

**CORTE MADERA CREEK PROJECT
TOWN OF ROSS, CALIFORNIA**

**Bypass Culvert Alignment and Impact Study
for the
Corte Madera Creek Flood Control Project
Unit 4, Marin County, California**

Prepared for

**U.S. Army Corps of Engineers
San Francisco District**

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By

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Final Project Report

For the

Bypass Culvert Alignment and Impact Study for the Corte Madera Creek Flood Control
Project, Unit 4, Marin County, CA

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Introduction:

This report was prepared at the request of the U.S. Army Corps of Engineers and is the result of a flood control bypass study made on a portion of Corte Madera Creek in the Town of Ross. Specifically, the study compares two potential bypass alignments that originate near the southwest corner of the exiting Corte Madera Creek Bridge southerly abutment and terminate at the lined channel area adjacent to the existing timber fish ladder.

Criteria established for this study centered around the construction of an underground bypass culvert that would result in the least amount of inconvenience to the infrastructure of the Town of Ross, maintain public traffic thru the site with the least amount of disruption to both through and local traffic, and a safe, workable construction plan for the bypass.

Results contained within include (a) an impact analysis of the two alignment choices; (b) Comparison of the difficulties presented by each alternative; (c) a recommended choice between alternatives; (d) a construction plan to show what the bypass construction work would entail including project staging, and traffic handling; (e) detailed listing of materials to be used and estimated costs; (f) and finally a set of electronic drawings that depict the alternative alignments, existing utilities, existing property lines and easements, staging and areas available for a contractor to establish a construction yard for equipment and materials, plus traffic handling detail.

General Discussion:

Due to the existing permanent flood control channel improvements on Corte Madera Creek both upstream and downstream from the Lagunitas Road Bridge, the limits of where the bypass would start and where it would end are essentially established.

Although there is some minor latitude for adjustment at each end, the locations of where the bypass culvert will enter the Creek banks are fixed.

Upstream Entrance Location:

The upstream entrance location needs to be close to the northwest corner of the westerly Bridge Abutment. Any alignment choice has to pass through the west end approach to this Abutment.

This area happens to contain elements of all 6 existing public utilities servicing the Town of Ross: (1) Sanitary Sewer District #1; (2) Marin Municipal Water District; (3) PacBell Telephone, underground; (4) Pacific Gas; (5) Pacific Electric, both overhead and underground; (6) ATT Cable, copper and fiber optic lines. There is also a fire hydrant in place.

Lagunitas Road over the Corte Madera Creek Bridge is one of the several main thoroughfares into the Town of Ross, with an ADT of about 1500 vehicles per day. The Town of Ross Fire Department firehouse is located very near the easterly Abutment of the bridge, so that access across the bridge must be maintained at all times. There is not a viable detour alternative across the creek for suitable fire response time to be maintained.

There is also the smaller private road (Sylvan Lane) that accesses Lagunitas Road just west of the bridge westerly Abutment. Turning motions onto Lagunitas Road from Sylvan Lane are not easy now, with out any considerations of traffic changes. Any detouring of Lagunitas Road must include consideration of in/out traffic for Sylvan.

Downstream Exit Location:

The downstream end of the proposed bypass should logically enter the lined creek channel just north of the existing timber fish ladder. An exit further northerly on the Creek channel would involve access into the forested park area that extends easterly on the west bank of the creek.

There are two underground utility lines to consider in this area: (1) Sanitary Sewer Dist. #1 line; and (2) Marin Municipal Water District. There is a fire hydrant also at this location.

The U.S. Post Office parking lot is adjacent to the chain link fence guarding the creek channel, and there is a significant amount of daily traffic into this area to the Post Office. There is also a significant number of vehicles parked here by residents who walk or cycle on the improved path into the park area along the west creek bank. The main traffic access into the lot is from Ross Commons.

Alignment Areas Available:

There are two logical main alignments that present themselves. Choice of either alignment must include the fact that existing conditions on either end will not change significantly, as outlined above.

Either alignment will present its unique traffic/utility and disruption issues. The decision of which alignment to choose will depend on how these issues can be practically resolved.

Potential Alignment #1:

This alignment can be described as originating at the area near the northwest bridge abutment, passing across Lagunitas Road at a near right angle, proceeding parallel and close to the westerly bank of the creek, between the Post Office loading dock area and the permanent sheet pile retaining structure at the Creek bank, and turning back toward the timber fish ladder area of the creek channel lining. This routing is nearly all on the property now occupied by the Post Office, and only involves public Town traffic on Lagunitas Rd., and access to Sylvan Lane.

Potential Alignment #2:

This alignment originates at the same area near the bridge abutment. However, the alignment angles across Lagunitas Rd. in a southwesterly direction toward Ross Common. Routing continues down the southeasterly curb line of Ross Commons, past the Post Office building, and then turns southeasterly into the Post Office parking lot and ending near the timber fish ladder area. This routing is mostly on town streets and will affect traffic on Lagunitas Road and Ross Common.

Comparative Alignment Issues:

Existing Physical Conditions- Alignment #1:

- Total available working area is very limited on this single-lane parking lot entrance.
- There is very little room for a Contractor's staging yard along side the potential excavation zone.
- At the exit end of the culvert, the alignment will need to curve westerly before entering the existing channel lining area, to avoid the construction leaving a narrow sliver of existing creek bank between the creek and the new concrete culvert, which could be unstable.
- There is a tight restriction or "choke zone" between the Post Office loading bay and the existing sheet pile retaining wall on the Creek bank.
 - The minimum horizontal space available is 19'-7".
 - The reinforced box culvert section needed to carry the projected floodwater volume will occupy a horizontal space of 19'-0".
 - The remaining 7" is insufficient for concrete forms and trench shoring.
- Sheet pile shoring would have to be driven very close to the Post Office building—subsidence due to driving activities may result in some structural damage.

Existing Physical Conditions-Alignment #2:

- Ross Commons (the street) has apparently been improved fairly recently and consists of 2 full lane widths from Lagunitas Road past the Post Office Building area.

- There is sufficient width available for the culvert construction area and a single one-way traffic lane.
- Street parking for the Post Office exists on both sides of Ross Commons, which could be modified to allow more room for the project to be built.

Impact of Construction on Utilities—Alignment #1:

- There are 2 existing waterlines that parallel the southerly Creek bank along this entire Alignment—a 12-inch cast iron pipe (CIP) and a 24” welded steel pipe (WSP).
 - There is insufficient existing width along this Alignment to either relocate or temporarily “shoofly” these two water lines alongside the culvert excavation.
- There is an existing 36-inch Sanitary Sewer line at the easterly end of the Post Office main parking lot that transitions to a 24-inch reinforced concrete (RCP) line at an inlet box.
 - The inlet box may need to be relocated.
 - Depending on actual existing invert elevations, it should be possible to relocate the inlet box back along the 36-inch line and lower the 24-inch line to miss the new culvert invert.

Impact of Construction on Utilities—Alignment #2:

- There is an existing 36-inch Sanitary Sewer that runs along Sylvan Lane, crosses Lagunitas Road, and then runs southeasterly along Ross Commons to the inlet box described above in the discussion of Alignment #1.
 - At the northerly end of Alignment #2, culvert excavation may avoid this 36-inch sewer by crossing the southeast corner of Lagunitas Road and Ross Common. However, if the sewer excavation elevations are low enough to be in conflict, may be necessary to adjust the sewer from the manhole at the west end of Ross Commons. With the observable sewer grade needed to catch the 39-inch sewer on the north side of the existing channel lining, it would appear that this adjustment could reasonably be made.
 - At the southerly end of Alignment #2, it should be possible to miss the inlet box and cross over the 24-inch connecting line that apparently runs through or under the Creek. If not, then the inlet could be relocated back along the 36-inch and the 24-inch line lowered (if needed) to allow the new culvert to pass over. There is also an abandoned Sanitary Sewer in this area that, once properly located, can be cut thru and plugged.
- At the southerly end of Alignment #2, the same 2 existing waterlines, the 12-inch and the 24-inch will pass directly over the excavation for the new culvert.
 - There are 2 ways to approach this conflict: (1) If these lines are at the normal utility depth underground, then the needed new culvert invert elevation should allow it to pass under these 2 waterlines. If not, they can be adjusted for the 20-foot width of the excavation. (2) If the interference in elevation is quite close, it would be possible to adjust the concrete culvert wall height and flare the walls out to allow the same available cross section. This would require a special design perhaps using an

integral reinforced concrete beam external to the top slab to accommodate a moderate increase in top slab design span.

Public Traffic/Safety-Alignment #1:

- As this proposed alignment would cross Lagunitas Road at nearly right angles near the creek bridge abutment, excavation would need to be staged to allow a single one-way traffic lane through the work area.
 - The location of this lane would change as the excavation is done up to the approximate centerline of Lagunitas Road, stopped, culvert construction completed and backfilled, and traffic shifted to run over the new culvert section.
- Residents of Sylvan Lane would be required to make a right turn only when exiting—it would be necessary for them to go westerly on Lagunitas Road and make a turn-around at Poplar Street. Right turns into Sylvan Lane may require special signage and detour design.
- There are no other real traffic impacts for the balance of this Alignment, other than for customers of the Post Office. Their accustomed route along the exiting one-way back entrance to the Post Office would change to using Ross Common exclusively. There would also be impact to the Post Office main parking lot, which could be mitigated by work staging.
- Exposure to safety issues during construction for the traveling public would be minimal, as most of the work would be done away from mainstream traffic.

Public Traffic/Safety-Alignment #2:

- Construction will cross Lagunitas Road at a more oblique angle. Traffic detouring would be similar to that for Alignment #1; however, there would be somewhat more room for setting up the lane changes.
- Along the northerly end of Ross Common, the alignment of the new construction would follow the easterly side of the street as much as possible and still miss the sewer manhole in front of the Post Office. Traffic would be shifted to the westerly side of the street. A one-way detour to be established with southbound traffic using a single lane on Ross Common and northbound traffic using the “long way around” via Brookwood /Bridge Road/Willow Ave. back to Lagunitas Road. Traffic would remain in this location through the construction of the new culvert underneath Ross Common.
- Post Office customers would not be allowed to use the parking spaces on either side of Ross Commons. Also during the construction of the culvert through the main parking lot, customers would not be able to use the westerly end of the lot and access to the main lot may be restricted. Note also that this lot is used by Poplar Street business parking.
- As a safety issue, there will be more exposure time for the traveling public to the construction operations due to using the Ross Common Street. However, this can be mitigated by requiring the proper traffic safety/delineation devices and proper staging of the work.

Public Health Considerations:

- Public Health Concerns involve the same issues for the completed bypass culvert under both Alternative #1 and Alternative #2.
- Possible access by vagrants or curious children at either end of the culvert could be defeated by use of heavy-duty bar screening that can be removable for inspection. The attraction of such a screening for climbing in and out of the Creek channel may also need to be mitigated; however, it could be argued that in an emergency the screening would provide an escape route from rising waters.
- The potential of standing water inside the culvert can be mitigated by the following (1) Although the existing Creek stream bed gradient is about 3 feet drop in about 750 linear feet, the culvert invert can be graded more steeply to increase flow, consistent with utility clearances; and/or (2) the culvert invert can be sloped transversely to force minimal flows to either of the wall corners to avoid standing puddles as potential mosquito breeding areas.

Effect on Trees/Vegetation-Alternative #1:

As a general note, it is recommended that an arborist be retained for consultation during the life of the construction project under Contract Change Order, to both be on-call for specific situations and to monitor any actual tree trimming/pruning needed. This should be done regardless of which Alternative is chosen.

- At the upstream entrance to the bypass culvert, construction alignment can be designed to minimize effect on the trees and vegetation on the westerly bank of the Creek. The easterly bank of the Creek should not be affected at all by new construction.
 - Recommended alignment would involve removing approximately the upper 1/2 of the northwesterly bridge wing wall.
 - There are 2 trees that may need to be considered:
 - The first tree immediately adjacent to the end of the wing wall may likely require removal. This particular tree has in the past been heavily pruned and topped off, and leans quite sharply.
 - The second tree to the northwest is in nice shape and will probably not need removal; however, the root structure may be involved and this cannot be seen until construction begins, hence the need for an arborist.

- Along the westerly Creek bank and along the small landscaped area north of the Post Office, there will be some minor trimming of overhead branches to avoid further damage by construction equipment.
- At the downstream end, there doesn't appear to be any trees or existing vegetation effected by proposed construction. However, the estimated excavation depth of approximately 13 feet may uncover some roots that would require appropriate trimming.

Effect on Trees/Vegetation—Alternative #2:

- At the upstream entrance to the bypass culvert, the impacts are essentially the same as under Alternative #1.
- At the southeast corner of Lagunitas Road and Ross Common, the excavation may involve the root structure of the existing conifers at this “mini park” area.
- Along Ross Commons, there may be some root structure discovered during the main excavation; however, there should be no need for upper level tree branch trimming.
- At the downstream end, the impacts are also essentially the same as under Alternative #1.

Comparative Construction Cost Differential:

As commented on under Summary Comparison of Alternatives on Page 9 of this report, Alternate #1 routing is not possible under the existing design premises for the culvert bypass and due to lack of room to reroute the 12-inch and 24-inch water mains that fall directly along the available room to construct the culvert.

If there were no waterlines to deal with and *if* the culvert size could be reduced, *then* the direct cost comparison of Alternative #1 and #2 would be based on a shorter length of culvert and no need to rebuild a roadway section along Ross Commons. Those estimated costs would be as follows:

- Alternative #1 Est. Costs = \$2,002,495 (Refer to Page 17)
- Alternative #2 Est. Costs = \$2,231,121 (Refer to Page 18)
- Difference = \$ 228,626

However, this doesn't reflect a major cost to relocate the 2 water mains prior to construction, which would have to be done thru Ross Commons under a separate contract.

Comparative Maintenance Issues—Alternatives #1 and #2:

There are two principle maintenance issues for the Flood Control and Water Conservation District: (1) Natural drift brought downstream by floodwaters; i.e. parts of trees, trash etc., and (2) Soil and small rocks carried by the larger flow volumes.

- (1) If the proposed large metal gratings are used on both ends to limit access to unauthorized people, then the following possibilities are presented:
- If the gratings are left in place year-around, then it is likely that drift may accumulate on the upstream end of the bypass. If so, then the District may need to remove any drift that stuck in the gratings to prevent damming. The number of times this would be needed depends on the number of flood stage occurrences during the storm season. However, inspection would be easily done from the Corte Madera Creek Bridge sidewalk with minimal effort. Conceivably the drift material could simply be loosened and allowed to drop to the channel invert, to be flushed downstream by the next storm.
 - If the gratings are moved/opened during the storm season, then the natural drift can enter the culvert and may stop inside. This presents a more serious maintenance problem due to the access needed and having to physically inspect the inside after a major storm incidence. Heavy equipment (i.e., a small Bobcat-type loader) may be needed to remove major drift, in turn requiring equipment access to reach the culvert.

(2) Using sufficient gradient for the bypass invert and sloping the invert may provide a self-cleaning action for the soil/rock carried by high water. It would seem that an annual inspection would discover if this is the case and if some minor damming occurs from accumulated fines, then some handwork should allow any trapped water to drain.

Comparison with other Culverts:

Santa Clara Water District (SCWD) has advertised a project entitled "Lower Silver Creek Flood Protection Project" with a Bid Opening Date of April 17, 2002. This project is estimated to cost between \$14- and \$17million, and includes 1200 LF of rectangular concrete channel. This project may be a good comparative alternative as costs would be more current and more appropriate to this study. A contact with SCWD in the Construction Administration Unit is Roberta Costman at (408) 265-2607.

Summary of Comparison of Alternatives:

The difficulty of construction, estimated costs, and utility interference at either end of the proposed bypass culvert are quite similar for either Alternatives #1 or #2. This is true for about the first 30-ft of culvert on either end.

The real differences between Alternatives occur in the middle of the culvert "barrel" between the connections to the existing Creek. Practically speaking, the deciding factors are (1) Physical room available to do the work of building the new culvert, coupled with (2) Practical underground utility avoidance, minor shifts or temporary movements.

The physical room available for the Alternative #1 alignment is the real deciding factor in making a decision between Alternatives. There is just insufficient horizontal space between the Post Office Building and the permanent sheet pile retaining wall directly opposite the Post Office loading bay to build the bypass culvert. Sizing of the culvert is based on hydraulic need or how much water flow is expected; the structure dimensions needed to provide this size are simply too wide to fit the available opening. (Please refer back to the discussion of Existing Physical Conditions-Alignment #1 on Page 4)

However, the room issue also comes to play when considering the 12-inch and 24-inch Marin Municipal Water District waterlines that parallel the alignment of Alternative #1. In many cases when such a utility conflict occurs, it would be possibly to reroute or temporarily "shoofly" the existing pipes in a parallel alignment.

Just as there is insufficient horizontal room to build the culvert itself, there is no practical way of rerouting these lines, which must remain active for fire protection and general health-and-welfare purposes. Short of some Herculean efforts in the form of either raising these pipes above ground from the Creek bank on an elevated temporary structure, or rerouting both pipes down under Ross Commons in advance of any construction of the new culvert, this is just not a reasonable alternative.

The issue of comparative costing really doesn't enter into the choice between Alternatives. Even the additional length of the culvert required under Alternative #2 alignment with its obvious cost increase over Alternative #1 does not govern due to the existing site conditions.

Neither does the issue of the stated goal to reduce disruption to Town traffic to a minimum really govern. The worst traffic disruption will occur at the intersection of Lagunitas Road and Sylvan Road/Ross Commons confluence. Either Alternative will cause about the same amount of traffic flow disruption at this area.

Alternative #2 actually adds to the disruption of traffic flow on Ross Common over that which could occur if Alternative #1 alignment was even physically possible.

Recommended Alignment:

Taking into account the governing factors of physical restrictions and location of existing utility facilities, the clearest alternative is Alignment #2.

Maintaining the best traffic flow and access for public traffic with the least amount of disruption to Town traffic will be minimized during construction by the

use of 4 Stages of work, as is discussed under “Recommended Project Staging” on Page 11 of this Report.

Detailed Construction Plan (Methods and Materials)

- The bypass structure is to be constructed as a single-cell reinforced concrete box culvert. The connections to the Corte Madera Creek will also be reinforced concrete wing wall/flares that will be designed to fit the conditions existing at each end of the bypass
- The reinforced box culvert will be constructed by the “cut-and-cover” method; i.e., a large trench will be excavated with driven sheep piling retaining the sides of the excavation. After excavation, the concrete box culvert section will be placed in two parts: first, the bottom slab will be placed, and then the sides and top slab placed at one time. Then, the excavation will be backfilled and a new riding surface (asphalt concrete) will complete the installation.
- Recommended Project Staging is as follows:
 - Stage I will start from the downstream connection to the Creek and proceed southerly to approximately the northerly curb line of Ross Commons. Most needed adjustments to the 36-inch Sanitary Sewer should be done under this stage.

Traffic on Ross Commons will not be affected during Stage 1, except for access into the Post Office main parking lot, which will probably be closed. Parking for the Post Office and adjacent Poplar Avenue will be on Ross Commons, with the possibility of creating additional parallel parking slots along Ross Commons.

- Stage II will start from the end of Stage I at the northerly curb line of Ross Common and proceed westerly to the area adjacent to the easterly edge of Lagunitas Road. Utility adjustments that are needed will be mainly confined to the northerly end of the Stage II, although some adjustment of the 36-inch sewer may be necessary. Depending on invert elevations encountered at the manhole directly in front of the Post Office, a sub phase to Stage II may be needed.

Traffic on Ross Commons will be limited to a single southbound lane, with northbound traffic detouring over town streets via Brookwood/Bridge Road/Willow Ave. back to Lagunitas Road.

Traffic through the construction zone will be protected by placement of portable concrete “K-Rail” sections along side the westerly side of the excavation, or the possible use of extended lengths of steel sheet piling used as shoring with a suitable “rub rail” installed.

Stage IIIA and Stage IIIB will start near the southerly edge of Lagunitas Road and proceed northerly to the upstream connection to the Creek.

Stage IIIA will establish a one-way traffic control on Lagunitas from approximately the center pier of existing Corte Madera Creek Bridge that will continue westerly on the existing westbound lane from the Bridge. Culvert construction will then continue from the end of Stage II to the approximate centerline of Lagunitas Road.

A significant amount of utility adjustment may be needed in Stage IIIA that must be done prior to shifting traffic for Stage IIIB work. Sylvan Road traffic will be restricted to a right hand turn exit onto Lagunitas Road.

Stage IIIB will switch to a one-way traffic control onto the eastbound lane of Lagunitas Road and the bridge, with traffic traveling over the Stage IIIA completed work.

The majority of utility adjustments will be needed during this Stage. However, some of the demolition and preliminary construction at the upstream entrance area can be done at the same time, which will help reduce the overall time.

Construction Time and Allowable Windows of Opportunity

- The combination of the above staging plan plus the Calif. Fish and Game (F&G) limits of work near Corte Madera Creek will require a full construction season plus as much as 2/3 of the next construction season. The time to complete will be greatly dependent on how much utility relocation can be done concurrently in any one Stage.
- With the F&G limit of start time of June 15 and the end time of Oct 15 for work near the creek, the available number of normal working days is approximately 90. (There may be some negotiation on this time limit when the permit is actually obtained.) The amount of work to be done cannot reasonably be done in less than an estimated total of 150 working days. Hence, the work will take more than 1 season to complete.

- There is no clear advantage in attempting to relocate underground utilities prior to the bypass construction under a separate contract. It may be possible to limit the amount of utility adjustment by small modifications to the box culvert cross section as discussed on Page 5 of this Report, under “Impact of Construction on Utilities—Alignment #2” depending on exactly what elevation the existing utilities are found. However, overhead work needed such as relocating the wooden power pole at the northwest corner of the westerly Bridge Abutment could be done during Stage I or Stage II.
- In summary, the estimated Construction Time is 150 Working Days, within the F&G limits of June 15 to October 15 to complete the project.
- It is not anticipated that any Hazardous Material problems will be found.
- It is anticipated that the 3 existing water mains along Lagunitas Road at the approximate excavation area (the 18-inch Lock Converse Sausalito Line, the 12-inch Cast Iron Sugar Line, and the 12-inch Cast Iron Federal Works Line) that do not have any reliable as-built information may cause some delay during excavation operations. Unfortunately, Marin Municipal Water District can only approximate where these lines are and how well they are bedded. This can only be practically ascertained by extensive pre-construction “potholing” or during the actual excavation. Some very minor alignment changes could be made for the bypass culvert; however, the invert elevation cannot easily be changed at the last minute.
- Estimated Construction Costs:
- Please refer to Page 16 for a worksheet showing the various materials and activities that are needed to construct this project. Estimated costs are from completed work done during the year 2000, modified by some current project information obtained in March 2002. Some of the more non-definable costs such as utility relocation and other “lump sum” items of work are based on the author’s experience.

Summary of Recommendations on Zoning, Easements, Road Closures and Contract Requirements:

- Zoning:
 - The use area for this construction project falls within the town zoning designated as Municipal or Quasi-Municipal, with the exception noted under “Easements” below. Therefore, there would be no need for zoning variations. The Post Office Building and parking area(s) fall in this zone.
- Easement Needed:
 - There will be one construction easement required for this project, which occurs at the northwest corner of the intersection of Lagunitas Road and

Sylvan Lane. The Assessor's Map Bk.73-Pg.19 identifies this as Parcel 20, owners-of-record John C. and Barbara J. Lake.

- There will also be needed a permanent easement for upstream end of the new bypass culvert headwall from the same Parcel owner.

▪ Flood Control Easements:

- The project falls within the FEMA zones of "A4" and "AO" for flood plane considerations.
- "Flood Control Easement" lines are indicated for the existing timber fish ladder and terminus of the existing downstream concrete channel lining on Corte Madera Creek as per Assessor's Map Bk 73-Pg.24, from Parcel 14 to the south boundary of Parcel 13.

However, there are no other indications found in any other public documents that flood control easements extend through the unimproved Creek area between the existing concrete channel linings on either end of the proposed bypass project.

Road Closure Durations:

- Traffic handling and road closures are tied to the recommended Staging phases as follows:
 - Stage I: (Refer to Page 11) The only traffic affected during this stage will be that would normal enter and leave the Post Office main parking lot, as this lot would be essentially closed to all traffic. This closure should be in effect for a maximum period of 2-1/2 months. Parking would be restricted to Ross Common.
 - Stage II: (Refer to Page 11) Traffic on Ross Common will be limited to 1-way eastbound for a maximum period of 5 months. (Note that this stage is not dependent on the Fish & Game limits on Corte Madera Creek.)
 - Stage IIIA: (Refer to Page 11) At the start of the second construction season, traffic on Lagunitas Road from Ross Common to the center pier of the Corte Madera Creek Bridge will be controlled to one-way traffic on the existing southbound lane, for a maximum period of 2-1/2 months. Traffic on Ross Common would again be one-way eastbound.
 - Stage IIIB:(Refer to Page11) Traffic will switch to controlled one-way operation on the northbound lane for a maximum period of 2-1/2 months, which will complete the project traffic closures.
 - Final Restriping will need some temporary closures under flaggers.

- Construction Operations There will be some temporary traffic handling under flaggers during some operations; however, they should be short in duration.

 - Contractor's Staging Area/Materials Yard:
 - For the recommended Alternative #2 alignment, there is sufficient room in the parking area to the southwest of the Post Office between the existing mini park and the creek bank area. (Please see CADD DWG. for Traffic Control Plans and Contractor Work Area in Attachment A.)

 - Disposal Sites Needed:
 - Excavated dirt from site for "clean fill" in the amount of approximately 7500 M3. May wish to designate a site in the contract if there is an interested receiver.
 - Asphalt/PCC concrete may be recycled or will need to be removed to an appropriate disposal site. Note that AC "grindings" may be used to backfill the culvert excavation.
 - All truck haul should have a designated route through Town limits.

 - Contract Advertisement Consideration:
 - Due to the Fish and Game calendar limitations for the Corte Madera Creek in the proposed construction area, it is recommended that advertisement for this project be timed to be in January. Bid opening and award could be accomplished prior to the end of March, thus allowing the potential contractor time to mobilize and make use of all the allotted time in the construction season.

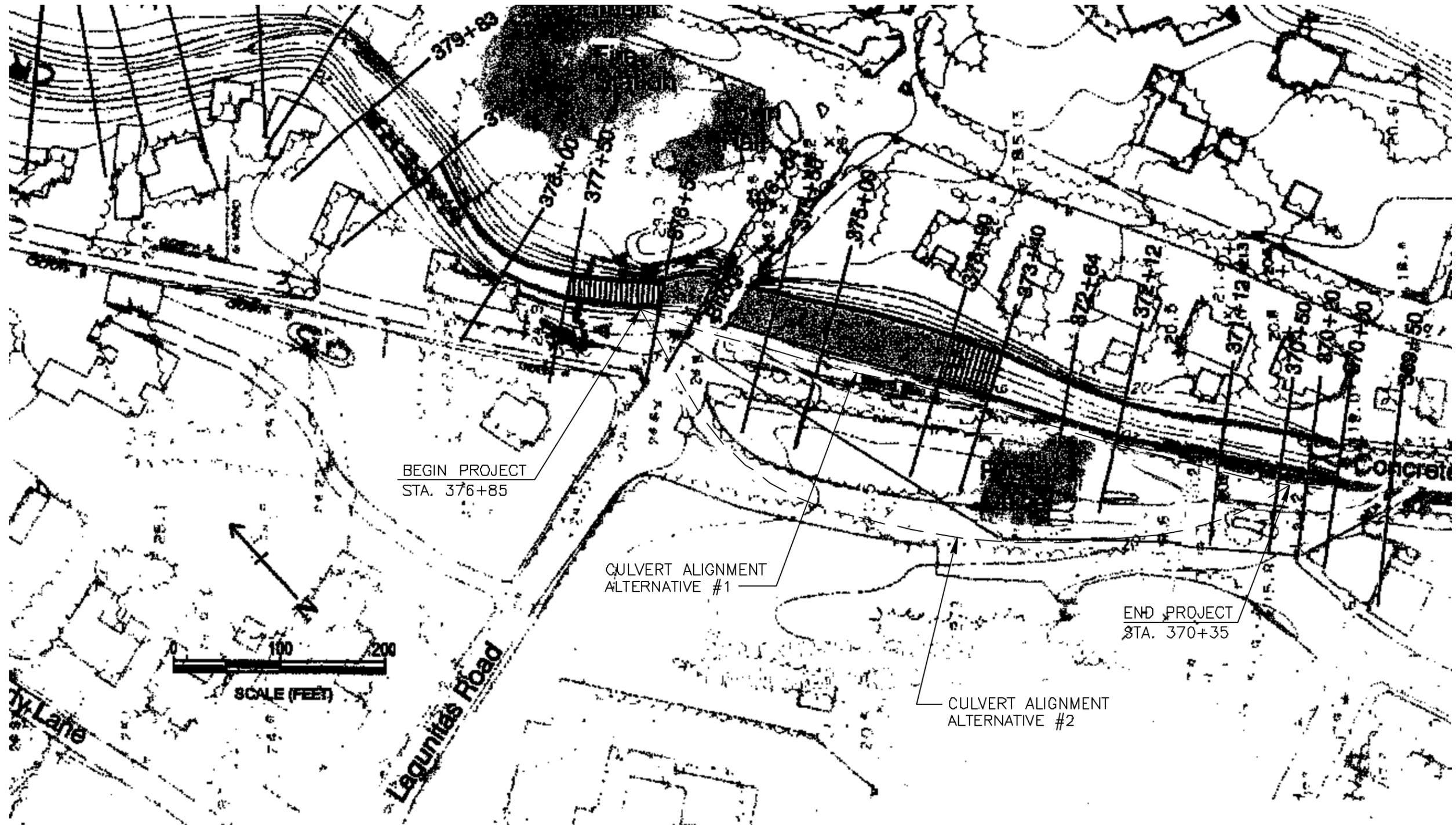
 - Cost Escalation:
 - Cost estimates shown under Attachment B of this report are compiled using data from similar work that was completed in calendar year 2000 plus data from bid documents for local concrete structure work from early 2002.
 - Recommended escalation factor for this project, based on current projects and the local economy is estimated to be 4% per year. Due to heavy demand from major seismic retrofit work on the various San Francisco Bay Bridges, the costs of bar reinforcing steel and structural concrete have been increasing at a higher rate than usual for work in this portion of California.
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Estimated Construction Costs for Alternative #2---Est. Culvert Length = 725LF (221M)

Work Item No.	Item Description	Est. Quantity	Est. Cost/Unit	Est. Total Cost
1	Mobilization (added below)	LS	\$-	\$-
2	Traffic Control	LS	\$60,000.00	\$60,000.00
3	Develop Water Supply	LS	\$5,000.00	\$5,000.00
4	Clear & Grub	LS	\$10,000.00	\$10,000.00
5	Construction Area Signs	LS	\$8,000.00	\$8,000.00
6	Reinforced Concrete Removal	LS	\$10,000.00	\$10,000.00
7	Remove Base and AC Surfacing	1220 M2	\$20.00	\$24,400.00
8	Pavement Repair	195 M2	\$40.00	\$7,800.00
9	Utility Relocation/Adjustment	LS	\$66,000.00	\$66,000.00
10	Structure Excavation (Box Culvert)	6041 M3	\$60.00	\$362,460.00
11	Structure Backfill (Box Culvert)	1850 M3	\$60.00	\$111,000.00
12	Aggregate Base--Class 2	288 M3	\$50.00	\$14,400.00
13	Asphalt Concrete (Type A)	600 TONNE	\$50.00	\$30,000.00
14	Furnish/Install/Remove Sheet Pile Shoring	3230 M2	\$180.00	\$563,364.00
15	Structure Concrete (Box Culvert)	1225 M3	\$400.00	\$490,000.00
16	Bar Reinforcing Steel (Box Culvert)	266,328 KG	\$1.15	\$306,277.00
17	Minor Concrete (Sidewalk)	5 M3	\$800.00	\$4,000.00
18	Minor Concrete (Curb & Gutter)	10 M	\$300.00	\$3,000.00
19	Re-landscaping	LS	\$5,000.00	\$5,000.00
20	Restripe Pavement	M	\$2,500.00	\$2,500.00
21	Miscellaneous Metal (Box Culvert)	KG		\$10,000.00
	Subtotal Construction Items of Work			\$2,093,201.00
	Plus Mobilization @ 10%			\$209,320.10
	Total Construction Items of Work			\$2,302,521.10
	<u>Suggested Contingency Fund Items:</u>			
	1. Sub Exc. For RCB Invert (as needed)	LS		\$5,000.00
	2. On-call Arborist for Tree Investigation/Recom.	LS		\$3,000.00
	3. Unknown Utility Adjustments	LS		\$10,000.00
	4. Repair/Reinstall Wood Fence	LS		\$600.00
	Total Estimated Construction Costs			\$2,321,121.10

Estimated Construction Costs for Alternative #1---Est. Culvert Length = 625LF (191M)

Work Item No.	Item Description	Est. Quantity	Est. Cost/Unit	Est. Total Cost
1	Mobilization (added below)	LS	\$-	\$-
2	Traffic Control	LS	\$31,000.00	\$60,000.00
3	Develop Water Supply	LS	\$5,000.00	\$5,000.00
4	Clear & Grub	LS	\$10,000.00	\$10,000.00
5	Construction Area Signs	LS	\$3,000.00	\$8,000.00
6	Reinforced Concrete Removal	LS	\$10,000.00	\$10,000.00
7	Remove Base and AC Surfacing	100 M2	\$20.00	\$2,000.00
8	Pavement Repair	195 M2	\$40.00	\$7,800.00
9	Utility Relocation/Adjustment (w/o 12+24-inch water)	LS	\$66,000.00	\$66,000.00
10	Structure Excavation (Box Culvert)	5210 M3	\$60.00	\$312,600.00
11	Structure Backfill (Box Culvert)	1595 M3	\$60.00	\$95,700.00
12	Aggregate Base--Class 2	248 M3	\$50.00	\$12,400.00
13	Asphalt Concrete (Type A)	60 TONNE	\$50.00	\$3,000.00
14	Furnish/Install/Remove Sheet Pile Shoring	2785 M2	\$180.00	\$501,300.00
15	Structure Concrete (Box Culvert)	1056M3	\$400.00	\$421,200.00
16	Bar Reinforcing Steel (Box Culvert)	229,601 KG	\$1.15	\$264,041.00
17	Minor Concrete (Sidewalk)	5 M3	\$800.00	\$4,000.00
18	Minor Concrete (Curb & Gutter)	10 M	\$300.00	\$3,000.00
19	Re-landscaping	LS	\$5,000.00	\$5,000.00
20	Restripe Pavement	M	\$2,500.00	\$2,500.00
21	Miscellaneous Metal (Box Culvert)	KG		\$10,000.00
	Subtotal Construction Items of Work			\$1,803,541.00
	Plus Mobilization @ 10%			\$180,354.10
	Total Construction Items of Work			\$1,983,895.10
	<u>Suggested Contingency Fund Items:</u>			
	1. Sub Exc. For RCB Invert (as needed)	LS		\$5,000.00
	2. On-call Arborist for Tree Investigation/Recom.	LS		\$3,000.00
	3. Unknown Utility Adjustments	LS		\$10,000.00
	4. Repair/Reinstall Wood Fence	LS		\$600.00
	Total Estimated Construction Costs			\$2,002,495.10

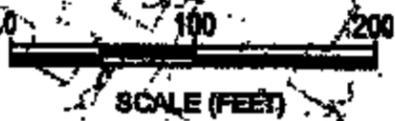


BEGIN PROJECT
STA. 376+85

CULVERT ALIGNMENT
ALTERNATIVE #1

END PROJECT
STA. 370+35

CULVERT ALIGNMENT
ALTERNATIVE #2



SCALE (FEET)

SCALE: 1"=50'

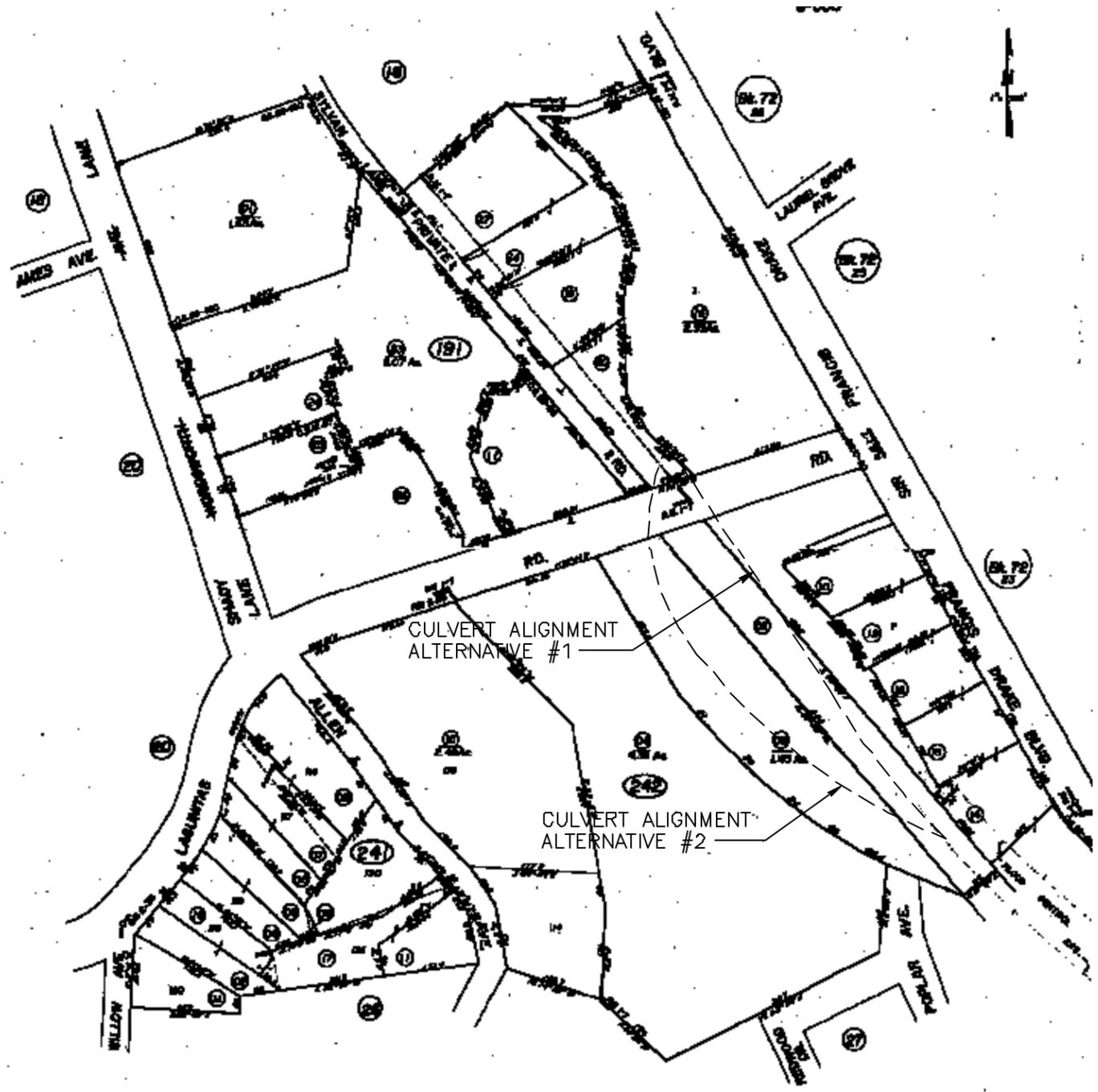
CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
TOWN OF ROSS

PROJECT SITE PLAN

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			



SCALE: 1" = 100'

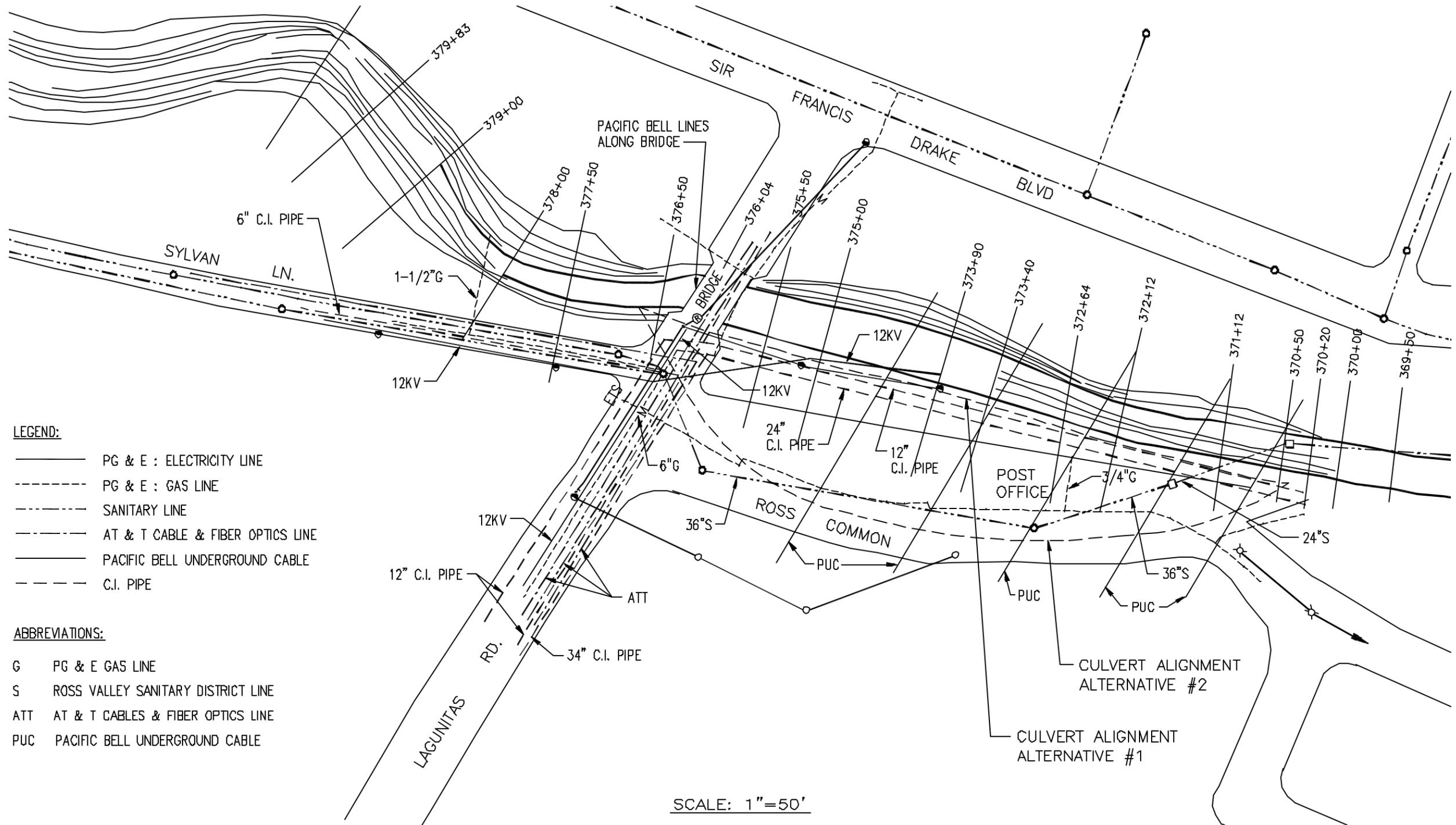
CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
 TOWN OF ROSS

ASSESSOR'S MAP



LEGEND:

- PG & E : ELECTRICITY LINE
- - - - PG & E : GAS LINE
- - - - SANITARY LINE
- - - - AT & T CABLE & FIBER OPTICS LINE
- PACIFIC BELL UNDERGROUND CABLE
- - - - C.I. PIPE

ABBREVIATIONS:

- G PG & E GAS LINE
- S ROSS VALLEY SANITARY DISTRICT LINE
- ATT AT & T CABLES & FIBER OPTICS LINE
- PUC PACIFIC BELL UNDERGROUND CABLE

SCALE: 1"=50'

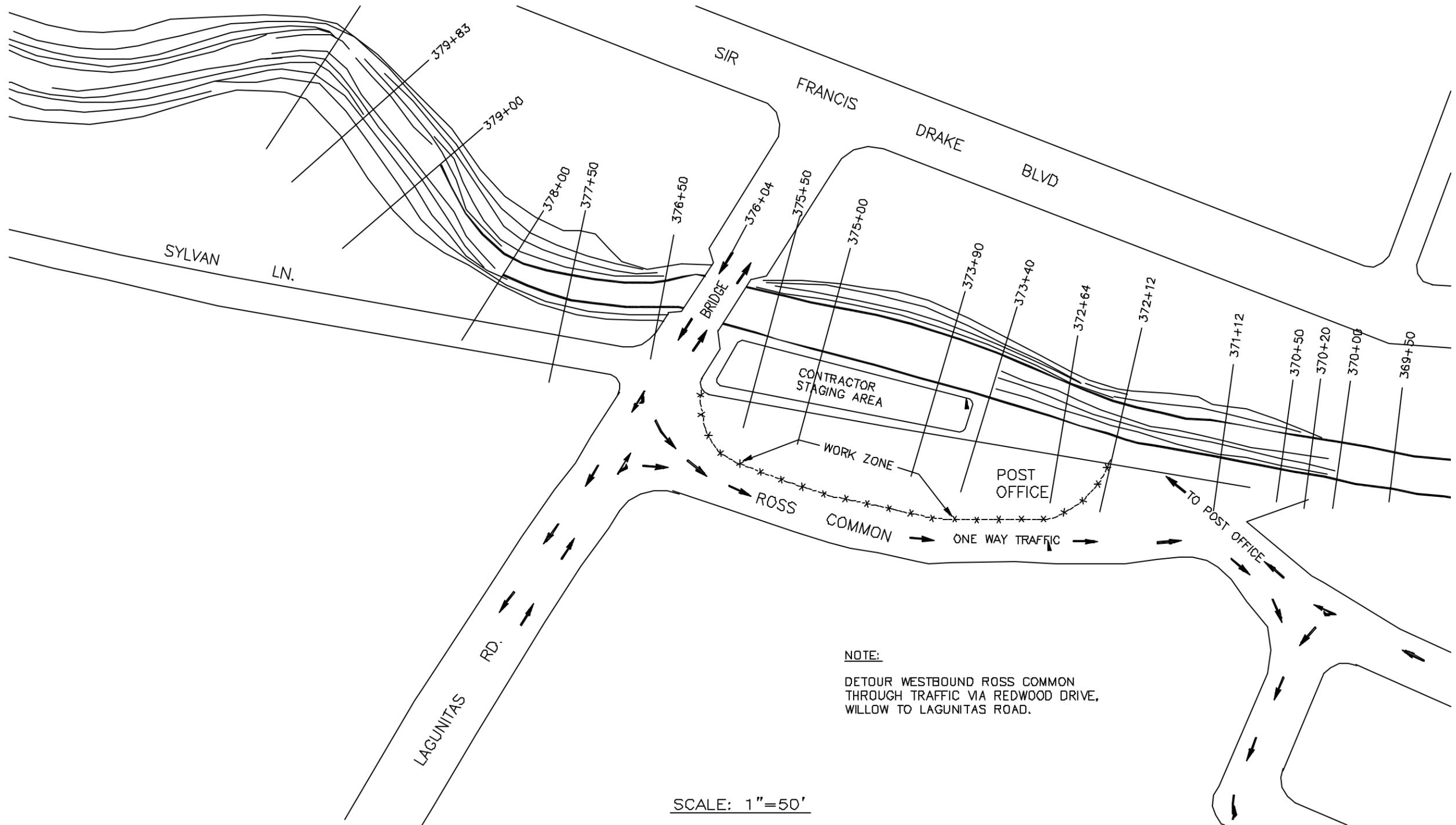
CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
TOWN OF ROSS

UTILITY PLAN



NOTE:
 DETOUR WESTBOUND ROSS COMMON
 THROUGH TRAFFIC VIA REDWOOD DRIVE,
 WILLOW TO LAGUNITAS ROAD.

SCALE: 1"=50'

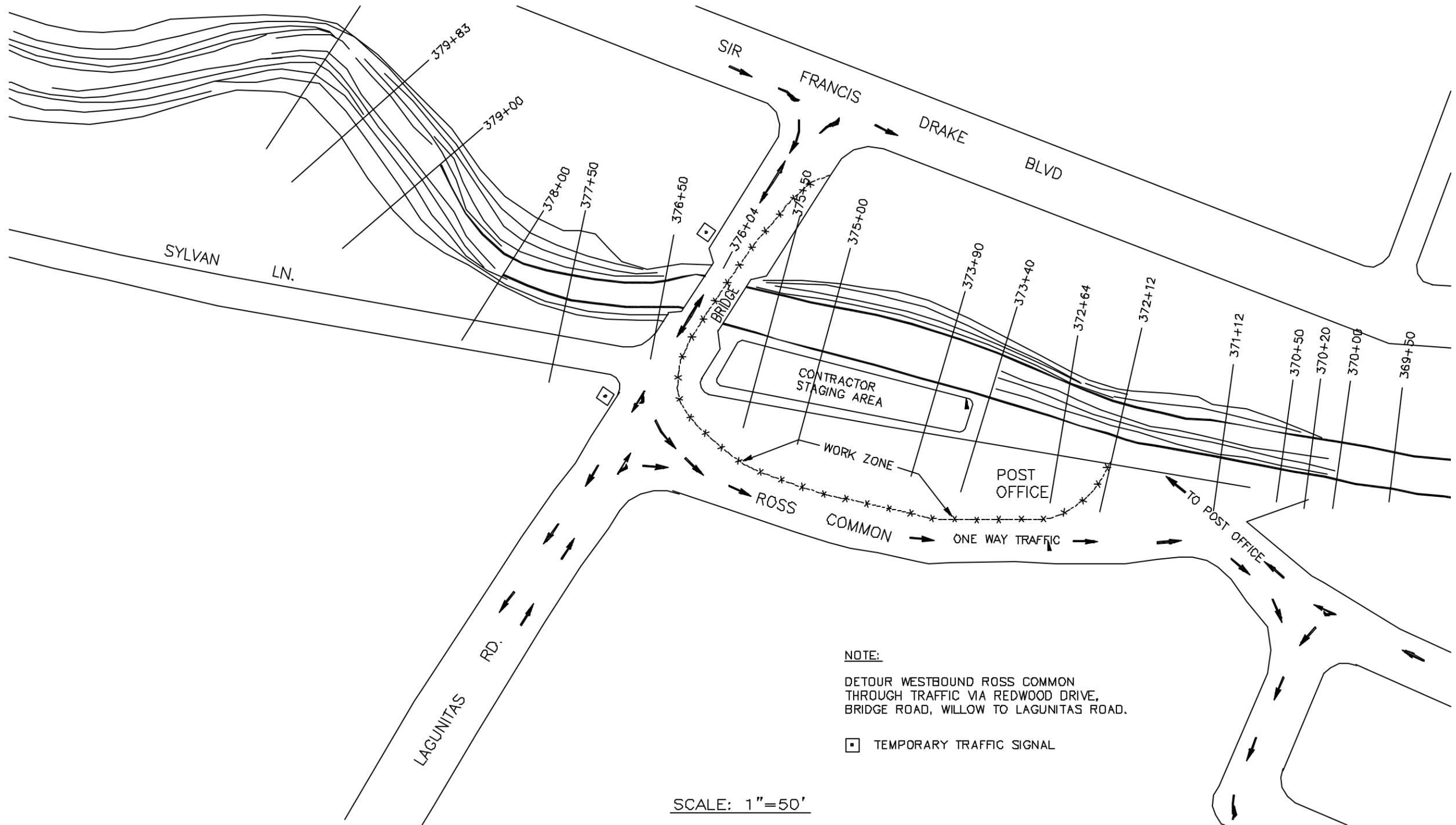
CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
 TOWN OF ROSS

STAGE II
 TRAFFIC PLAN
 FOR ALTERNATIVE #2

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			



NOTE:
 DETOUR WESTBOUND ROSS COMMON
 THROUGH TRAFFIC VIA REDWOOD DRIVE,
 BRIDGE ROAD, WILLOW TO LAGUNITAS ROAD.

□ TEMPORARY TRAFFIC SIGNAL

SCALE: 1"=50'

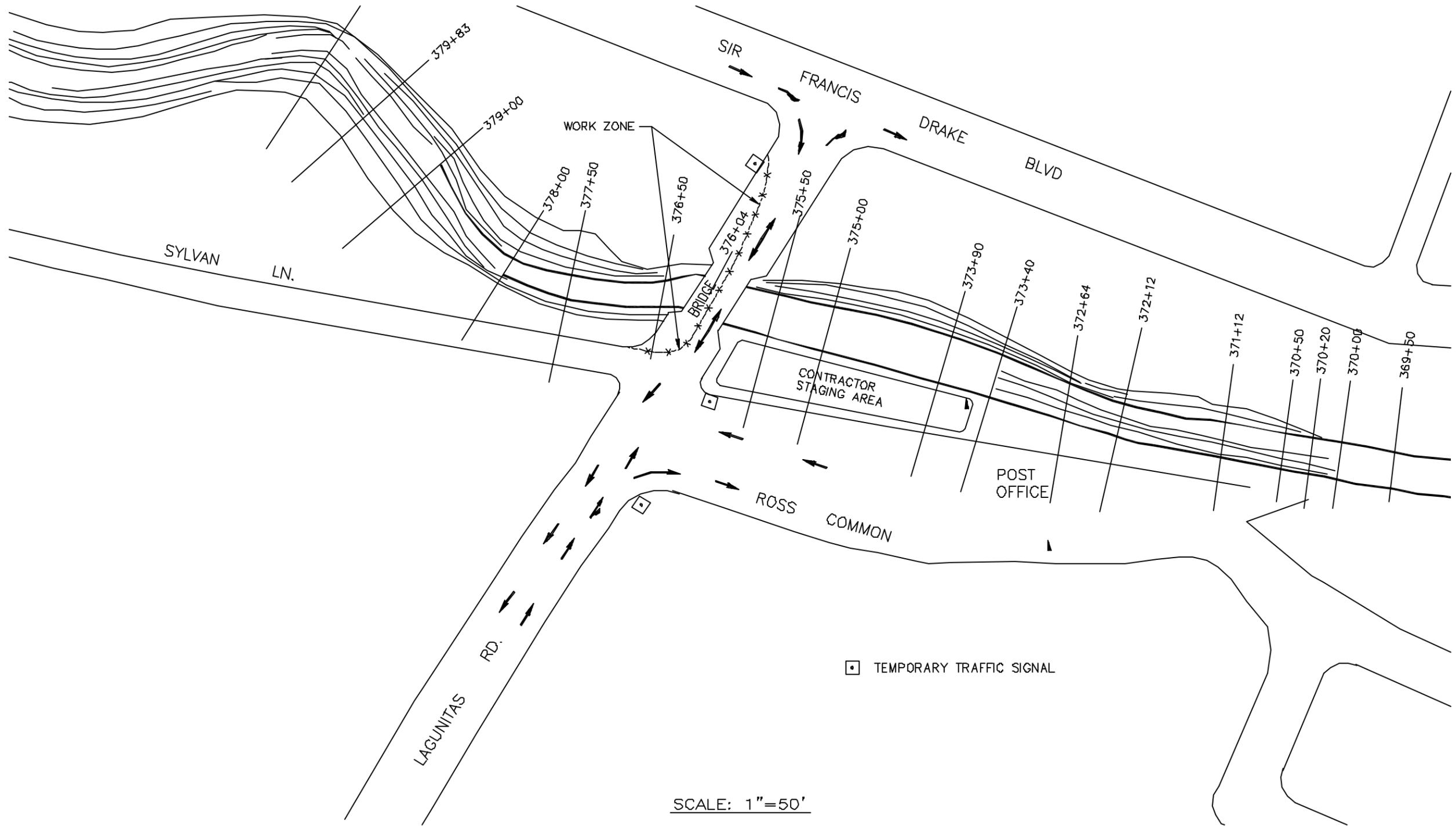
CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
 TOWN OF ROSS

STAGE III A
 TRAFFIC PLAN
 FOR ALTERNATIVE #2



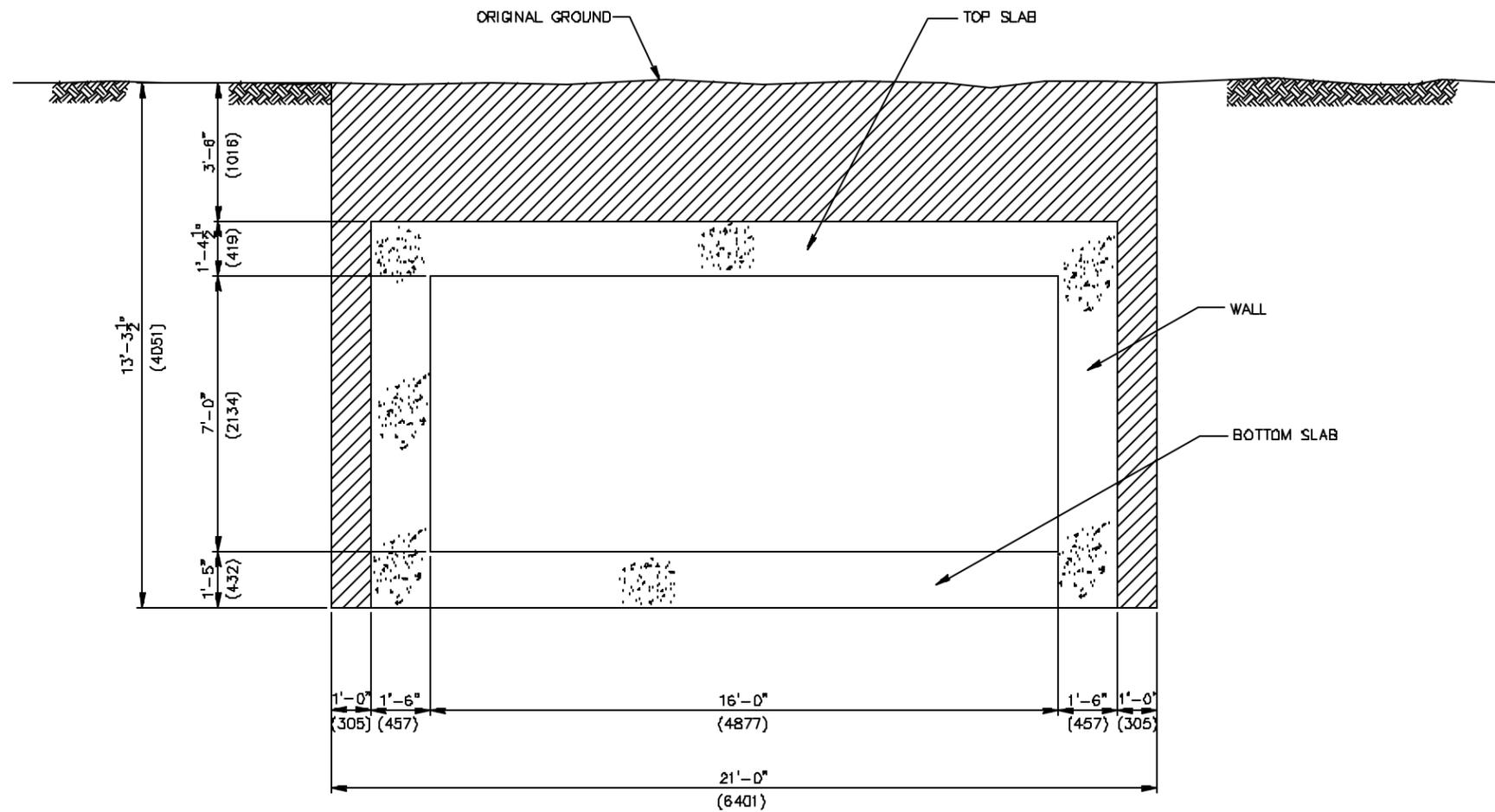
CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
TOWN OF ROSS

STAGE III B
TRAFFIC PLAN
FOR ALTERNATIVE #2

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			



ASSUMED TYPICAL SECTION
SCALE: 1/2" = 1'-0"

CORTE MADERA CREEK FLOOD CONTROL BYPASS STUDY

REV	DATE	REVISION DESCRIPTION	DESIGNED BY	DRAWN BY	QUANTITY BY	CHECKED BY	APPROVED
			E. HOLT	V. NGUYEN			

JACOBS CIVIL, INC.

PREPARED FOR THE
MARIN COUNTY
TOWN OF ROSS

TYPICAL SECTION