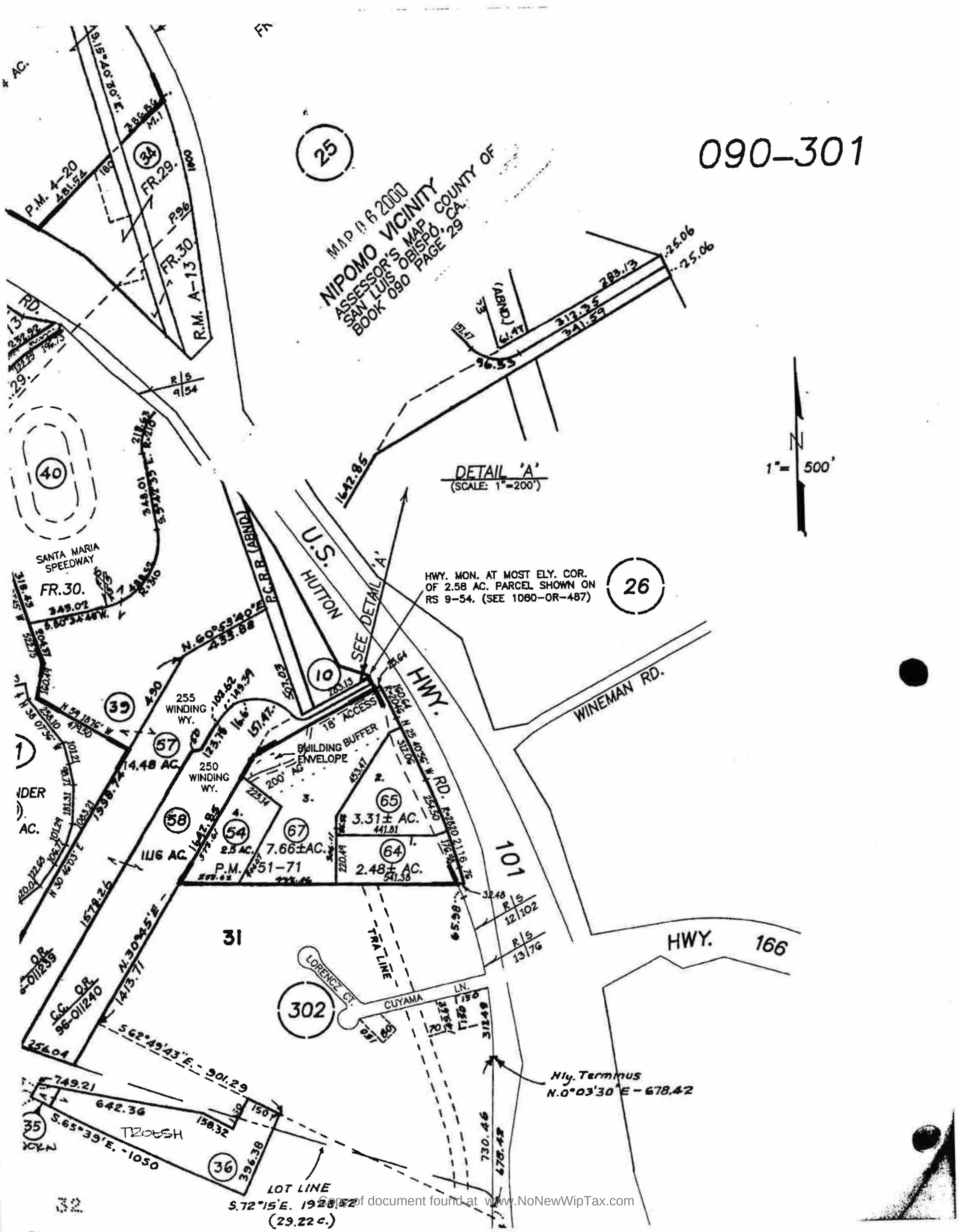
.P IS PREPARED FOR
.MENT PURPOSES ONLY.

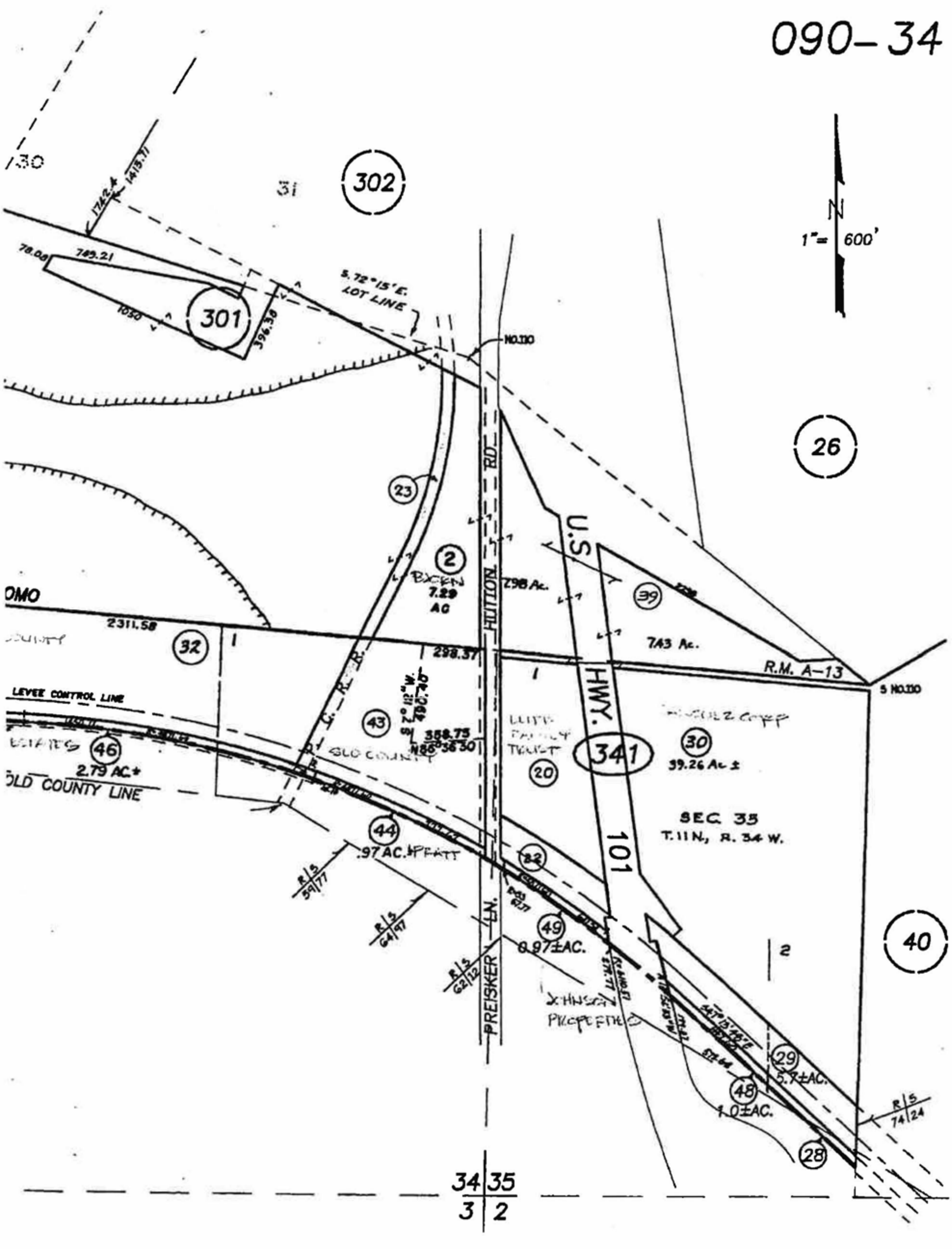

090-301
U.S. HIGHWAY NO. 101
HUTTON RD.
AVE.
HELEN WY.
ST.
MOSS LN.
60' PRIVATE RD.
SANTA MARIA SPEEDWAY
OPEN SPACE ESMT.
REMAINDER
301
291
FR.29.
FR.30.
FR.56.
B. 23.52 AC.
A. 25.04 AC.
A. 10.0 AC.
7. 21.74 AC.
6. 21.65 AC.
28.81± AC.
25.48± AC.
1. 15.74 AC.
1. 4.65 AC.
12.80 AC.
47.0± AC.
14.48 AC.
1116 AC.
2.3 AC.
7.66±AC.
P.M. 4-20
P.M. 12-61
P.M. 51-71
TR. 18-78
TR. 1802-1
TR. 1856-1
R.M. A-13
255 WINDING WY.
250 WINDING WY.
40' OFFER (REJECTED)
50' RD. OFFER (REJECTED)
LVF
31

090-301



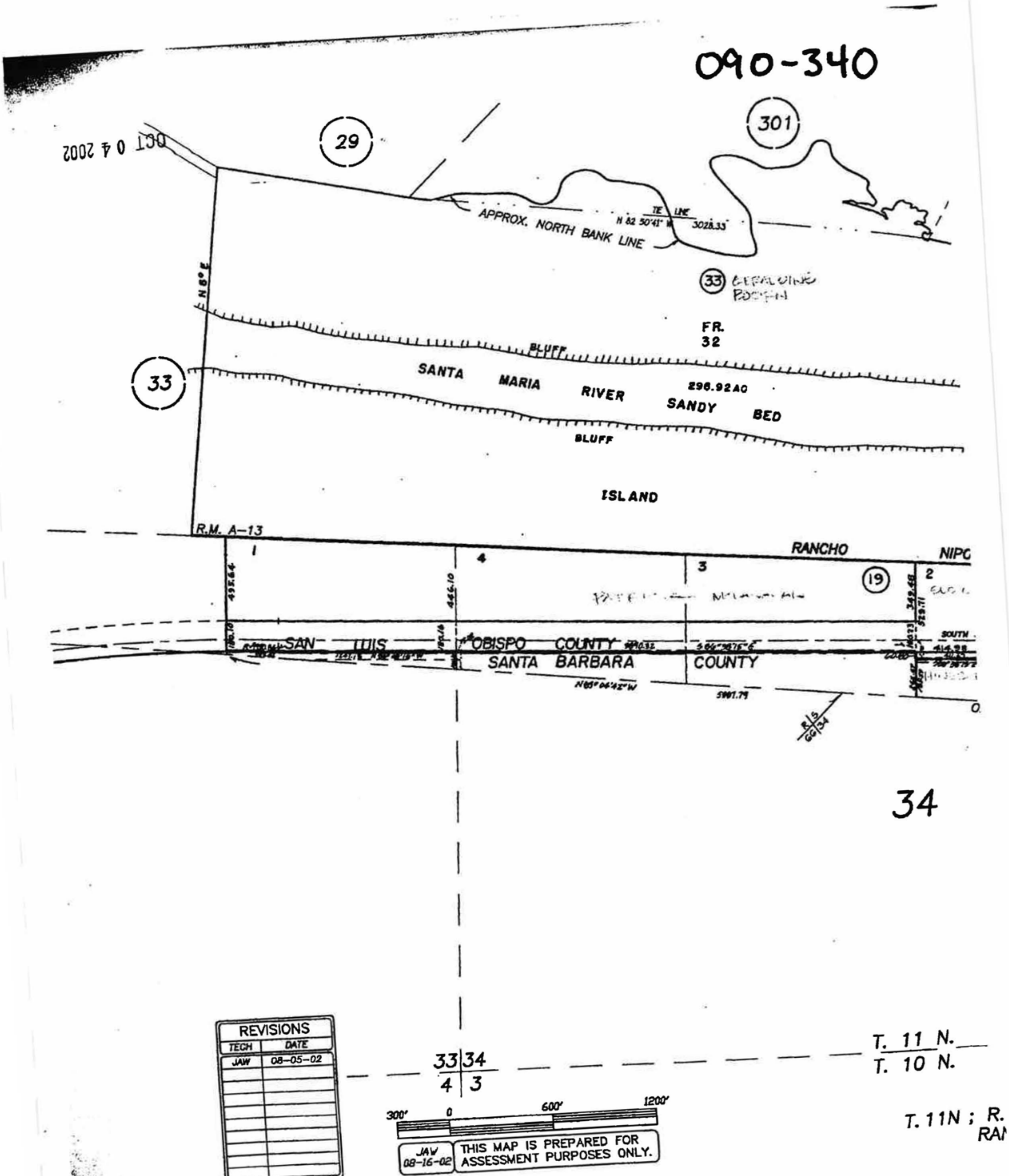
JOSHUA ST.
AVE.
U.S. HIGHWAY
FR.28.
FR.29.
28
291
36
P.M. 12-61
A. 31 10.0 AC.
B. 30 10.0 AC.
24
3. 41 21.66 AC.
2. 40 21.77 AC.
7. 45 21.74 AC.
6. 44 21.65 AC.
5. 43 21.74 AC.
4. 42 21.53 AC.
37
39 21.69 AC.
TR. 18-78
TR. 1802-1
REMAINDER
63 28.81± AC.
62 25.48± AC.
13 47.0± AC.
34
19
LVF
40' OFFER (REJECTED)
50' PRIVATE ACCESS EASEMENT
25' X 25' WATER WELL EASEMENT
25' PRIVATE PIPELINE + ACC. ESMT.
10' DEDICATION FOR EQUESTRIAN TRAIL (REJECTED)
60' PRIVATE
APPROX. NORTH BANK LINE
TIE LINE N 82 50'41" W 3028.33
1318.22
SANTA MARIA RIVER
REVISIONS
I.S. DATE
04-070 08-21-03
NOTE: NO INFORMATION EXISTS FROM


090-301
MAP 0 6 2000
NIPOMO VICINITY
ASSESSOR'S MAP, COUNTY OF
SAN LUIS OBISPO, CA.
BOOK 090 PAGE 29
DETAIL 'A'
(SCALE: 1"=200')
N
1"= 500'
HWY. MON. AT MOST ELY. COR. OF 2.58 AC. PARCEL SHOWN ON RS 9-54. (SEE 1080-OR-487)
SEE DETAIL 'A'
U.S. HWY. 101
HUTTON RD.
WINEMAN RD.
HWY. 166
P.C.R.R. (ABND.)
SANTA MARIA SPEEDWAY
FR.30.
FR.29.
R.M. A-13
P.M. 4-20
255 WINDING WY.
250 WINDING WY.
18' ACCESS
BUILDING BUFFER ENVELOPE
14.48 AC.
11.16 AC.
3.31± AC.
7.66±AC.
2.48± AC.
2.5 AC.
P.M. 51-71
N.60°53'40"E 433.88
N.30°45'E
1413.71
1579.26
1938.74
1642.85
C.G. O.R. 96-011240
LORENCE CT.
CUYAMA LN.
TRA LINE
R/S 9/54
R/S 12/102
R/S 13/76
Nly. Terminus
N.0°03'30"E - 678.42
S.62°49'43"E. - 901.29
S.65°39'E. - 1050
LOT LINE
S.72°15'E. 1928.52
(29.22 c.)
TROUGH
25
26
40
39
57
58
54
67
65
64
10
31
302
34
35
36
32



. 34W; SECTIONS 33 – 35, S.B.B. & M.
NCHO NIPOMO, R.M. Bk. A , Pg. 13.

ASSESSOR'S MAP, COUNTY OF
SAN LUIS OBISPO, CA.
BOOK 090 PAGE 341


090-340
OCT 04 2002
29
301
APPROX. NORTH BANK LINE
N 82 50'41" W
3028.33'
33
FR.
32
N 8° E
BLUFF
SANTA MARIA RIVER SANDY BED
296.92AC
BLUFF
ISLAND
33
R.M. A-13
RANCHO
NIPO
1
4
3
2
19
495.64
446.10
349.48
SAN LUIS OBISPO COUNTY
SANTA BARBARA COUNTY
SOUTH
N65°06'42"W
5901.79
34
REVISIONS
TECH
DATE
JAW
08-05-02
33
34
4
3
T. 11 N.
T. 10 N.
300'
0
600'
1200'
JAW
08-16-02
THIS MAP IS PREPARED FOR ASSESSMENT PURPOSES ONLY.
T. 11N ; R.

APPENDIX F
Contact List

CalTrans
Jim Perano
50 Higuera Street
San Luis Obispo, California 93401
Phone: (805)549-3438

Carollo Engineers
10540 Talbert Avenue Suite 200 East
Fountain Valley, California 92708
Phone: (714)593-5100
Fax: (714)593-5103
www.webmaster@carollo.com

City of Santa Maria
Dwayne Chisam, P.E. Director of Utilities
2065 E. Main
Santa Maria, California 93454
Phone: (805)925-0951 ext 7270
Fax: (805)928-7240
dchisam@ci.santa-maria.ca.us

City of Santa Maria
Rick Sweet, City Engineer
2065 E. Main Street
110 South Pine Street Suite 101
Santa Maria, California 93458
Phone (805)925-0951 ext 227
Fax (805)928-4995
rsweet@ci.santa-maria.ca.us

ConocoPhillips
1580 Battles Road
Santa Maria, California 93454
(805)925-1498
www.conocophillips.com

Nipomo Community Services District
Michael LeBrun, General Manager
P.O. Box 326
148 South Wilson Street
Nipomo, California 93444-0326
(805)929-1133
generalmanager@nipomocsd.com

Pacific Gas & Electric
Jeff Smetters
San Luis Obispo, California
Phone: (805)545-6017

Santa Barbara County Flood Control District
123 East Anapamu Street
Santa Barbara, California 93101
Phone: (805)568-3440

Sempra Energy
Centralized Correspondence
P.O. Box 3150
San Dimas, California 91773
www.sempra.com

Southern California Gas Company
Rich Isbell
750 Industrial Way
San Luis Obispo, California 93401
Phone: (805)781-2440

State Fish and Game
Sandy Brunson
P.O. Box 47
Yountville, California 94599
Phone: (707)944-5520

State Water Resources Control Board
Amanda Schmidt
895 Aerovista Place Suite 101
San Luis Obispo, California 93401
Phone: (805)549-3167

APPENDIX G
Reference List

International Society of Trenchless Technology
Istt.com

Phillips Driscopipe, Inc.
"Technical Expertise" Application of Driscopipe Pipe in Directional-Drilling and River-Crossings, September 1993

Ryan Process Inc.
866 Podva Road Danville, CA 94526

General Electric Infrastructure Water & Process Technology
Technical Paper
www.gewater.com

US EPA, US EPA Region 9
Technical Papers, Standards
www.epa.gov

City of Mountain View Public Works Department
Consumer Confidence Report 2002
www.mountainview.gov

American Water Works Association
www.awwa.org

City of Santa Maria
Quarterly Report for Disinfectant Residuals Compliance, Chloramines
December 28, 2004

Directional Crossing Contractors Association (DCCA)
"Guidelines for a Successful Directional Crossing Package"
www.dcca.org

Whitaker Contractors, Inc.
PO Box 910, 22985 El Camino Real
Santa Margarita, CA 93453

Assessor's Map, County of San Luis Obispo
Book 090 Page 301, 302, 341, 291

Assessor's Map, County of Santa Barbara
Book 117 Page 73

Riverside Estates Tract 5643
Survey Data

Thomas Guide, Street Map 2004

City of Santa Maria Potable Water Distribution System Map

City of Santa Maria Water-Sewer-Storm Atlas
2002 Latest Revision

Final Report – October 2001
Evaluation of Water Supply Alternatives
Nipomo Community Services District
Kennedy/Jenks Consultants

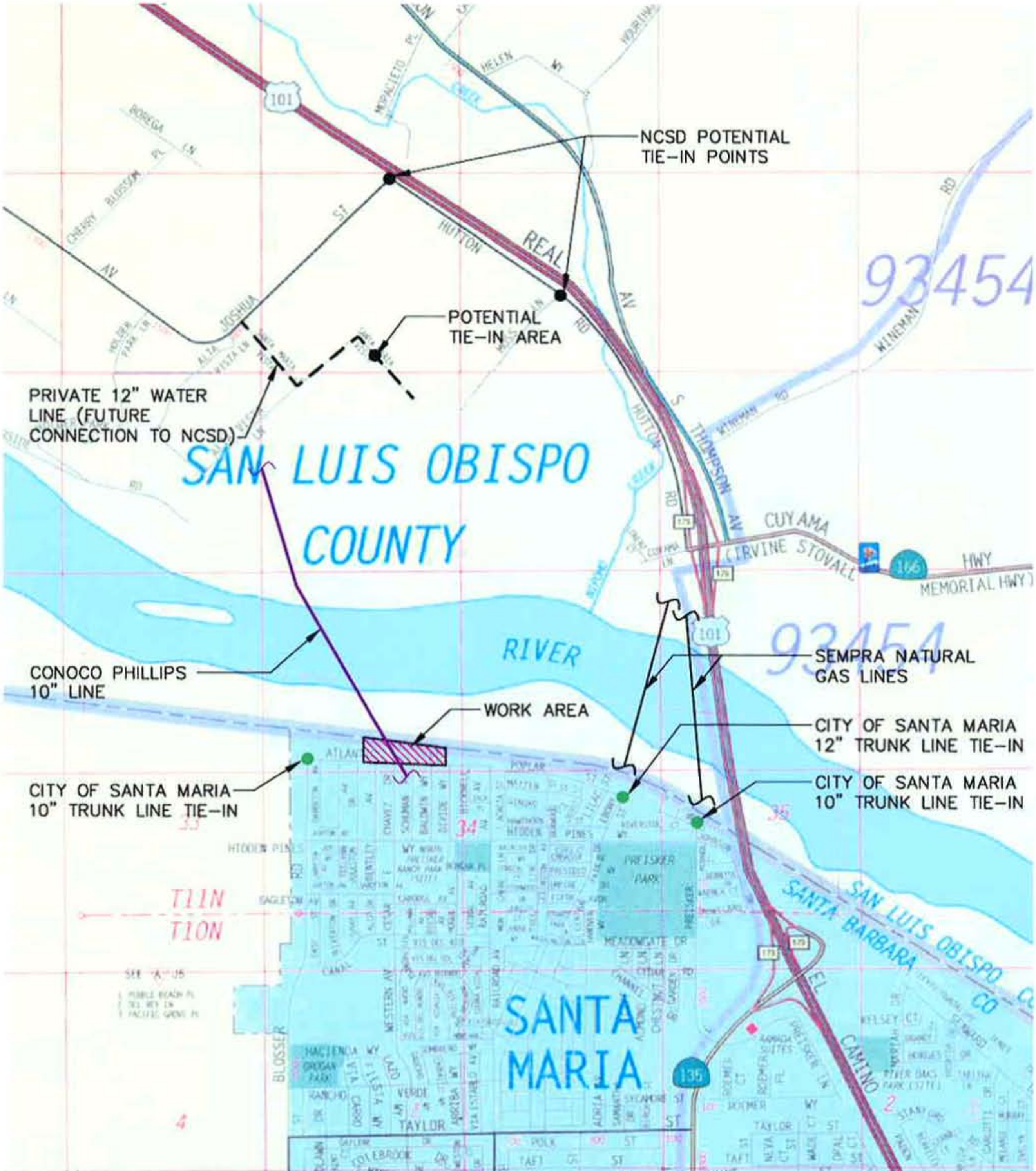


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FIGURE # 2-1
TIE-IN POINTS/
EXISTING CONDITIONS

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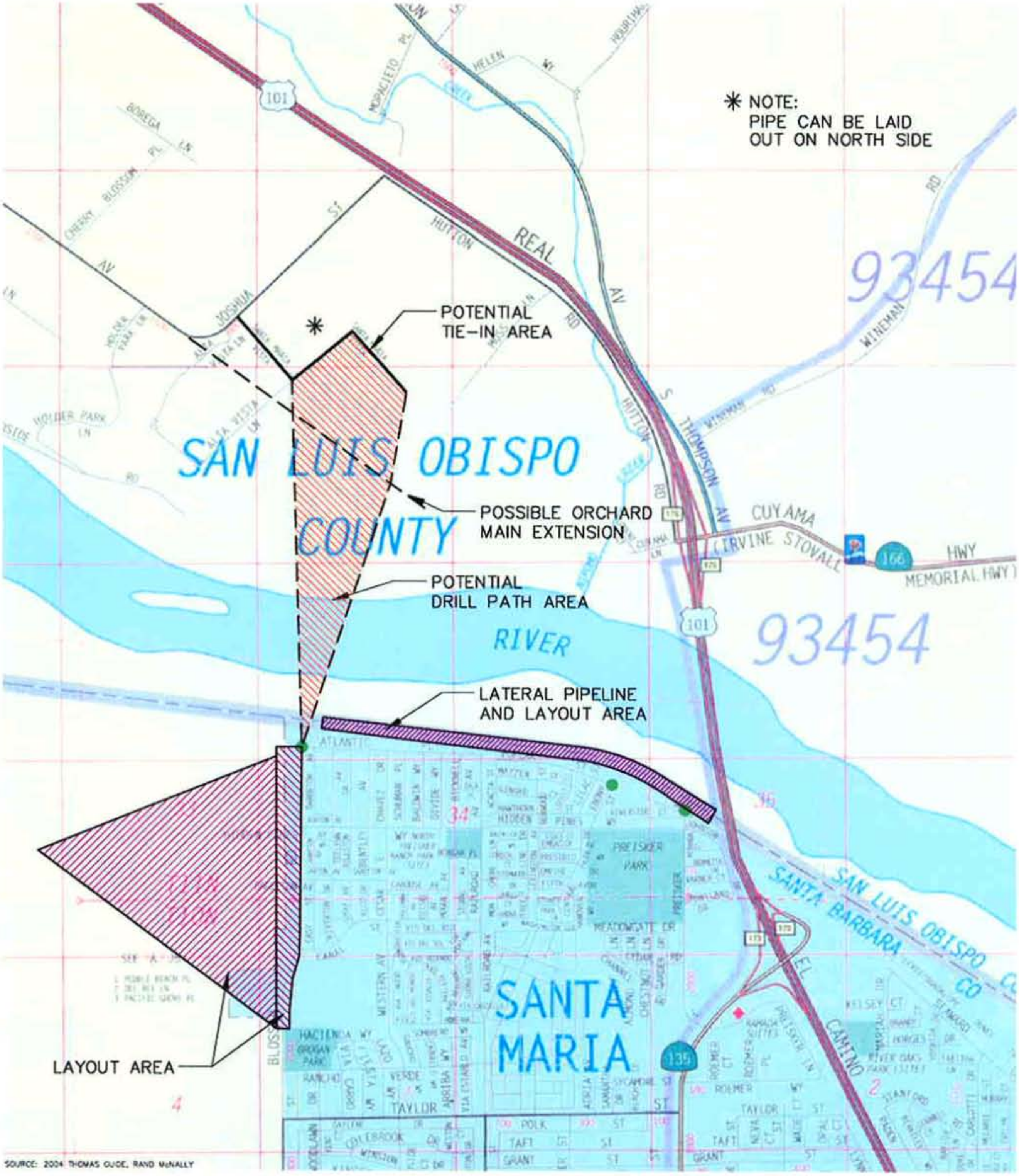

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FIGURE # 4-1A
DIRECTIONAL DRILLING
(CROSSING OPTION A)

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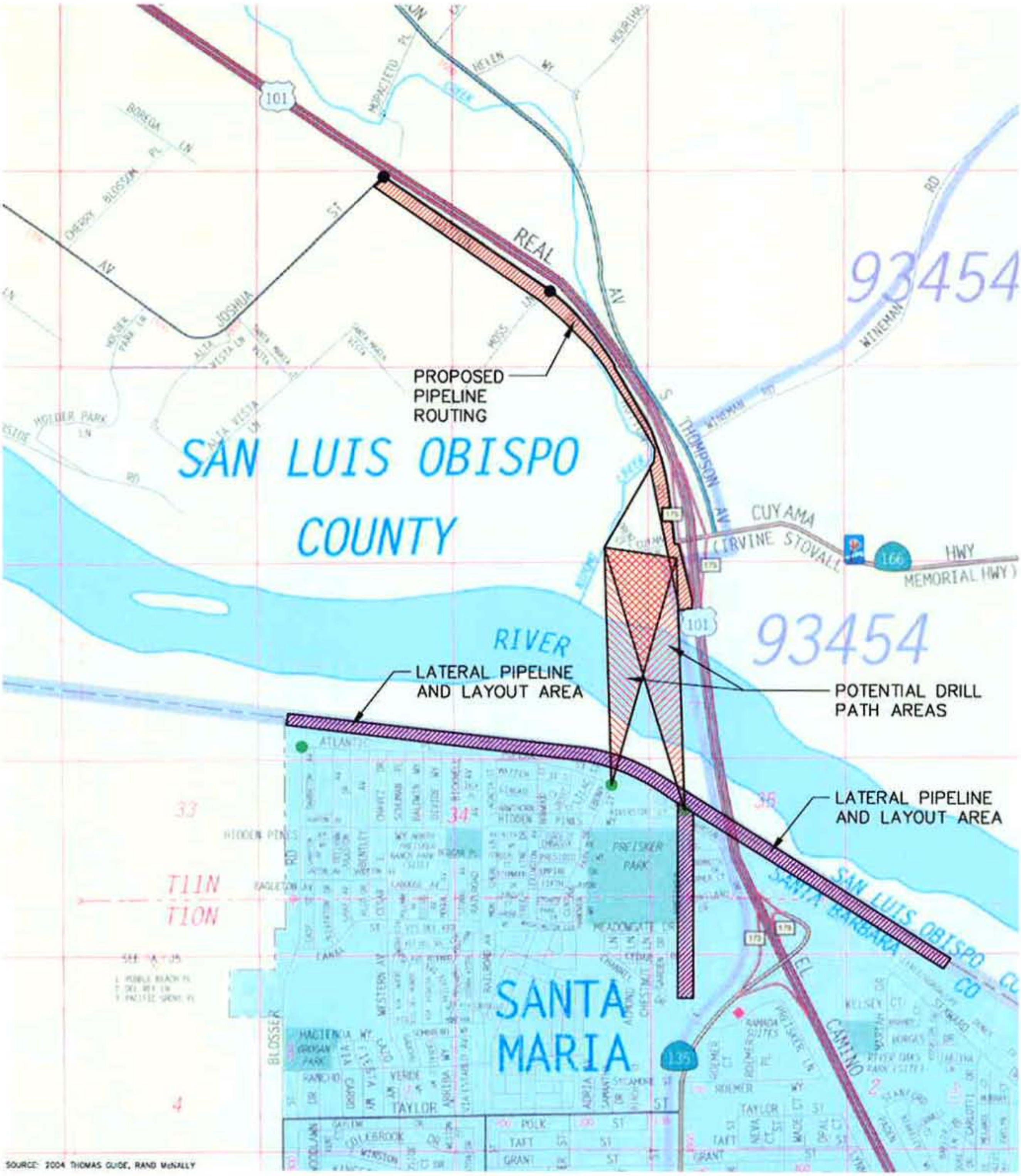

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FIGURE # 4-1B
DIRECTIONAL DRILLING
(CROSSING OPTION B)

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FIGURE # 4–2
EXISTING HIGHWAY 101
BRIDGE ATTACHMENT

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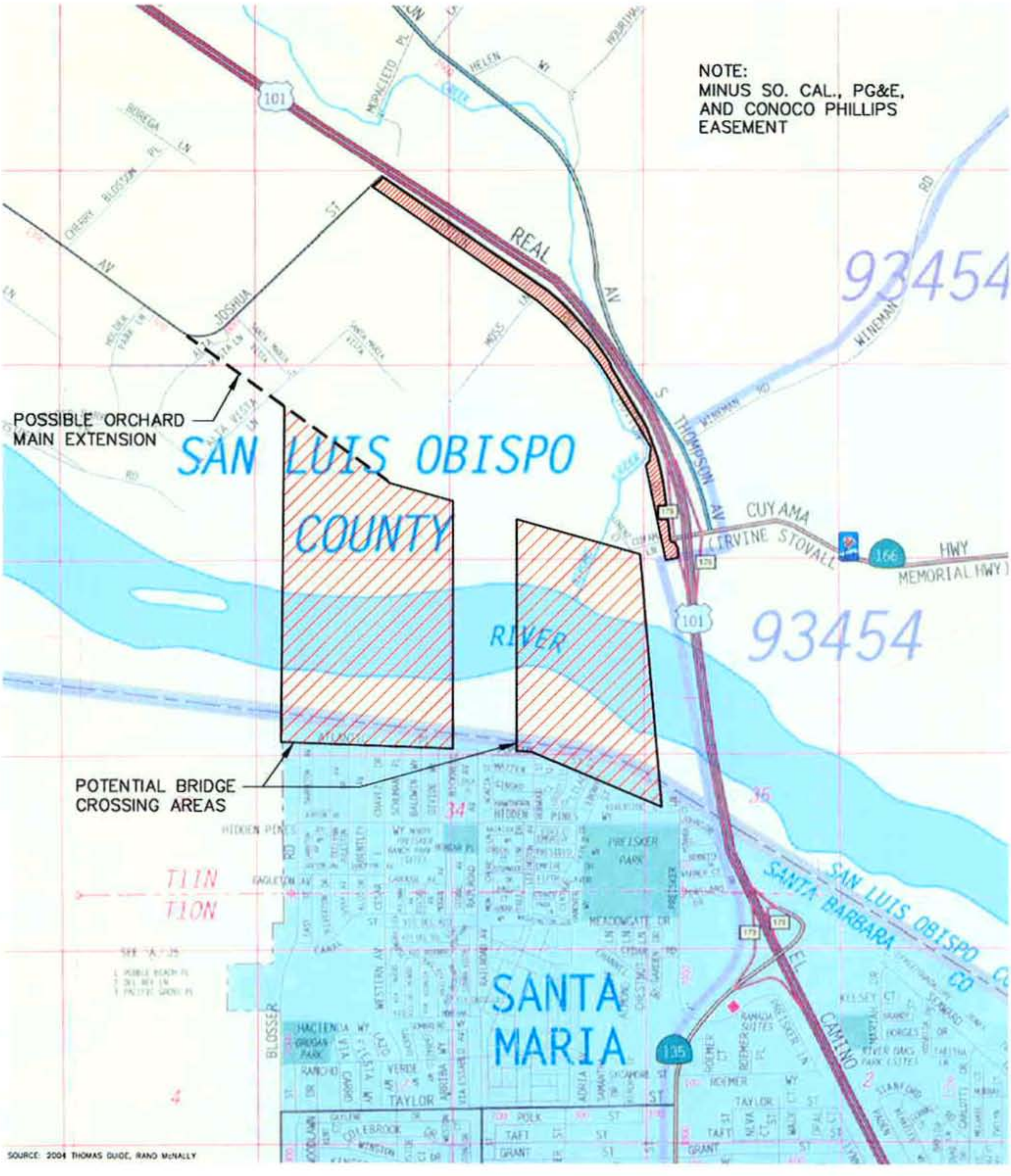

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FIGURE # 4-3 ALTERNATIVE 5 PEDESTRIAN/BIKE OR PIPE BRIDGE

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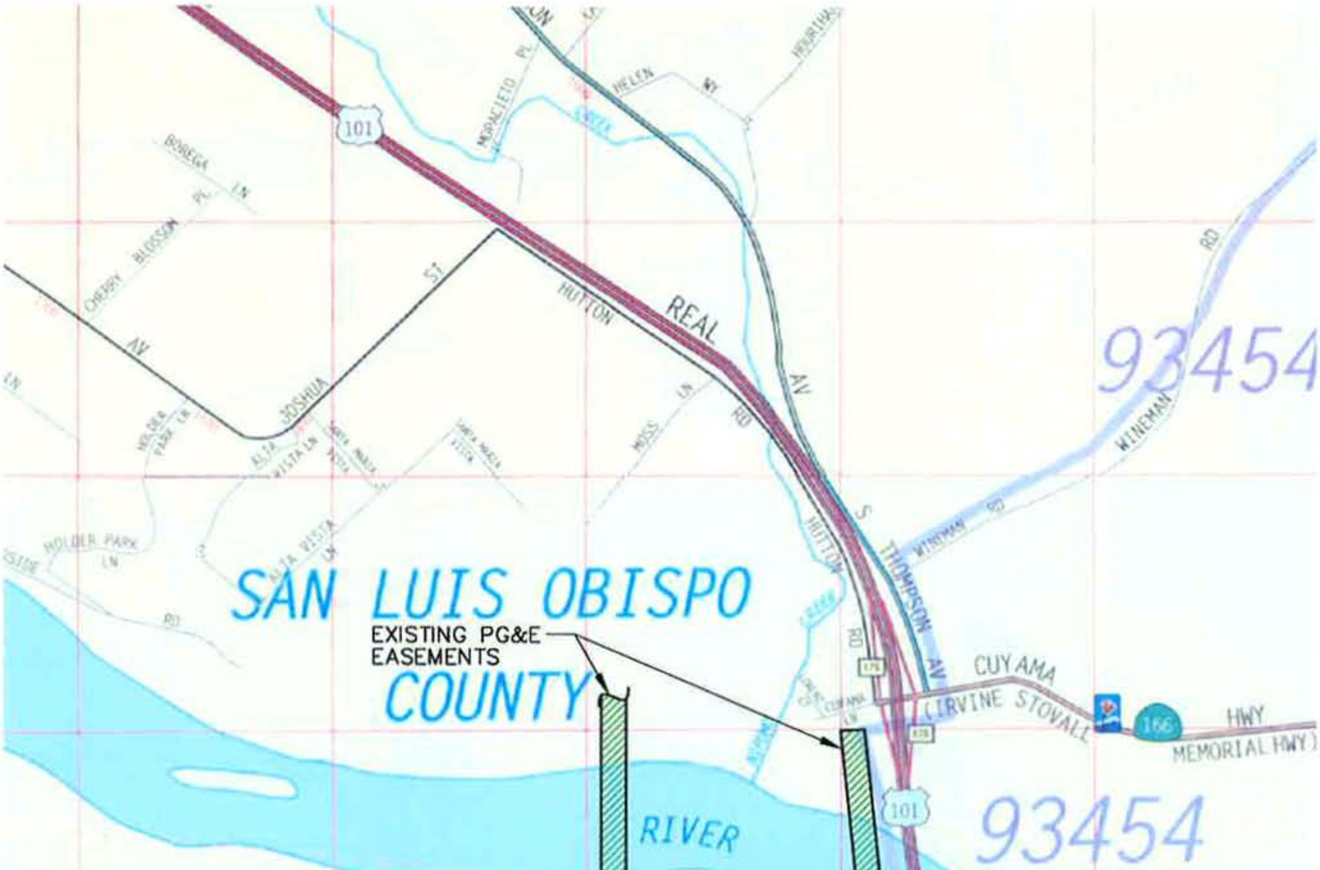

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FIGURE # 5-1
SO. CAL. GAS & PG&E
UTILITY EASEMENT

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