County of San Mateo - Planning and Building Department

ATTACHMENT P

Crystal Springs County Sanitation District

Parrott Drive Sanitary Sewer Alternatives Study

February 2003

Prepared by:

Harris & Associates

Parrott Drive Sanitary Sewer Alternatives

Crystal Springs County Sanitary District
San Mateo County

San Mateo County operates the sanitary sewer collection system in Crystal Springs County sanitary District and, in particular, at the top of Parrot Drive between Bel Aire Drive and the Town of Hillsborough city limits. The area was developed in the early 1950's. Due to the topography at the top of the hill, sanitary sewer service was not able to be connected to the system which serves the majority of this area and flows to Ascension Drive at Polhemus Road. Instead, an alternate connection was developed down the adjacent hillside to Crystal Springs Road. Over the years, sections of this hillside have gradually moved, taking pipe and manholes with it.

OVERVIEW

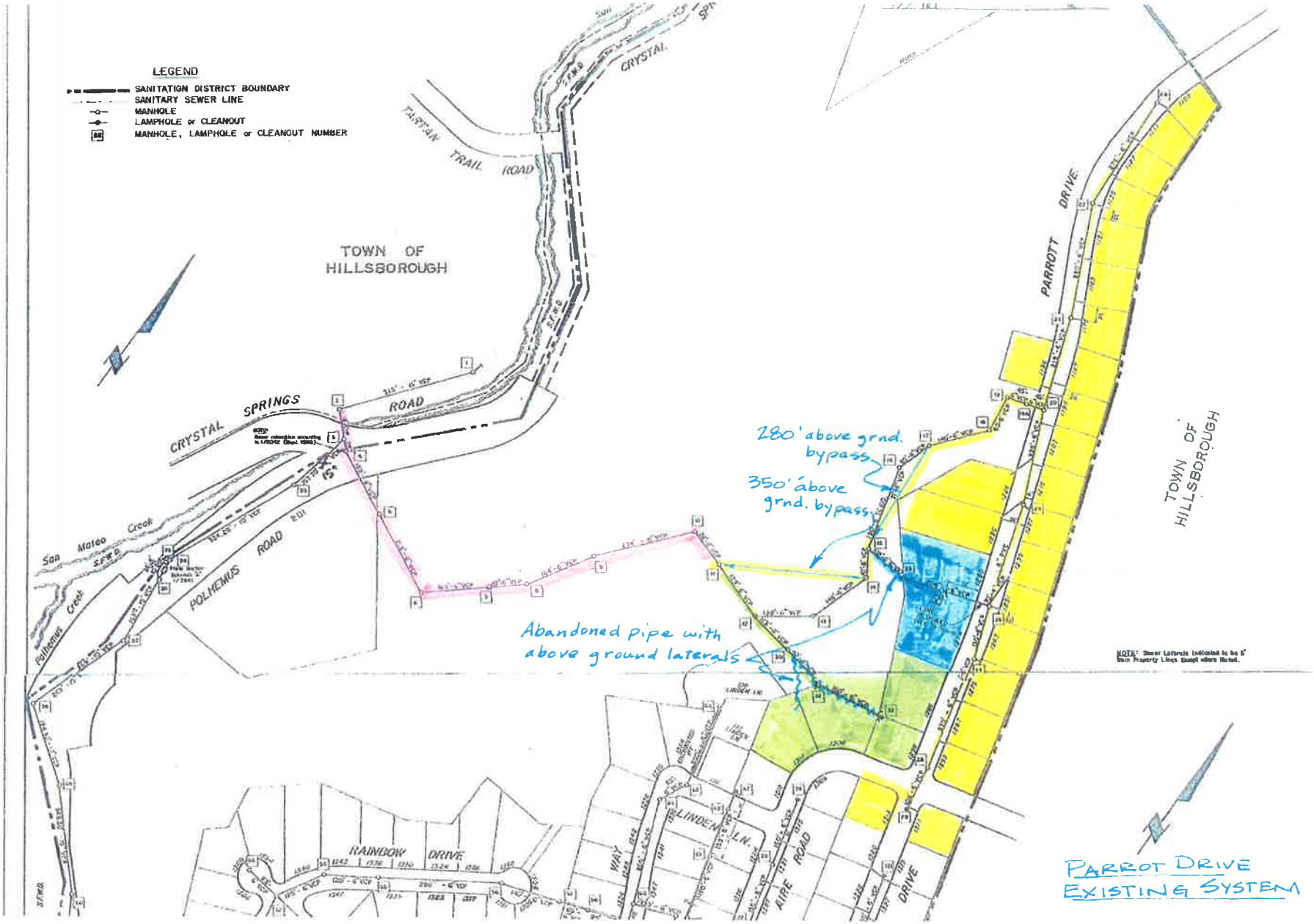
Approximately 29 lots on this section of Parrot Drive are mostly connected to 1,750 l.f. of 6" vitrified clay pipe (VCP) sanitary sewer in Parrot Drive. This sub system is connected to the main Crystal Springs collection system by use of approximately 3,000 ft. of 6" VCP which was installed in the steep hillside below Parrot Drive; a vertical drop of approximately 400 ft. This pipe eventually connects to the main system in the vicinity of Crystal Springs Road and Polhemus Road.

The focus of this report is on the 3,000 l.f of 6" pipe that lies on that hillside; affectionately known by the sewer maintenance crews as "Billy Goat Hill". In particular, this hillside is very steep in many locations, is accessible only by foot with little or no trail, and appears to be constantly moving; especially during wet weather.

The purpose of this report is to evaluate the existing condition of this pipeline and to propose pipeline replacement or an alternate pump station layout which would serve the area and eliminate the need for this cross country pipeline.

EXISTING PIPELINE

Installed in 1952, this 1,750 l.f. of 6" VCP connects a group of 23 lots on Parrot Drive (addresses1103 to 1312), and two lesser branches connect 6 other downslope lots on Parrott Drive (1250 to 1298) and Bel Aire Road (1306 & 1312) to 3,000 l.f. of primarily 6" VCP. A map showing the layout of the existing system is shown on the following page. These pipelines are connected to approximately 3,000 l.f. of 6" pipe which lies in the hillside below Parrott Drive and eventually connects to the system's main trunkline in the vicinity of Crystal Springs Road at Polhemus Road. In many locations, this pipeline exceeds slopes of 20%.


LEGEND
SANITATION DISTRICT BOUNDARY
SANITARY SEWER LINE
MANHOLE
LAMPHOLE or CLEANOUT
MANHOLE, LAMPHOLE or CLEANOUT NUMBER
TARTAN TRAIL ROAD
TOWN OF HILLSBOROUGH
CRYSTAL SPRINGS ROAD
San Mateo Creek
Polhemus Creek
POLHEMUS ROAD
PARROTT DRIVE
TOWN OF HILLSBOROUGH
280' above grnd. bypass
350' above grnd. bypass
Abandoned pipe with above ground laterals
RAINBOW DRIVE
LINDEN LN.
AIRE ROAD
DRIVE
PARROT DRIVE EXISTING SYSTEM

In addition, the hillside has a long history of slippage and has been the location of numerous ongoing small landslides. It currently appears to be highly unstable in many areas. These slides have resulted in crushed and broken pipelines and manholes disconnecting from pipelines in areas which have little or no access for maintenance or repair equipment. Thus, foot access and hand maintenance and repairs are the only remedy available to County crews in this area. In addition, the existence of poison oak and copious other vegetation has added to access and maintenance difficulties.

Subsequent to the 1952 initial construction, County records show the first sections of pipe immediately below Parrott Drive began to fail almost immediately. In 1960, approximately 500 l.f. of 6" VCP in the vicinity of MH 15 to MH 25 and MH 15 to MH 19 was replaced. The project used 6" Transite, Class 100 (asbestos cement pipe; 6"ACP) to replace the clay. The ACP was considered to be a stronger material; primarily used for water pipe. Sections of this repair would later fail in the mid 90's.

Over the years, additional manholes began to slide down the hill and sections of pipe would fail including MH 25, MH 31 and Riser 32. All of the pipe in the vicinity of these structures has now been abandoned.

In approximately 1995, a number of sections of pipe ultimately had to be "temporarily" bypassed with over 600 l.f. of 4" PVC pipe which was installed above ground. In order to maintain somewhat of a constant slope, much of this pipe was supported by fence posts and wire. Today, over 8 years later, these temporary pipes still exist, from MH11 to MH14 and from MH15 to MH 17. Much of this PVC pipe has significantly deteriorated due to constant exposure to sunlight and is currently becoming brittle and subject to failure. In addition, all of the laterals from the 6 downslope lots have been abandoned and currently exist in the form of 4" corrugated plastic flexible pipe laying directly on top of the ground. While the County's maintenance crews regularly visit this area, the visits are infrequent and small spills or overflows can sometimes go for weeks undetected due to the remoteness of the area.

The 4" PVC bypass between MH 11 and MH 14, which lays directly on top of the ground, is of particular concern in that it lies outside the existing easement as it runs cross country. The area is completely overgrown with vegetation making any monitoring for leaks almost impossible.

The result is a temporary, unmonitored system which is highly subject to small sewage spills of unknown quantity or duration. This writer has twice witnessed this condition during field visits. Both instances have resulted in an immediate report to County maintenance crews for quick remediation.

Photographs of these existing conditions follow:

Temporary 4" PVC bypass pipe installed below Parrott Drive

Temporary Bypass Pipe from MH 17 entering MH 15

Temporary Bypass Pipe Supports between MH 15 and MH 17

Temporary Bypass Pipe on ground between MH 11 and MH 14

Example of difficult access – MH 13

Example of MH re-exposed after being covered by sliding hillside

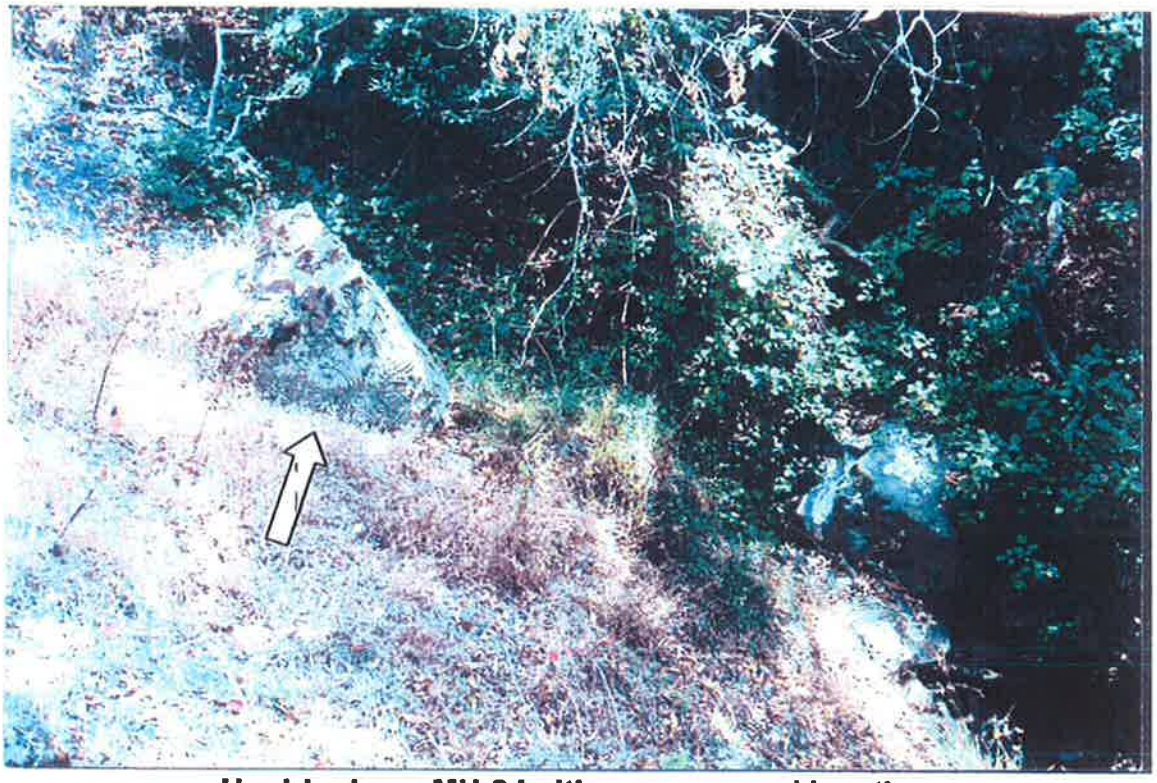
Laterals from 1306 & 1312 Bel Aire Road are connected into one 4" flex pipe

Combined laterals flowing into MH 30

Near the lower end of the hillside, the pipeline approaches a creek and parallels the bank of the creek down to Polhemus Rd. MH 6 was originally located adjacent to the creek bank. During the heavy rainstorms in the mid 1990's, the bank became severely eroded and eventually exposed the base of MH 6 which ultimately fell into the creek thus allowing raw sewage to run into the creek for an unknown period of time. State Fish and Game personnel reported the discovery of the broken pipe to County maintenance crews. Both the repair of the pipeline and the abandoned MH are shown:

Former Location of MH 6

It is likely that, as the MH base began to move and become separated from the pipe, sewage flow from the exposed pipe caused the final erosion around the MH base. The resulting erosion left the brick MH upside down and completely in tact, approximately 30 feet down the hill near the creek. While difficult to pick out in the following photograph, it serves as a reminder of the potential that a remote pipeline on a slipping hillside has to cause damage.



Upside down MH 6 in it's new, unused location

After the pipeline reaches Crystal Springs Road, it crosses Crystal Springs Creek where it connects to the Town of Hillsborough's collection system, per agreement. This crossing currently carries all of the flow from the entire Sanitary District; a peak wet weather flow of approximately 3 million gallons per day. The pipe crossing the creek is 16" ductile iron pipe. It appears that it may have originally been constructed below the flowline of the creek without any encasement to protect from erosion. Over time, the creek bottom has eroded to 2 feet or more below the bottom of the pipe, a tree has fallen across the pipe, and it appears to be a significant "debris catcher." The County's Polhemus Road sewer pipeline replacement project, to be constructed in Summer, 2003, will reroute all but the flow from these 29 lots away from this crossing; thus significantly reducing the potential overflow to the creek should this vulnerable pipe become strained during a major storm.

Sewage Collection Alternatives

After review of the existing topography and the configuration of the existing collection system it was determined that two basic alternatives were available; either replace the majority of the existing pipelines with a more reliable gravity system or install pumps to reroute the sewage to a different point of collection. Referring to the previous map, which shows the existing system, it can be seen that 23 lots flow directly to the Parrott Drive collector before flowing down the hillside pipeline. That location is an ideal for a Lift Station. An additional 6 downslope lots flow directly to the hillside system. Alternately, these lots would require individual pumps to carry their discharge up to Parrott Drive.

Alternative 1 – Replace Gravity Pipelines

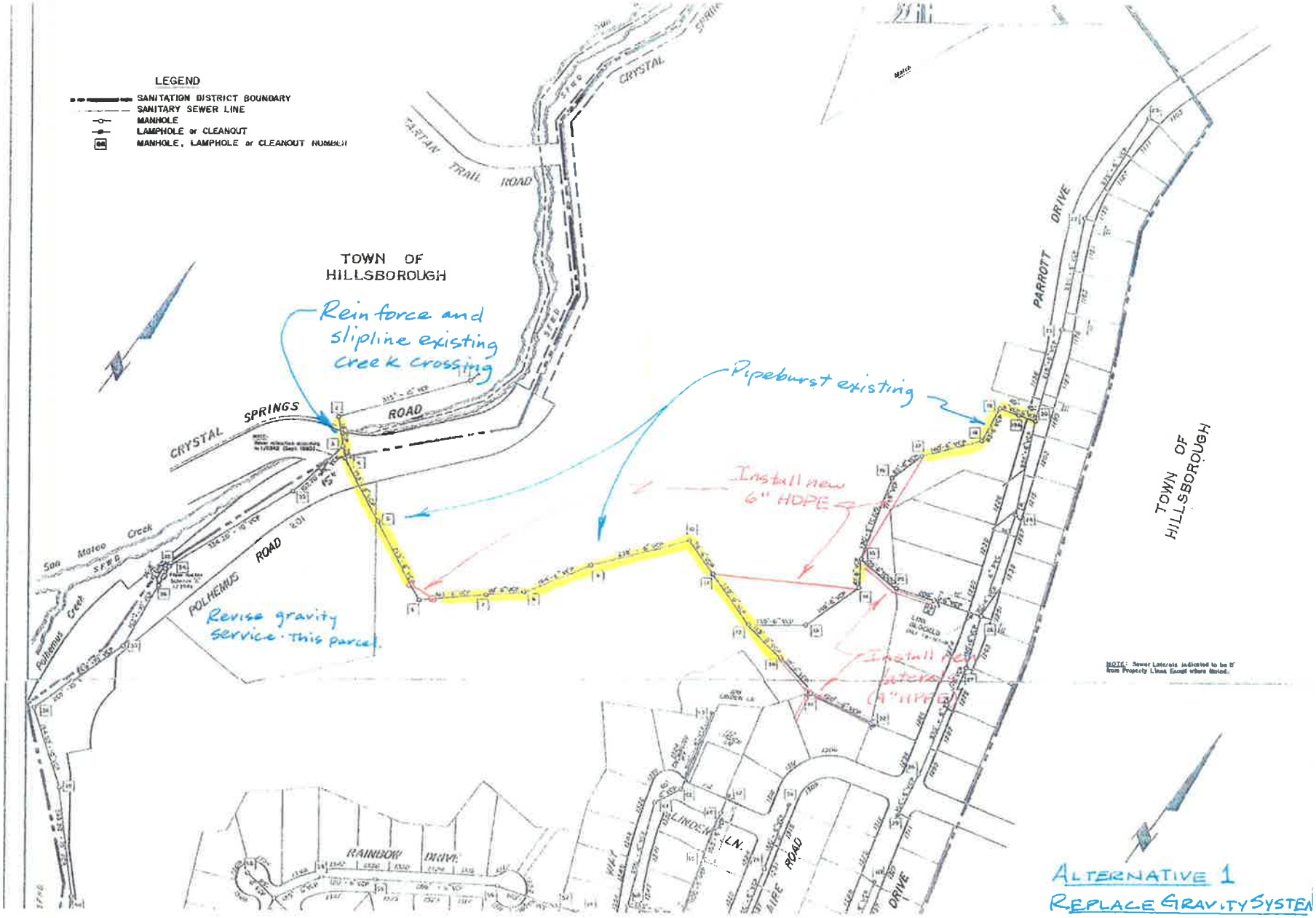
In developing this Alternative, several assumptions must first be made. First, environmental clearance of the hillside, for the construction of new and replacement of existing, along the pipeline route is assumed. While cursory discussions with Public Works' Lisa Ekers have revealed no immediate roadblocks, a thorough review of the area must be completed. This would include any potential State Fish and Game Permits; both for the hillside riparian area as well as a Stream Alteration Permit for clearing and rehabilitating the pipeline crossing Crystal Springs Creek.

Second, it must be assumed that geotechnical clearance is provided and that the County accepts any potential liability. In other words, it can safely be assumed that any disturbance of the hillside; whether it be for clearing of brush for access, excavation for new pipe, or small excavations for pipe replacement using trenchless technology; will be considered to be the "trigger" should subsequent damage occur. The minute the County steps foot on the project, those "deep pockets" will be the first avenue for retribution. Native backfill materials would be used wherever possible, as opposed to the County Standard using sand bedding, in order to avoid any potential of the bedding material being used as a "conduit" for water on the hillside.

It is obvious that the use of rigid pipe for construction in the hillside is the source of most of the damage to the existing collection system. The pipe was either crushed by the moving hillside or sheared by the moving manholes. This Alternative proposes the use of 6" High-Density Polyethylene (HDPE) pipe. These pipe sections are thermally-fused together such that one length of pipe lies between manholes. While being flexible, the standard SDR-17, which denotes diameter to thickness ratio, is very tough when it comes to manhole connections. The 6" pipe proposed for this project is over 3/8" thick and is rated for 100 psi. In particularly difficult areas, SDR-11, 6" HDPE pipe could be specified with a wall thickness of 5/8" and 160 psi rating. *One complete section of tough, yet flexible pipe between manholes is key to this hillside construction.* HDPE would be specified for both the new construction and for the pipebursting portions of the project. This heavy-wall pipe is also important due to the previously-mentioned use of native backfill materials whenever possible. This same material would be used as a pipe within a pipe in lining the 16" DIP which crosses Crystal Springs Creek.

As shown on the following page, this Alternative includes approximately 700 feet of new 6" HDPE pipeline along a new route, 1700 feet of 6" HDPE pipebursting the existing 6" VCP and the potential replacement of 15 manholes. This Alternate also proposes the installation of 700 feet of new 4" HDPE laterals, in common trenches wherever possible, and the extension of those laterals to abandon approximately 500 feet of 6" VCP. It should be noted that, contingent on detailed inspection of the lower hillside system, there is a remote possibility that a portion of these pipes would not need replacement as they are not located in the same slippage areas as the top and intermediate sections of the hillside. This report assumes that all pipeline sections require replacement.

The small tributary creek, previously mentioned near the bottom of the hill, prevents rerouting to join the new Polhemus Road Sanitary Sewer. Therefore, the existing Crystal Springs Creek crossing must remain in use. This Alternate assumes the permitting, cleanup and reinforcement


LEGEND
SANITATION DISTRICT BOUNDARY
SANITARY SEWER LINE
MANHOLE
LAMPHOLE or CLEANOUT
MANHOLE, LAMPHOLE or CLEANOUT NUMBER
TOWN OF HILLSBOROUGH
Reinforce and slipline existing creek crossing
Pipeburst existing
Install new 6" HDPE
Revise gravity service this parcel
CRYSTAL SPRINGS ROAD
TARTAN TRAIL ROAD
POLHEMUS ROAD
San Mateo Creek
Polhemus Creek
PARROTT DRIVE
RAINBOW DRIVE
LINDEN LN.
HILL CREST ROAD
NOTE: Sewer Laterals indicated to be 5' from Property Lines Except where Noted.
ALTERNATIVE 1
REPLACE GRAVITY SYSTEM

of the existing 16" DIP crossing and the insertion of an 8" HDPE pipe within the DIP for added safety.

Finally, after completion of construction, it is assumed that no vehicular access for maintenance will be allowed. The single parcel on Polhemus Road, across from the Polhemus/Crystal Springs intersection, will also require rerouting of their service lateral.

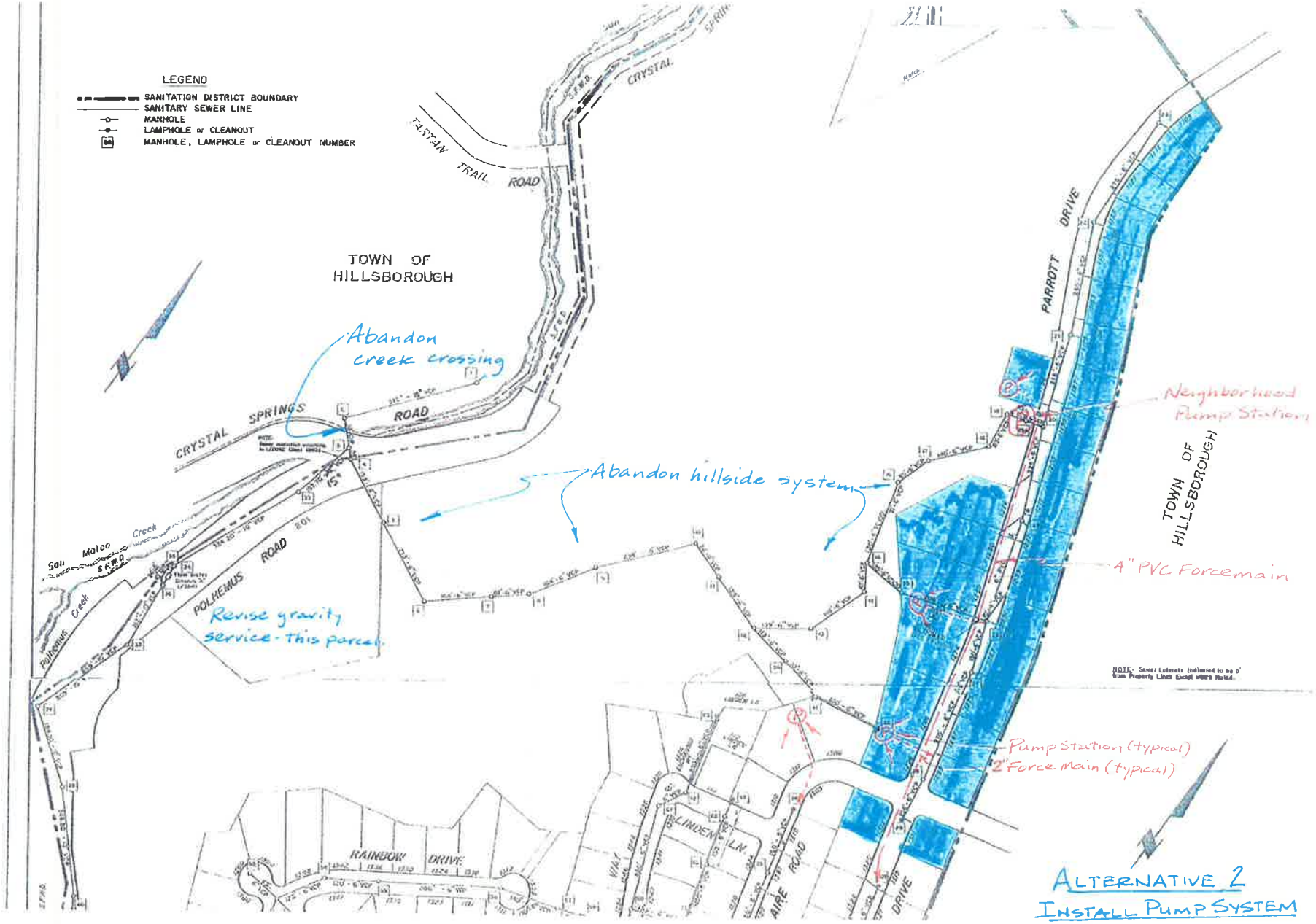
Alternative 2 – Install Pump Stations

Development of this alternative does not require the same assumptions as required for Alternative 2. In fact, the County has a relatively good record with the use of County-owned and maintained individual pump stations in the Emerald Lakes area. As shown on the following page, this Alternative proposes the installation of 3 common pump stations, each to be used by 2 adjacent lots. These pump stations would consist of a wet well, two alternating grinder pumps, a control panel with alarm and a 2" force main to the nearest gravity sewer. The proposed configuration is shown. Five of these pump stations would pump twice; once at the individual station and then again at the neighborhood pump station. The small pump stations would be specified to coincide with the existing individual pump stations in order to use the same spare parts, controls and pumps which are kept in stock on County shelves.

As seen in the layout, approximately 27 lots would be tributary to the neighborhood pump station, which is proposed to be located just downstream and west of MH 20, at the low point of that section of Parrott Drive. The layout and configuration of this station would be very similar to the stations currently maintained by the County except on a somewhat larger scale. The wet well would consist of a cast-in-place or precast concrete base with sections of 6-foot or 7-foot diameter concrete pipe. The wet well volume would be designed to store 4 hours of peak flow. This storage allows for a comfortable emergency response time without the risk of a spill or overflow. To minimize corrosion, the wet well would be plastic lined. Adjacent to the wet well, the discharge piping, check valves and control valves would be located in a valve pit. Both the wet well and the valve pit would be accessed via stainless steel hatches. Submersible pumps would set on stainless steel guide rails for easy installation and removal. The entire facility would be located at or below grade with the exception of the control panel and a fence. Underground electric power service would come from an existing pole located across the street. Due to the small size of this facility, it is not recommended to include an onsite standby generator. This would simply increase maintenance and noise at the site and the County has portable generators at the maintenance yard which can be used for this application. Disagree

Assuming 240 gal/day per lot and a peaking factor of 3.9, the pumps would be sized to pump a maximum of 20 gallons per minute. Two pumps would alternate operation and would provide a backup should one pump fail. The submersible pumps are sized to carry a 3-1/2" solid and would be connected, via the valve pit, to a 1,200 foot long 4" PVC force main. The force main would connect to MH 121, further south on Parrott Drive.

The control panel would be equipped with a special electrical plug and a transfer switch to connect the portable generator. It would also include an alarm system which will notify the on-call person or the Sheriff's Department of any problem. Current technology allows the operator


LEGEND
SANITATION DISTRICT BOUNDARY
SANITARY SEWER LINE
MANHOLE
LAMPHOLE or CLEANOUT
MANHOLE, LAMPHOLE or CLEANOUT NUMBER
TARTAN TRAIL ROAD
CRYSTAL SPRINGS ROAD
TOWN OF HILLSBOROUGH
Abandon creek crossing
Abandon hillside system
Revise gravity service - This parcel
PARROTT DRIVE
Neighborhood Pump Station
4" PVC Forcemain
TOWN OF HILLSBOROUGH
NOTE: Sewer Laterals indicated to be 5' from Property Lines Except where Noted.
Pump Station (typical)
2" Force Main (typical)
POLHEMUS ROAD
San Mateo Creek
Polhemus Creek
RAINBOW DRIVE
LINDEN LN.
AIRE ROAD
DRIVE
ALTERNATIVE 2
INSTALL PUMP SYSTEM

to remotely monitor the station and determine the severity of the problem. For instance, during a power outage, the operator could remotely monitor the wet well level and determine how quickly the portable generator might be required.

The connection point and depth of the lateral, which serves the house adjacent to the pump station site at 1136 Parrott Drive, is unknown. The design should consider a wet well depth which would serve this property without the use of an additional individual pump station. (That design must also be sure that backflow devices are included on that line.) The current cost estimates include an individual pump station at that site.

Upon completion of the pump system, the existing hillside system could be entirely abandoned or be used to carry away drainage water from those lots which appear to be particularly susceptible.

Main Lift Station Site approximately 30 feet left of MH 20 (in street)

Cost Estimates

The estimates for both Alternatives are presented below:

Alternative 1 – Replace Gravity Pipelines

Description	Unit Cost	Units	Quantity	Total
Construction Costs				
Replace 6" Pipe (new)	$200	LF	700	$140,000
Replace 6" Pipe (pipeburst)	$150	LF	1700	$255,000
Replace 4" Laterals (2 pipes/single trench	$80	LF	700	$56,000
Manhole	$5,000	EA	15	$75,000
Creek Crossing	$40,000	LS	1	$40,000
Construction Cost Subtotal				$566,000
Contingency (20%)				$113,000
Construction Cost Total				$679,000
Design Costs (8%)				$54,000
Construction Administration Costs (12%)				$82,000
Land/Easement Acquisition (1 prop owner	$50,000	LS	1	$50,000
Total Project Cost (rounded)				$865,000

It should be noted that the pipe unit prices are estimated on the high side to include site access issues, potential hand digging requirements, environmental protection issues and potential mitigation which may be required. As previously mentioned, a portion of the lower hillside pipes may not need replacement as they are not located in the same slippage areas as the top and intermediate sections of the hillside. For the purposes of this estimate, complete replacement is assumed.

Alternative 2 – Install Pump Stations

Description	Unit Cost	Units	Quantity	Total
Construction Costs				
Pump Station (24 units)	$100,000	LS	1	$100,000
Pump Station – duplex (serving two lots)	$15,000	EA	3	$45,000
Pump Station – duplex (serving one lot)	$10,000	EA	1	$10,000
4" PVC Force Main	$60	LF	1200	$72,000
2" PVC Force Main	$50	LF	1000	$50,000
Construction Cost Subtotal				$277,000
Contingency (20%)				$55,400
Construction Cost Total				$332,400
Design Costs (12%)				$39,900
Construction Administration Costs (12%)				$39,900
Land/Easement Acquisition	$10,000	EA	7	$70,000
Total Project Cost (rounded)				$482,000

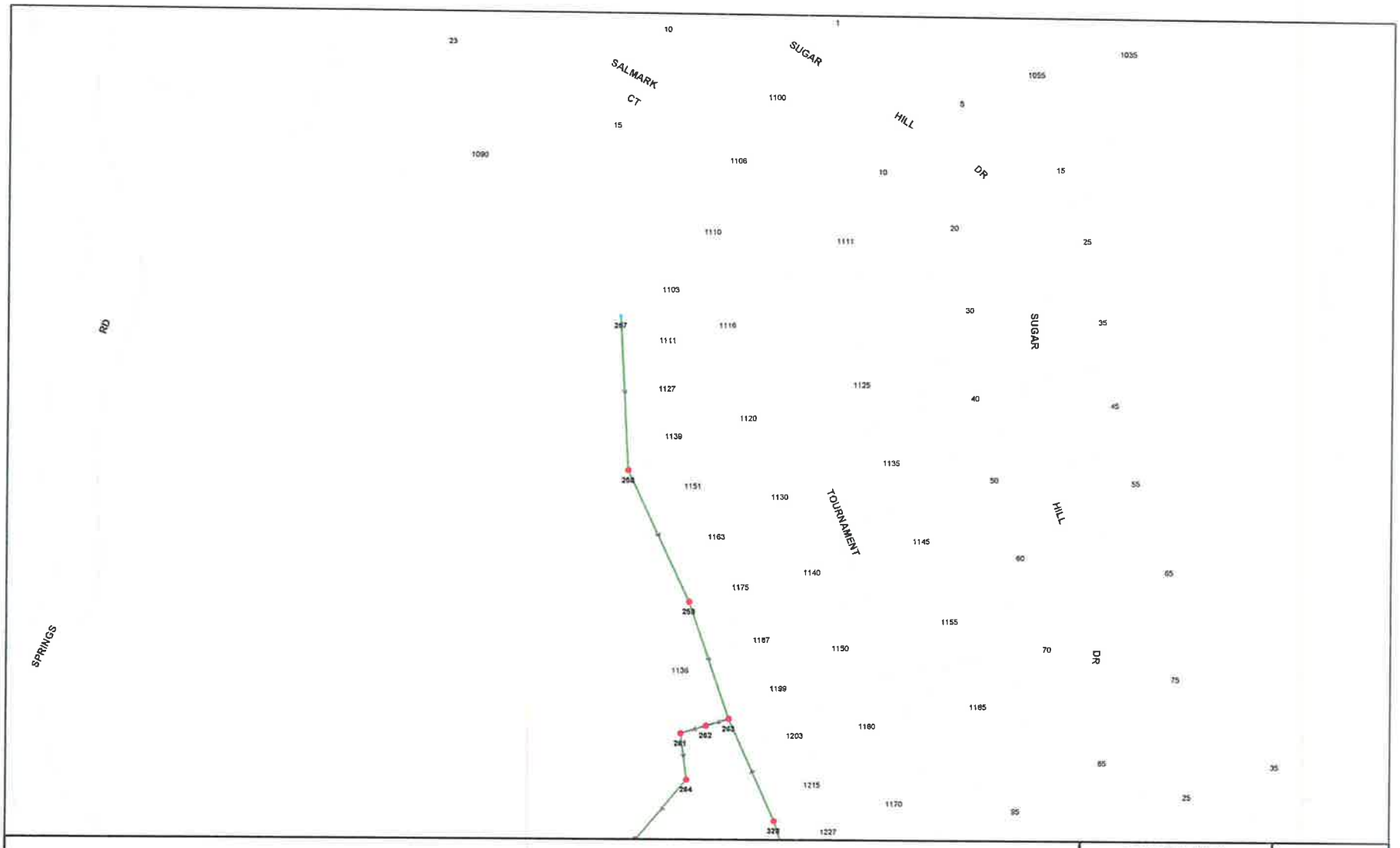
Alternatives Summary

The following Summary Table lists the two Alternatives, their costs and the advantages and disadvantages of each:

Alternative 1 – Replace Gravity Pipelines	**Alternative 2 – Install Pump Stations**
Estimated Cost: $ 865,000	**Estimated Cost: $ 482,000**
Pros:	**Pros:**
- No Energy Costs	- Abandon vulnerable hillside pipe system
- New pipe reduces current maint. Costs	- Abandon vulnerable creek crossing
-	- Alarmed systems reduce chances of spill
-	- Improved maintenance access
Cons:	**Cons:**
- Geotechnical unknowns	- Energy Costs
- Environmental unknowns	- Easements required
- Replace majority of hillside pipe system	- Standby generator required
- Improve / maintain creek crossing	- Revise gravity sewer for Polhemus Rd parcel
- Geotech / Environmental liabilities ?	-
- Continue difficult monitoring access	-
- No vehicular access = hand maintenance	-
- New easements req'd for new pipe align	-
-	-
Note: Maintenance costs are assumed to be equal for each Alternative.	

Recommendation

There are a number of unknowns regarding new construction on the existing hillside. Environmental access for replacement of the existing pipeline may or may not be a problem. More importantly, the significant geotechnical liability that may be incurred by simply stepping foot back onto the already vulnerable hillside, is of particular concern. Alternately, the County has existing experience with individual pump stations. The concept, with proper alarms, for a neighborhood-sized pump station is the same. As can be seen from the cost estimates, the gravity system is almost double the cost of the pump station alternative. Therefore, this report recommends the abandonment of the existing gravity system and installation of a system of pump stations for the long term protection of the Parrott Drive neighborhood.



County of San Mateo
Department of Public Works

James C. Porter, Director

The County does not guarantee the accuracy or currency of the information on this map page. Information shown on this map page is approximate. Exact locations should be verified in the field.

For Reference Only

Sanitary Sewer System

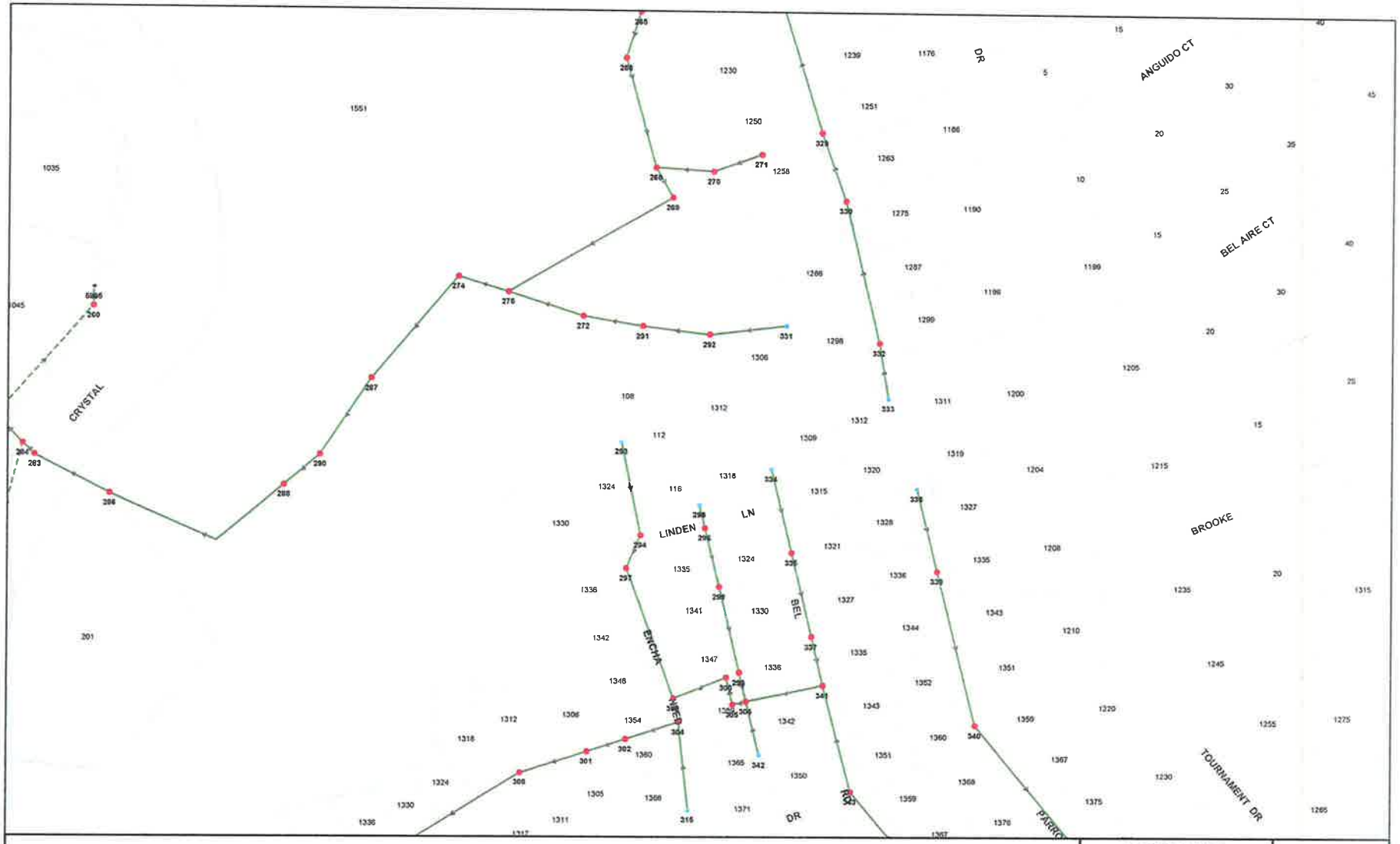
Revised: 11/10/11

Location Map

9 | 10 | 11

Sheet Number

9



County of San Mateo
Department of Public Works
James C. Porter, Director

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0 100 200 300 400 500
Feet

For Reference Only

Sanitary Sewer System

Revised: 11/10/11

Location Map

	9	
10	11	
12	13	14

Sheet Number

11

County of San Mateo
Department of Public Works

James C. Porter, Director

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0 100 200 300 400 500
Feet

For Reference Only

Sanitary Sewer System

Revised: 11/10/11

Location Map

	9	
10	11	
12	13	14

Sheet Number

11

County of San Mateo - Planning and Building Department

ATTACHMENT Q

COUNTY OF SAN MATEO

BOARD OF SUPERVISORS
DAVE PINE
CAROLE GROOM
DON HORSLEY
WARREN SLOCUM
ADRIENNE J. TISSIER

Department of Public Works

JAMES C. PORTER
DIRECTOR

555 COUNTY CENTER, 5TH FLOOR • REDWOOD CITY • CALIFORNIA 94063-1665 • PHONE (650) 363-4100 • FAX (650) 361-8220

December 3, 2013

Mr. Nick Zmay
751 Laurel Street PO Box #409
San Carlos, CA 94070

Re: Sewer Service for Proposed Parrott Drive Subdivision (APN: 038-131-110)

Dear Mr. Zmay:

This letter is a follow-up to our recent telephone conversations and electronic correspondences regarding the Crystal Springs County Sanitation District's (District) ability to provide sewer service to the proposed four-parcel subdivision along Parrott Drive (copy of marked-up assessor parcel map page enclosed). The District is able to provide sewer service to the proposed subdivided parcels. However, the requirements listed below must be satisfied prior to connections to the District sewer main on Parrott Drive can be made:

1. There are capacity issues in the sewer lines downstream of the project area within the Town of Hillsborough and the City of San Mateo during wet weather events. The project shall minimize its impact on the downstream systems by completing capital improvement projects within the District that would reduce inflow and infiltration into the District's system in an amount equal to the projected sewage discharge amount to the District from the project. This type of mitigation would mitigate the project's effect on downstream pipes by reducing or eliminating wet weather inflow and infiltration from the District to downstream of the project.

   I understand, based on our telephone conversation on November 19, 2013, that you are aware that District sewer mains exist within the referenced parcel and downstream of the four proposed parcels. As we discussed, segments of these sewer mains have experienced damage due to earth movement over the past several years and are in need of replacement. A study prepared by Harris & Associates, the consultant firm retained by the District, in 2003 evaluated the conditions of the sewer mains and estimated the cost to replace the pipes in their current locations or install a pump and force main system as an alternative (Harris Study). Due to the significant cost of either option and the District's budgetary constraints, only temporary repairs were made to the damaged pipe segments. Permanent repairs to the District mains that would convey the sewage from the proposed four parcels remain a priority for the District. The District is willing to discuss a project to repair the District pipe segments as a mitigation project to offset sewage generation and eliminate infiltration and inflow to the downstream sewer facilities. For your information, I've enclosed with this letter a copy of the Harris Study and pages (9 and 11) of the County sanitary sewer system map depicting the existing sewer mains in the vicinity of your project site.

2. The developer of the proposed subdivision must demonstrate that the District sewer mains utilized to transport sewage from the subdivision has the peak wet weather capacity for conveying the additional flow generated from the 4 residences. If it is determined that the lines are insufficient to convey the additional flow, the developer may need to upgrade the sewer lines to accommodate this subdivision.

3. Should a pump system be utilized to deliver sewage from the four parcels to the District's sewer main on Parrot Drive, the District will require that a covenant for each parcel be prepared stating that the ownership, operation, maintenance and repair of the pump system will be the responsibility of the property owner. The covenant must be prepared, signed, notarized, recorded with the San Mateo County Recorder's Office, and a copy provided to the District prior to final sewer sign-off for the building permit.

4. Each new parcel will require a 4" lateral with a minimum of 2% slope and a standard cleanout installed at the property line or on the property within 5' of the property line.

5. Plan review, Sewer Inspection Permit, and connection fees will be required for each new parcel. A Sewer Inspection Permit is required for the inspection of the property line cleanout and the connection to the main.

If you have any questions, please contact Mark Chow at (650) 599-1489 or myself at (650) 599-1497.

Very truly yours,

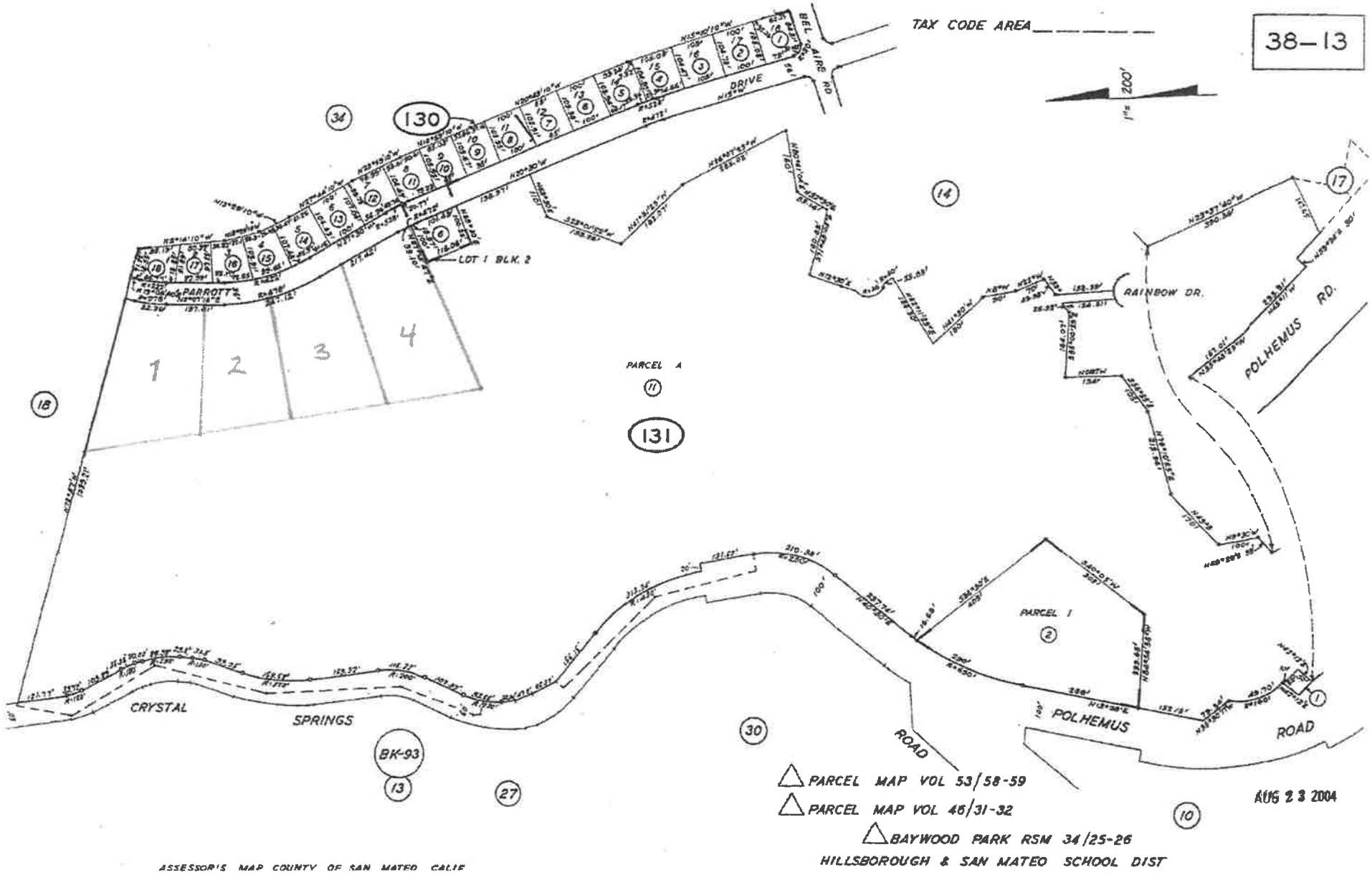
Ann M. Stillman, P.E.
Deputy Director
Engineering and Resource Protection

AMS:MC:ca
F:\Users\admin\Utility\Sewers\Districts\Crystal Springs CSD\Property Information\Parrott Drive Subdivision\Sewer Service Letter.docx
G:\users\utility\sewers\Districts\Crystal Springs CSD\Property Information\Parrott Drive Subdivision\Sewer Service Letter.docx

Encl: Marked-up Assessor Parcel Map (Book 38, Page 13)
Parrott Drive Sanitary Sewer Alternatives Study (February 2003) – Harris Study
County of San Mateo Sanitary Sewer System Maps (Sheets 9 and 11)

cc: Mark Chow, P.E., Principal Civil Engineer, Utilities-Flood Control-Watershed Protection
Julie Young, P.E., Senior Civil Engineer, Utilities-Flood Control-Watershed Protection

Appox. Address 7113 Parrott Drive



County of San Mateo - Planning and Building Department

ATTACHMENT R

NOTES:

1) ALL DISTANCES SHOWN ARE GRID DISTANCES. TO OBTAIN GROUND DISTANCES MULTIPLY BY 1.00007500.

2) AREAS WITH DENSE VEGETATION HAVE CONTOURS DEPICTED BY A DASHED LINETYPE AND THESE AREAS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS.

3) DATE OF AERIAL PHOTOGRAPHY WAS NOVEMBER 1, 2006, CONTOUR INTERVAL = 2 FEET.

4) SITE AREA IS 60.263 ACRES±.

BASIS OF BEARINGS:

THE BEARINGS SHOWN ON THIS MAP ARE BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD 83) CCS83, EPOCH 2002.75, CALIFORNIA ZONE 3.

BENCHMARK:

SURVEY DISK ENCASED IN PVC PIPE WITH ACCESS COVER SET IN CONCRETE FLUSH WITH THE GROUND. LOCATED ON THE WEST SIDE OF SKYLINE BLVD, BETWEEN HIGHWAY 280 AND LOWER CRYSTAL SPRINGS RESERVOIR, ABOUT 284 FEET SOUTHEAST OF THE INTERSECTION OF GOLF COURSE DRIVE AND SKYLINE BLVD, 39.2 FEET NORTHWEST OF A 50-MILE PER HOUR SPEED LIMIT SIGN, 6.8 FEET NORTHEAST OF A 6 FOOT HIGH STRAND BARBED WIRE FENCE AND LEVEL WITH SKYLINE BLVD. THE DISK IS 0.2 FEET BELOW THE LID OF THE ACCESS COVER.

NGS PID = AB7675
ELEVATION = 634.4 FEET
DATUM: NAVD 88

OWNER AND SUBDIVIDER:

STEVE ZMAY AND NICK ZMAY
751 LAUREL STREET, # 409
SAN CARLOS, CA 94070
TEL: (650) 430-0075

CIVIL ENGINEER / LAND SURVEYOR:

DAN MacLEOD
MacLEOD & ASSOCIATES, INC.
965 CENTER STREET
SAN CARLOS, CA 94070
TEL: (650) 593-8580

ASSESSOR'S PARCEL NUMBER:

038-131-110

EXISTING AND PROPOSED ZONING:

RM

FLOOD ZONE:

ZONE X

UTILITIES:

WATER:	CAL WATER
SANITARY SEWER:	COUNTY OF SAN MATEO
GAS & ELECTRICAL:	PG & E
TELEPHONE:	AT&T COMMUNICATIONS
FIRE:	CAL FIRE

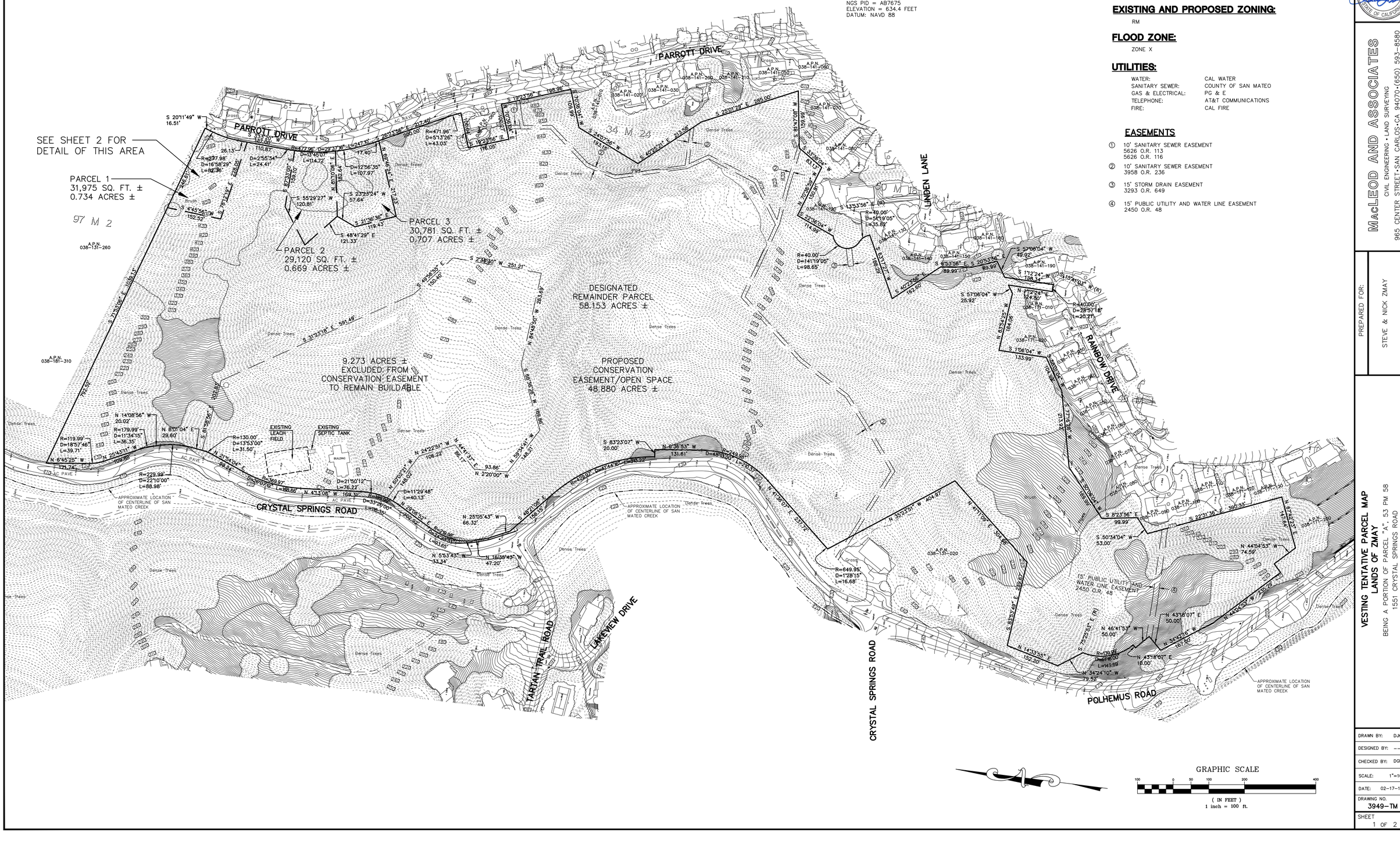
EASEMENTS

① 10' SANITARY SEWER EASEMENT
5626 O.R. 113
5626 O.R. 116

② 10' SANITARY SEWER EASEMENT
3958 O.R. 236

③ 15' STORM DRAIN EASEMENT
3293 O.R. 649

④ 15' PUBLIC UTILITY AND WATER LINE EASEMENT
2450 O.R. 48



REV.	DESCRIPTION	BY:	DATE:
–	ADD SEPTIC SYSTEM	VPG	10/03/18
–	DELETE ONE LOT	VPG	06/14/18
–	REVISE LOT LINES	DGM	11/02/16

DANIEL G. MacLEOD
No. 5304

MacLEOD AND ASSOCIATES
CIVIL ENGINEERING • LAND SURVEYING
965 CENTER STREET•SAN CARLOS•CA 94070•(650) 593-8580

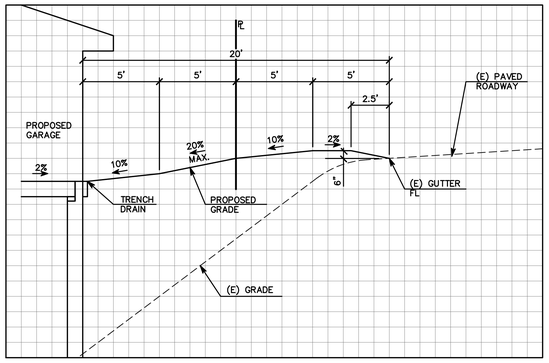
PREPARED FOR:
STEVE & NICK ZMAY

VESTING TENTATIVE PARCEL MAP
LANDS OF ZMAY

BEING A PORTION OF PARCEL "A", 53 PM 58
1551 CRYSTAL SPRINGS ROAD
SAN MATEO COUNTY

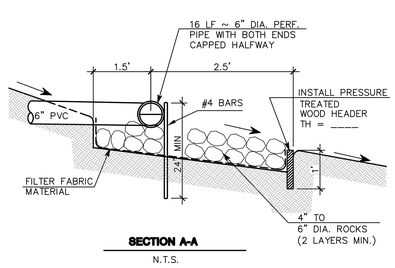
UNINCORPORATED
CALIFORNIA

DRAWN BY:	DJK
DESIGNED BY:	---
CHECKED BY:	DGM
SCALE:	1"=100'
DATE:	02-17-15
DRAWING NO.	3949-TM
SHEET	1 OF 2



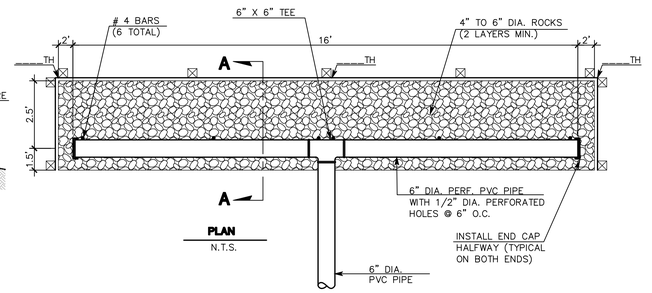
A **TYPICAL DRIVEWAY PROFILE**

SCALE: 1"=4'



SECTION A-A

N.T.S.

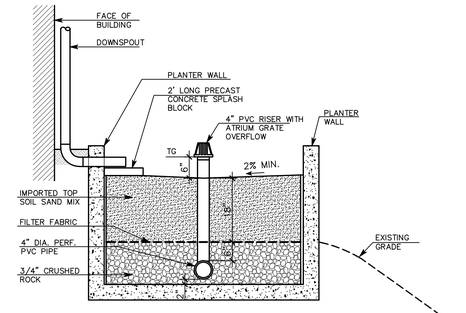


PLAN

N.T.S.

B **ENERGY DISSIPATER**

SCALE: NOT TO SCALE



C-3 STORM WATER TREATMENT MEASURES FLOW-THROUGH PLANTER BOX FILTRATION DETAIL (TO SERVICE 4% OF IMPERVIOUS AREAS)

C SCALE: NOT TO SCALE

SLIDE REPAIR REVEGETATION NOTE:

AFTER COMPLETION OF GRADING, ALL DISTURBED AREAS SHALL BE HYDRO-SEEDED WITH A COSTAL MIX AT A MINIMUM RATE OF 50 POUNDS PER ACRE.

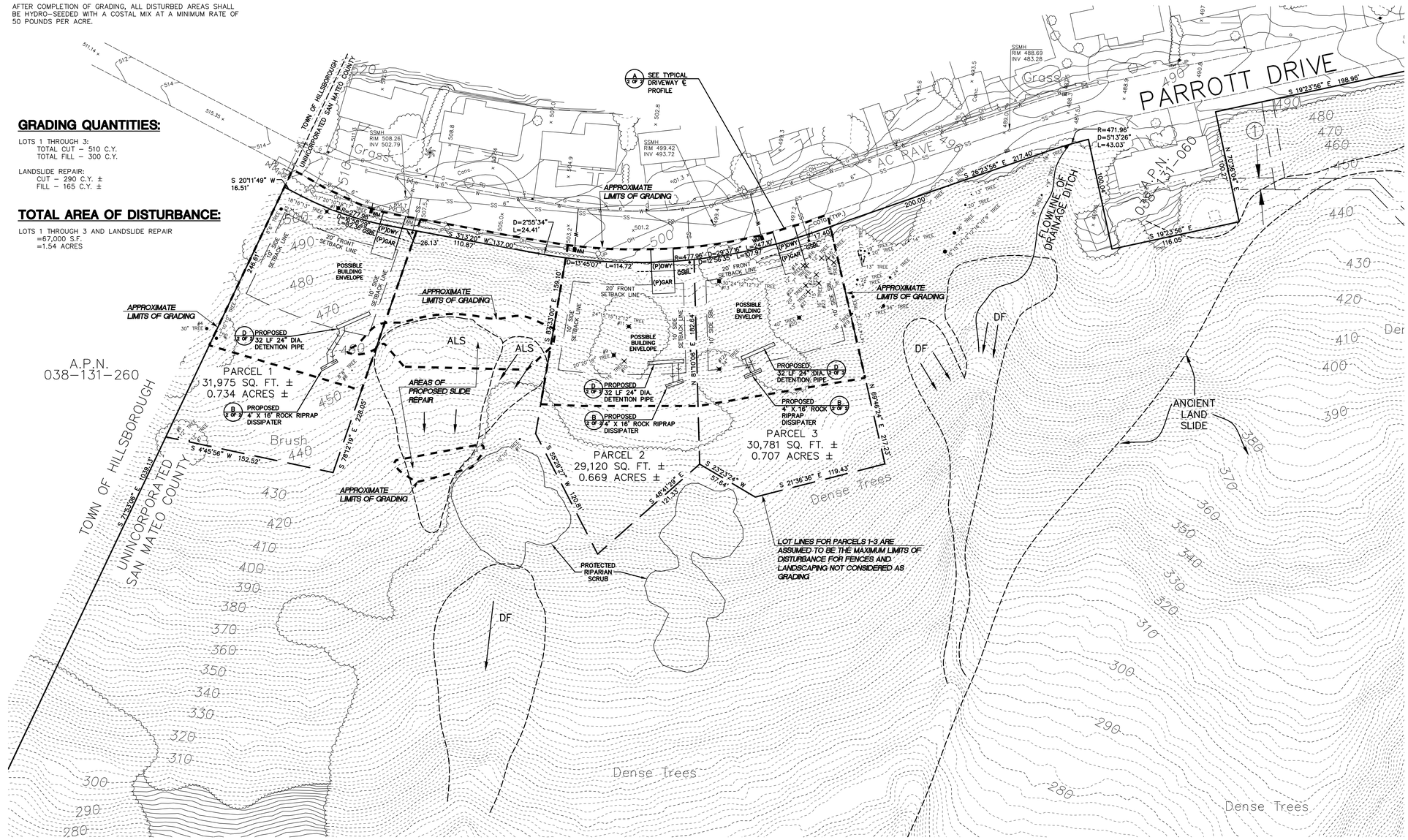
GRADING QUANTITIES:

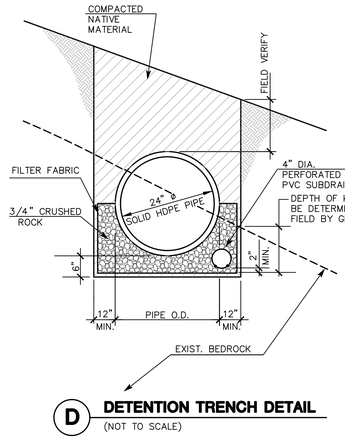
LOTS 1 THROUGH 3:
TOTAL CUT – 510 C.Y.
TOTAL FILL – 300 C.Y.

LANDSLIDE REPAIR:
CUT – 290 C.Y. ±
FILL – 165 C.Y. ±

TOTAL AREA OF DISTURBANCE:

LOTS 1 THROUGH 3 AND LANDSLIDE REPAIR
=67,000 S.F.
=1.54 ACRES





D **DETENTION TRENCH DETAIL**

(NOT TO SCALE)

LEGEND

———	PROPERTY LINE
— — —	PROPOSED PROPERTY LINE
ALS	ACTIVE LAND SLIDE PER GEOTECHNICAL REPORT
℄	CENTER LINE
COTG	CLEANOUT TO GRADE
DF	DEBRIS FLOW PER GEOTECHNICAL REPORT
DWY	DRIVEWAY
GAR	GARAGE
GSBL	GARAGE SET BACK LINE – 20' FROM CURB LINE
FL	FLOWLINE
INV.	INVERT
JP	JOINT UTILITY POLE
PGEV	PG&E VAULT
ℙ	PROPERTY LINE
SBL	SETBACK LINE
SSMH	SANITARY SEWER MANHOLE
WM	WATER METER
WVLT	WATER VAULT
(P)	PROPOSED
⋈	WATER VALVE
——E——	ELECTRIC LINE
——G——	GAS LINE
——OH——	OVERHEAD LINE
——SS——	SANITARY SEWER LINE
——W——	WATER LINE
——SS——	PROPOSED SANITARY SEWER LINE
——W——	PROPOSED WATER LINE
COTG •	PROPOSED CLEANOUT TO GRADE
WM ■	PROPOSED WATER METER
●12" TREE	TREE W/ SIZE
✖12" TREE	EXISTING TREE THAT MIGHT BE REMOVED DEPENDING ON FINAL BUILDING LOCATIONS

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

REV.	DESCRIPTION	BY:	DATE:
---	REVISED GRADING LIMITS	VPC	10/03/18
---	DELETE ZONE 4 LOT	VPC	06/14/18
---	ADD GRADED/DISTURBED AREA	DGM	11/02/16
---	REVISE LOT LINES		
---	ADDED ENERGY DISSIPATER & TRENCH DETAIL	VPC	05/29/15

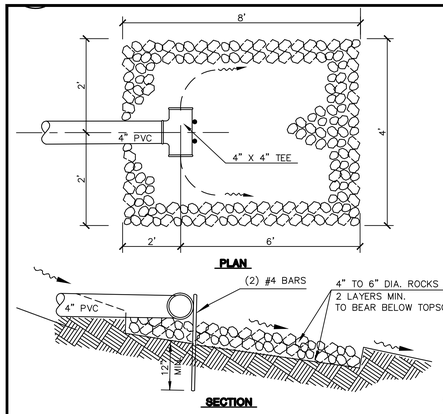
LICENSED LAND SURVEYOR DANIEL G. MacLEOD No. 5304 STATE OF CALIFORNIA

MacLEOD AND ASSOCIATES
CIVIL ENGINEERING • LAND SURVEYING
965 CENTER STREET • SAN CARLOS • CA 94070 • (650) 593-8580

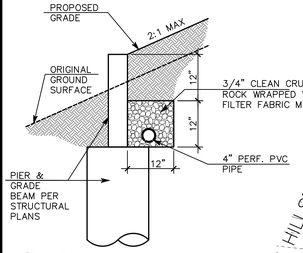
PREPARED FOR:
STEVE & NICK ZMAY

VESTING TENTATIVE PARCEL MAP
LANDS OF ZMAY
BEING A PORTION OF PARCEL "A", 53 PM 58
1551 CRYSTAL SPRINGS ROAD
SAN MATEO COUNTY
CALIFORNIA
UNINCORPORATED

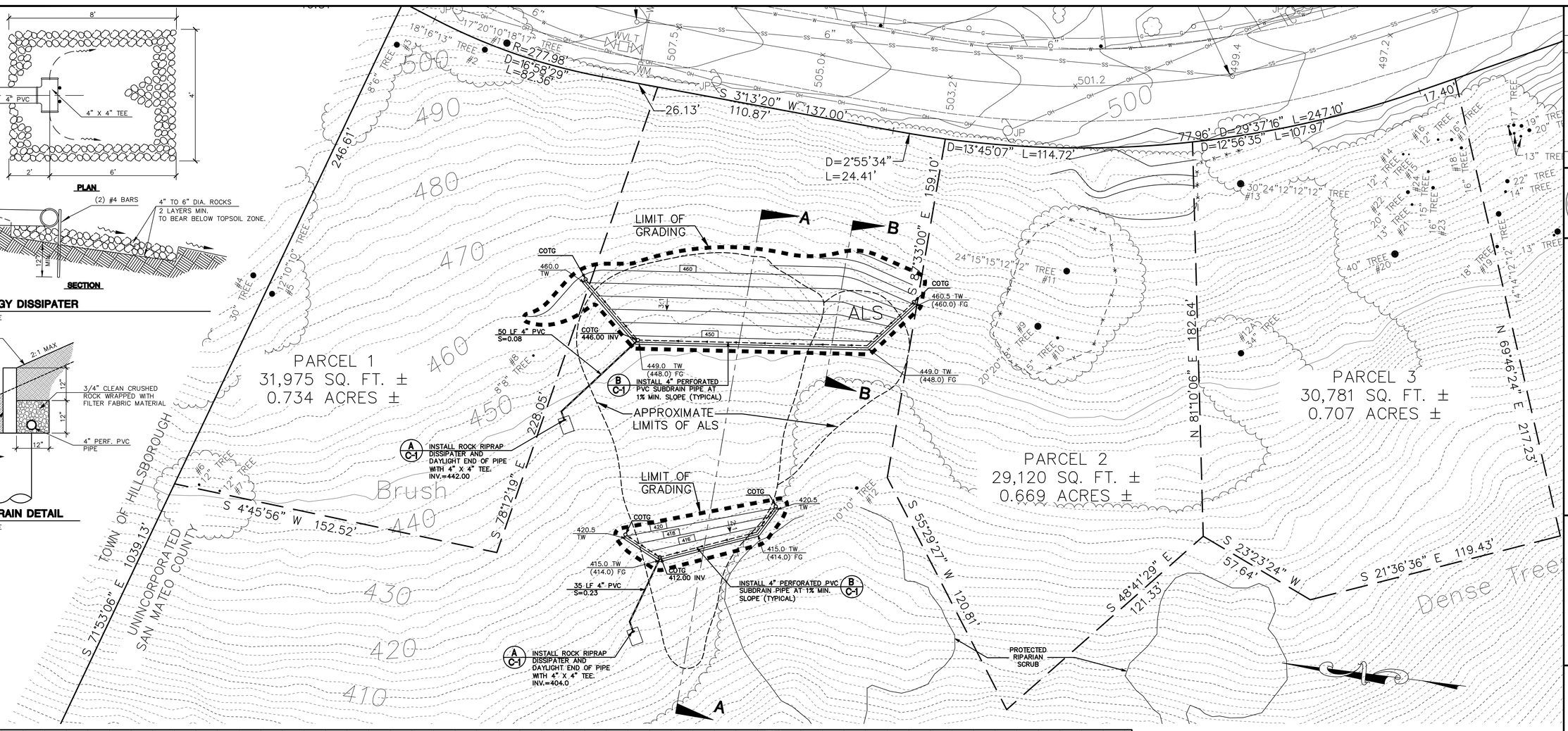
DRAWN BY:	DJK
DESIGNED BY:	---
CHECKED BY:	DGM
SCALE:	1"=40'
DATE:	02-17-15
DRAWING NO.	3949-TM
SHEET	2 OF 2

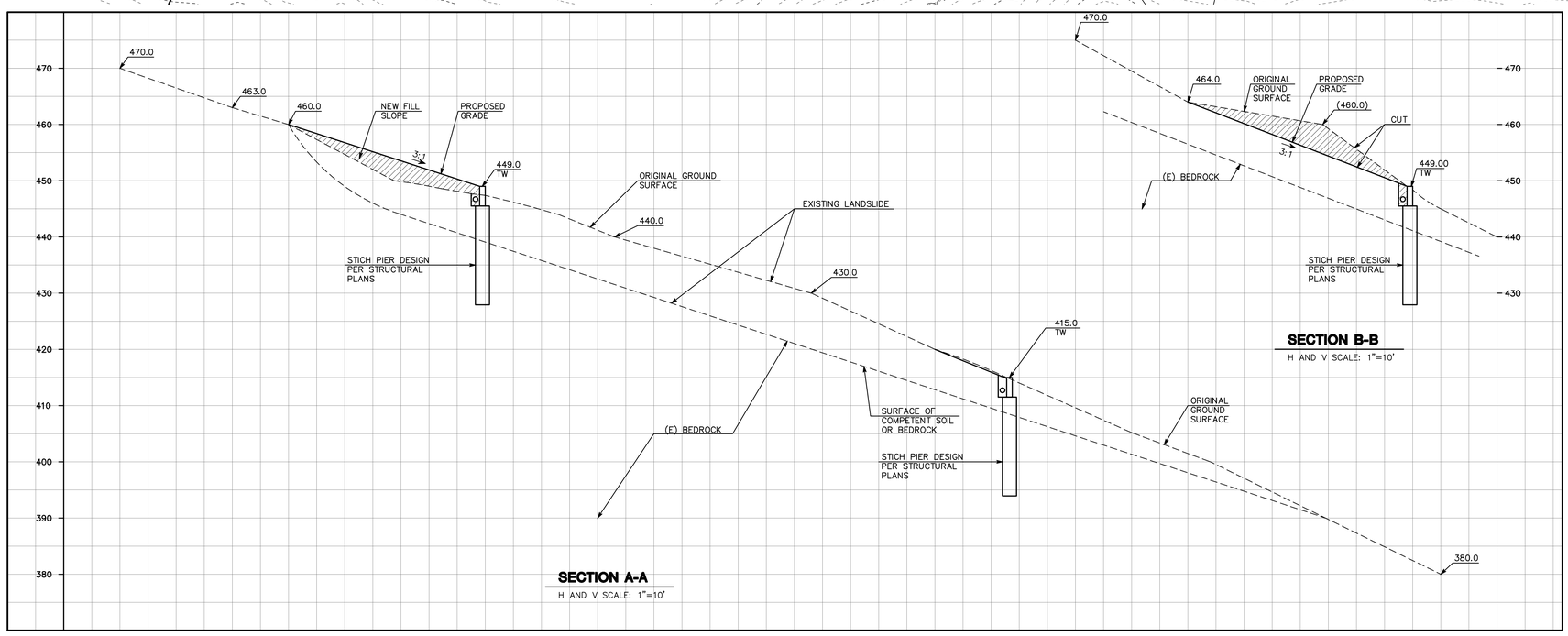


A **ENERGY DISSIPATER**
NO SCALE



B **SUBDRAIN DETAIL**
NO SCALE





GRADING QUANTITIES:

CUT: 290 C.Y.± (CUT & EXPORT 18" TOP SOIL)

FILL: 165 C.Y.± (IMPORTED MATERIAL FOR ENGINEERED FILL)

LEGEND:

———	PROPERTY LINE
— — —	PROPOSED PROPERTY LINE
ALS	ACTIVE LANDSLIDE PER GEOTECHNICAL REPORT
℄	CENTER LINE
COTG	CLEANOUT TO GRADE
INV.	INVERT
JP	JOINT UTILITY POLE
ℙ	PROPERTY LINE
SSMH	SANITARY SEWER MANHOLE
WM	WATER METER
WVLT	WATER VAULT
⋈	WATER VALVE
●12" TREE	TREE W/ SIZE
E	ELECTRIC LINE
G	GAS LINE
OH	OVERHEAD LINE
SS	SANITARY SEWER LINE
W	WATER LINE
SS	PROPOSED SANITARY SEWER LINE
W	PROPOSED WATER LINE
430	NEW CONTOUR

GEOTECHNICAL ENGINEER'S NOTE

ALL EARTHWORK AND SITE DRAINAGE, INCLUDING SITE GRADING, PIER AND TIEBACK EXCAVATIONS, TIEBACK TESTING, PLACEMENT AND COMPACTION OF ENGINEERED FILL, PREPARATION OF SUBGRADE AND UNDERLAYMENT BENEATH ANY SLABS AND/OR THE DRIVEWAY, RETAINING WALL BACKFILL, AND FINAL SURFACE DRAINAGE INSTALLATION SHOULD BE PERFORMED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED BY MURRAY ENGINEERS, INC., DATED FEBRUARY 10, 2014. MURRAY ENGINEERS, INC. SHOULD BE PROVIDED AT LEAST 48 HOURS ADVANCE NOTIFICATION OF ANY EARTHWORK OPERATIONS AND SHOULD BE PRESENT TO OBSERVE AND TEST, AS NECESSARY, THE EARTHWORK, FOUNDATION, AND DRAINAGE INSTALLATION PHASES OF THE PROJECT.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

C-1

REV.	DESCRIPTION	BY:	DATE:
---	REVISE GRADING	VPG	09/18/18
---	REVISE LOT LINES	DGM	11/02/16
---	PER GEOTECH COMMENTS	VPG	05/19/15

PROFESSIONAL ENGINEER REGISTERED No. 35048 CIVIL STATE OF CALIFORNIA

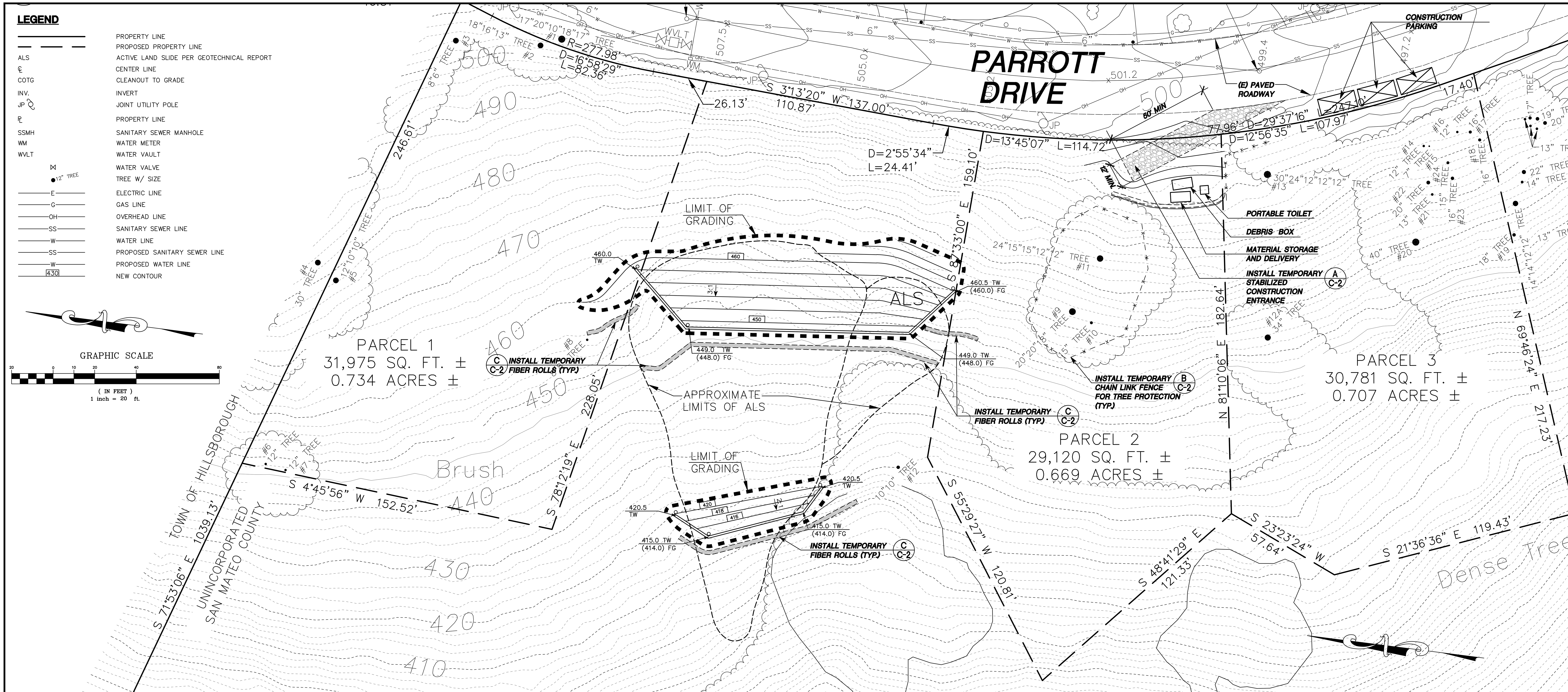
MacLEOD AND ASSOCIATES
CIVIL ENGINEERING • LAND SURVEYING
965 CENTER STREET • SAN CARLOS • CA 94070 • (650) 593-8580

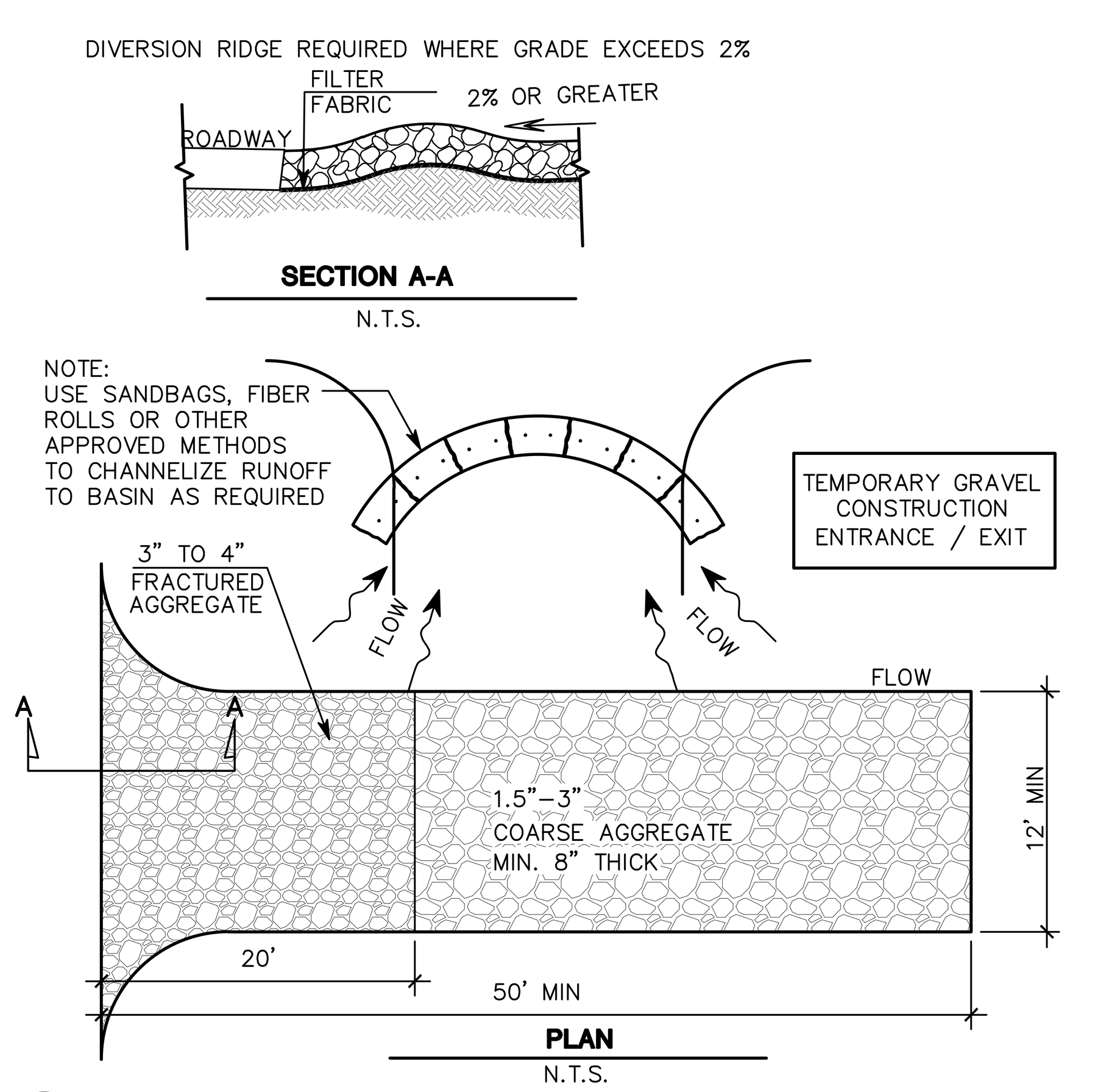
PREPARED FOR:
STEVE & NICK ZMAY

GRADING & DRAINAGE PLAN FOR SLIDE REPAIR

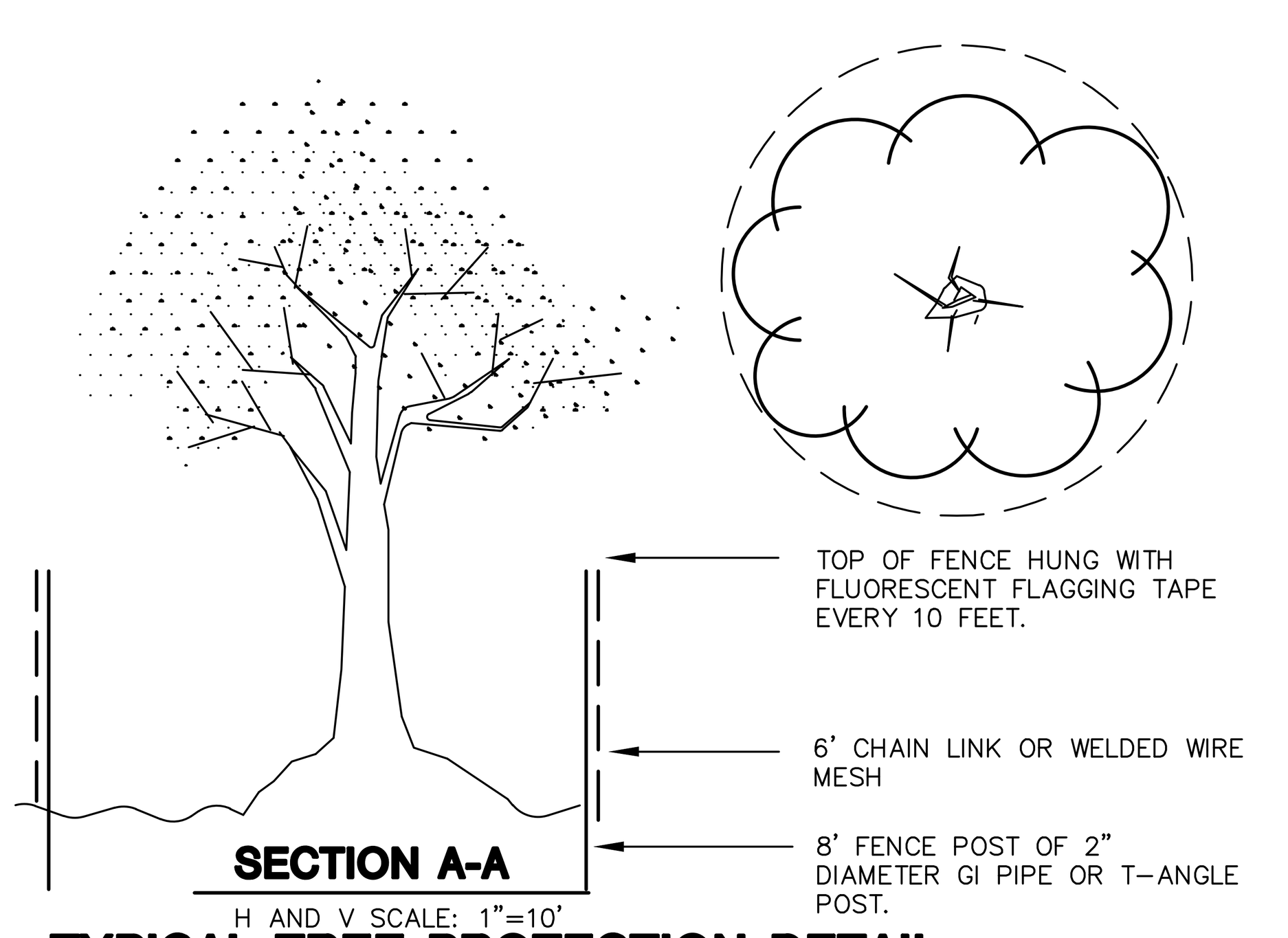
1551 CRYSTAL SPRINGS ROAD
SAN MATEO COUNTY
CALIFORNIA
UNINCORPORATED

DRAWN BY:	AAP
DESIGNED BY:	VPG
CHECKED BY:	DGM
SCALE:	1"=20'
DATE:	03-20-15
DRAWING NO.	3949-14
SHEET	1 OF 2





A CONSTRUCTION ENTRANCE DETAIL
NOT TO SCALE



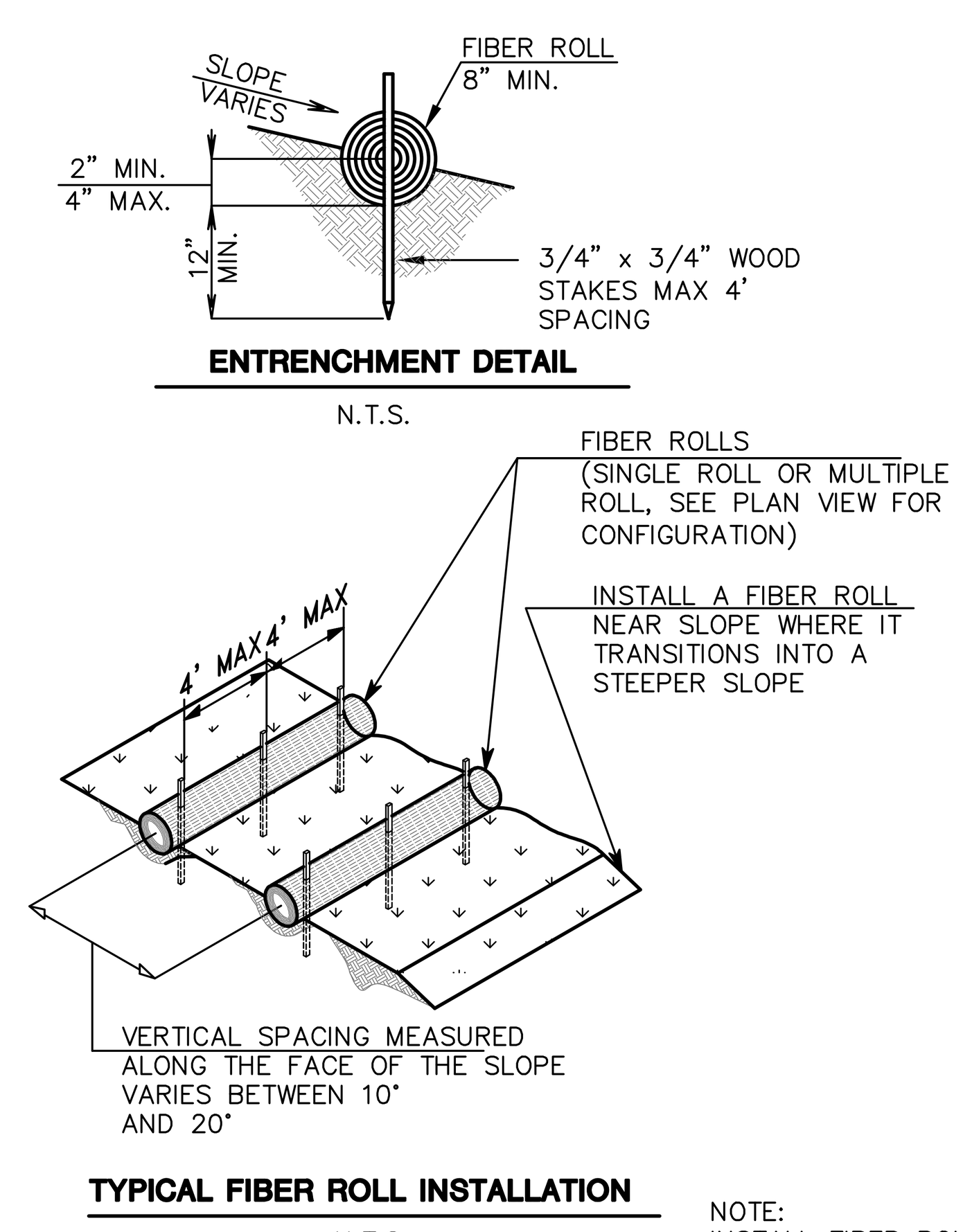
B TYPICAL TREE PROTECTION DETAIL
(NOT TO SCALE)

REVEGETATION NOTE:

AFTER COMPLETION OF GRADING, ALL DISTURBED AREAS SHALL BE HYDRO-SEEDED WITH A COSTAL MIX AT A MINIMUM RATE OF 50 POUNDS PER ACRE.

CONSTRUCTION SCHEDULE:

START OF PROJECT	: APRIL 2015
ESTIMATED PROJECT COMPLETION	: JULY 2015



NOTE: INSTALL FIBER ROLL ALONG A LEVEL CONTOUR

C FIBER ROLL DETAIL
NOT TO SCALE

EROSION CONTROL NOTES:

1. THE INTENT OF THE EROSION CONTROL PLAN IS TO MINIMIZE ANY WATER QUALITY IMPACTS IN THE FORM OF SEDIMENT POLLUTION TO MAIN CREEK & TRIBUTARIES.
2. A CONSTRUCTION ENTRANCE WILL BE INSTALLED PRIOR TO OF GRADING. LOCATION OF THE ENTRANCE MAY BE ADJUSTED BY THE CONTRACTOR TO FACILITATE GRADING OPERATIONS. ALL CONSTRUCTION TRAFFIC ENTERING THE PAVED ROAD MUST CROSS THE CONSTRUCTION ENTRANCE. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITION DEMAND, AND REPAIR OF ANY MEASURES USED TO SEDIMENTS.
3. WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH, OR WATERCOURSE THROUGH THE USE OF SAND BAGS, GRAVEL, BOARDS OR OTHER APPROVED METHODS.
4. THE EROSION AND SEDIMENT CONTROL MEASURES WILL BE OPERABLE ALL YEAR LONG, UNTIL GRADING AND INSTALLATION OF STORM DRAINAGE AND PERMANENT EROSION AND SEDIMENT CONTROL FACILITIES WILL BE COMPLETED. NO GRADING WILL OCCUR BETWEEN OCTOBER 1 AND APRIL 30 UNLESS AUTHORIZED BY THE CITY REPRESENTATIVE.
5. DURING THE RAINY SEASON, ALL PAVED AREAS WILL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE WILL BE MAINTAINED SO THAT A MINIMUM OF SEDIMENT-LADEN RUNOFF ENTERS THE STORM DRAINAGE SYSTEM.
6. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL FIELD MANUAL OF THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, 4TH EDITION, DATED AUGUST 2002.
7. INSTALL TEMPORARY EROSION CONTROL OVER DISTURBED AREAS UTILIZING STRAW MULCH.
8. USE SEDIMENT CONTROLS OR FILTRATION TO REMOVE SEDIMENT WHEN DEWATERING SITE AND OBTAIN REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) PERMIT(S) AS NECESSARY

SAN MATEO COUNTY STANDARD NOTES:

1. EROSION CONTROL POINT OF CONTACT:

   OWNER: NICK ZMAY
   EMAIL: NICKZ93@SBCGLOBAL.NET
   TEL: (650) 430-0075
2. PERFORM CLEARING AND EARTH-MOVING ACTIVITIES ONLY DURING DRY WEATHER. MEASURES TO ENSURE ADEQUATE EROSION AND SEDIMENT CONTROL SHALL BE INSTALLED PRIOR TO EARTH-MOVING ACTIVITIES AND CONSTRUCTION.
3. STABILIZE ALL DENUDED AREAS AND MAINTAIN EROSION CONTROL MEASURES CONTINUOUSLY BETWEEN OCTOBER 1 AND APRIL 30.
4. STORE, HANDLE, AND DISPOSE OF CONSTRUCTION MATERIALS AND WASTES PROPERLY, SO AS TO PREVENT THEIR CONTACT WITH STORMWATER.
5. CONTROL AND PREVENT THE DISCHARGE OF ALL POTENTIAL POLLUTANTS, INCLUDING PAVEMENT CUTTING WASTES, PAINTS, CONCRETE, PETROLEUM PRODUCTS, CHEMICALS, WASH WATER OR SEDIMENTS AND NON-STORMWATER DISCHARGES TO STORM DRAINS AND WATERCOURSES.
6. AVOID CLEANING, FUELING, OR MAINTAINING VEHICLES ON-SITE, EXCEPT IN A DESIGNATED AREA WHERE WASH WATER IS CONTAINED AND TREATED.
7. LIMIT AND TIME APPLICATIONS OF PESTICIDES AND FERTILIZERS TO PREVENT POLLUTED RUNOFF.
8. LIMIT CONSTRUCTION ACCESS ROUTES TO STABILIZED, DESIGNATED ACCESS POINTS.
9. AVOID TRACKING DIRT OR OTHER MATERIALS OFF-SITE; CLEAN OFF-SITE PAVED AREAS AND SIDEWALKS USING DRY SWEEPING METHODS.
10. TRAIN AND PROVIDE INSTRUCTION TO ALL EMPLOYEES AND SUBCONTRACTORS REGARDING THE WATERSHED PROTECTION MAINTENANCE STANDARDS AND CONSTRUCTION BEST MANAGEMENT PRACTICES.
11. THE AREAS DELINEATED ON THE PLANS FOR PARKING, GRUBBING, STORAGE ETC., SHALL NOT BE ENLARGED OR "RUN OVER".
12. CONSTRUCTION SITES ARE REQUIRED TO HAVE EROSION CONTROL MATERIALS ON-SITE DURING THE "OFF-SEASON".
13. DUST CONTROL IS REQUIRED YEAR-ROUND.
14. EROSION CONTROL MATERIALS SHALL BE STORED ON-SITE.
15. CONSTRUCTION SITES ARE REQUIRED TO HAVE EROSION CONTROL MATERIALS ON-SITE DURING THE "OFF-SEASON".
16. THE TREE PROTECTION SHALL BE IN PLACE BEFORE ANY GRADING, EXCAVATING OR GRUBBING IS STARTED.

C-2

REV.	DESCRIPTION	BY:	DATE:
-	REVISE GRADING	VPG	09/18/18
-	REVISE LOT LINES	DGM	11/02/16
-	PER GEOTECH COMMENTS	VPG	05/18/15

REGISTERED PROFESSIONAL ENGINEER · DANIEL G. MacLEOD · No. 35048 · CIVIL · STATE OF CALIFORNIA

MacLEOD AND ASSOCIATES
CIVIL ENGINEERING • LAND SURVEYING
965 CENTER STREET • SAN CARLOS • CA 94070 • (650) 593-8580

PREPARED FOR:
STEVE & NICK ZMAY

EROSION AND SEDIMENTATION CONTROL PLAN WITH TREE PROTECTION
1551 CRYSTAL SPRINGS ROAD
UNINCORPORATED SAN MATEO COUNTY CALIFORNIA

DRAWN BY:	AAP
DESIGNED BY:	VPG
CHECKED BY:	DGM
SCALE:	1"=20'
DATE:	03-20-15
DRAWING NO.	3949-14
SHEET	2 OF 2