

**GEOLOGIC HAZARD ABATEMENT DISTRICT (GHAD)
PLAN OF CONTROL**

**SIENA HILL DEVELOPMENT
OAKLAND AREA GHAD
OAKLAND, CALIFORNIA**

The logo for ENGE, featuring the letters in a large, white, 3D sans-serif font. The letters are set against a background that is a horizontal strip of three images: a blue sky on the left, a green rolling hill in the center, and a blue sky on the right. The logo is positioned in the upper middle of the page.

ENGE

The tagline "Expect Excellence" in a white, italicized serif font, flanked by two horizontal lines. It is positioned below the ENGE logo and above a photograph of orange rocks.

Expect Excellence

Submitted to:
Oakland Area GHAD Board of Directors
Oakland, California

Prepared by:
ENGE Incorporated

**May 9, 2006
Latest Revision April 26, 2016**

Project No:
6964.002.015

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Chair Desley Brooks
Oakland City Hall
One Frank Ogawa Place
Oakland, CA 94612

Subject: Siena Hill Development
Oakland Area Geologic Hazard Abatement District (GHAD)
Oakland, California

GEOLOGIC HAZARD ABATEMENT DISTRICT (GHAD) PLAN OF CONTROL

Dear Chair Brooks:

ENGEO Incorporated, acting as the Oakland Area Geologic Hazard Abatement District (GHAD) Manager, is pleased to present this revision of the Oakland Area GHAD Plan of Control.

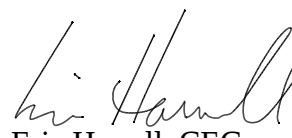
The amendments to the Plan of Control are intended to reflect the following:

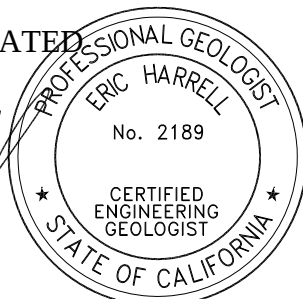
1. Revision of the Responsibility for GHAD Activities section to allow for individual Assessor's Parcels to be transferred to the GHAD.
2. Revision of the *GHAD Maintenance and Monitoring Schedule* section to acknowledge existing site conditions and improvements.
3. Update of the *Background* section to summarize developments since the last revision of the Plan of Control in 2006.
4. Revision of miscellaneous items to clarify or update the 2006 Plan of Control.

If you have any questions concerning the contents of our report, please do not hesitate to contact us.

Very truly yours,

ENGEO INCORPORATED


Eric Harrell, CEG
eh/ue/jf



Reviewed by:

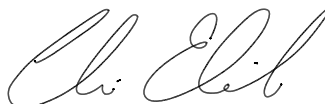

Uri Eliahu, GE

TABLE OF CONTENTS

Letter of Transmittal

1.0	AUTHORITY AND SCOPE	1
1.1	PROPERTY IDENTIFICATION	1
2.0	BACKGROUND	2
2.1	CURRENT AND PROPOSED DEVELOPMENT	2
2.2	EASEMENT AND KELLER AVENUE RIGHT OF WAY	2
3.0	SITE GEOLOGY.....	3
3.1	GEOLOGIC SETTING	3
3.2	GEOLOGIC UNITS	3
3.2.1	Artificial Fill	3
3.2.2	Topsoil	3
3.2.3	Colluvium	3
3.3	GROUNDWATER.....	4
3.4	SEISMIC SOURCES.....	4
4.0	GEOLOGIC HAZARDS	5
4.1	SLOPE INSTABILITY	5
4.2	SEISMICALLY INDUCED GROUND SHAKING	7
5.0	CRITERIA FOR GHAD RESPONSIBILITY	8
5.1	ISOLATED OR REMOTE FEATURE REQUIRING MITIGATION.....	8
5.2	SINGLE PROPERTY	8
5.3	GEOLOGIC HAZARDS RESULTING FROM NEGLIGENCE OF PROPERTY OWNER.....	8
5.4	PROPERTY NOT ACCEPTED.....	8
5.5	GEOLOGIC HAZARD WHICH REQUIRES EXPENDITURE IN AMOUNT EXCEEDING THE VALUE OF THE THREATENED OR DAMAGED IMPROVEMENT	9
5.6	GHAD FUNDING OR REIMBURSEMENT FOR DAMAGED OR DESTROYED STRUCTURES OR SITE IMPROVEMENTS	9
5.7	NO REIMBURSEMENT OF EXPENSES INCURRED BY PROPERTY OWNERS.....	9
6.0	ACCEPTANCE	10
6.1	ACTIVATION OF ASSESSMENT.....	10
6.2	RESPONSIBILITY FOR GHAD ACTIVITIES.....	10
6.3	PROCESS FOR TRANSFERRING RESPONSIBILITY FOR GHAD ACTIVITIES.....	10

TABLE OF CONTENTS (Continued)

7.0	GHAD PLAN OF CONTROL.....	12
7.1	GENERAL LANDSLIDE AND EROSION HAZARD MITIGATION	12
8.0	PRIORITY OF GHAD EXPENDITURES	14
9.0	MAINTENANCE AND MONITORING SCHEDULE.....	15

SELECTED REFERENCES

- APPENDIX A:** Figure 1 - GHAD Boundary
Exhibit A - Legal Description of Siena Hill Property
Exhibit B - Legal Description of Siena Hill Easement Area
Exhibit C - Retaining Walls Outside of Project Area

1.0 AUTHORITY AND SCOPE

On July 18, 2006, the Oakland City Council adopted Resolution No. 80058, formed the GHAD, and appointed itself as the Oakland Area GHAD Board of Directors (“Board”). On October 3, 2006, the Board appointed interim officers to the GHAD, a GHAD Manager, Attorney, and Treasurer/Clerk. On June 17, 2015, by Resolution No. 09, the GHAD Board appointed a new GHAD treasurer and appointed the GHAD attorney to also act as the GHAD Clerk.

Section 26509 of the Public Resources Code requires a Plan of Control, prepared by a State-Certified Engineering Geologist, as a prerequisite to formation of a GHAD. The Plan of Control was adopted by the GHAD Board on December 5, 2006. Pursuant to Section 26509, this Plan of Control was prepared by an Engineering Geologist certified pursuant to Section 7822 of the Business and Professions Code and describes, in detail, the geologic hazards, their location, and the area affected by them. It also provides a plan for the prevention, mitigation, abatement, or control thereof.

As used in this Plan of Control, and as provided in Section 26507, “geologic hazard” means an actual or threatened landslide, land subsidence, soil erosion, earthquake, fault movement, or any other natural or unnatural movement of land or earth.

1.1 PROPERTY IDENTIFICATION

The GHAD boundary is shown in Figure 1 (“Property”). The GHAD area includes the areas within the Siena Hill project. The legal description of the land to be included within the Siena Hill GHAD is included in Exhibit A.

2.0 BACKGROUND

The Property is located at Keller Avenue and Greenridge Drive in Oakland, California. The irregularly shaped Property has approximately 950 feet of frontage on Keller Avenue and extends approximately 250 feet in width. Prior to the grading activities, elevations ranged from a low of about 340 feet above mean sea level (msl) near Keller Avenue to a high of about 450 feet above msl in the most elevated portion of the Property.

2.1 CURRENT AND PROPOSED DEVELOPMENT

A geotechnical investigation was completed by Gary E. Underdahl (2001) for the Siena Hill site. At final buildout, a total of 32 residential lots are planned for the Siena Hill development. Currently 10 residences have been constructed on the site and have been occupied since 2008.

2.2 EASEMENT AND KELLER AVENUE RIGHT-OF-WAY

Retaining walls and appurtenant drainage facilities have been constructed within an offsite easement (Easement) and within the Keller Avenue right-of-way (Right-of-Way). Although these areas are located outside of the Property boundary, the GHAD will be responsible for the maintenance of the retaining walls and appurtenant drainage facilities, as they directly benefit the Siena Hill project. The legal description of the Easement and a depiction of the retaining walls outside of the Property are presented in Exhibits B and C, respectively.

The GHAD is charged with responsibilities that relate to the prevention, mitigation, abatement, or control of geologic hazards, which include the maintenance of facilities that enhance geologic as well as hydrogeologic stability such as drainage facilities and associated improvements. This may include the monitoring and maintenance of drainage facilities which, if subject to improper care, could result in decreased slope stability, the prime concern of the GHAD. As currently planned, the drainage facilities to be maintained by the GHAD include Best Management Practice (BMP) water quality treatment facilities and filter systems, concrete-lined drainage ditches, storm drain facilities, and drain inlets.

The GHAD will mitigate or abate landslide or erosion hazards that could directly affect improved, developed, and accepted properties (as defined in Section 7) within the project, in accordance with Section 6. The GHAD will also perform maintenance of water control and conveyance facilities.

3.0 SITE GEOLOGY

3.1 GEOLOGIC SETTING

The Property is located within the Coast Ranges geologic province of California, a series of northwest-trending ridges and valleys. Bedrock in the province has been folded and faulted during regional uplift beginning in the Pliocene period, roughly 4 million years before present. According to a geotechnical investigation report prepared by Gary E. Underdahl (2001), the Property is situated on geologically young volcanics, labeled as Leona Rhyolite (Radbruch (1969), Dibblee (1980) and Crane (1988)). The bedrock strength of the formation reportedly varies considerably in strength and hardness. Nilsen (1975) has mapped the site as rock and colluvial-filled swales. The Nilsen map reportedly identifies colluvium and numerous landslides on adjacent hillsides and swales.

3.2 GEOLOGIC UNITS

The geologic units mapped on the site include bedrock and surficial deposits consisting of artificial fill, topsoil, and colluvium that are described below. The fill and topsoil geologic units were identified in the Underdahl (2001) geotechnical investigation report and describe the pregraded site conditions

3.2.1 Artificial Fill

The upper soil in the central swale is a well-compacted fill. The fill is composed of a gravelly silt or clay or silty gravel, with the gravel consisting of sandstone and shale rock fragments.

3.2.2 Topsoil

The natural layer, under the fill, is firm and dry sandy clay topsoil, ranging from 6 to 18 inches in thickness. The topsoil is moderately to highly plastic and probably highly expansive. Sand and gravel content is relatively high.

3.2.3 Colluvium

Mantling the unquarried bedrock and filling swales are colluvial deposits. These sediments are derived from weathering of the underlying bedrock and consist mostly of silty clay. This material generally is moderately expansive and has low strength. Where colluvium is located on sloping ground, it may be characteristically unstable. Within swales, the colluvial deposits tend to be relatively thicker and may be subject to flow or slip downslope.

3.3 GROUNDWATER

Groundwater was not encountered during the field investigation performed by Underdahl. Fluctuations in groundwater levels may occur seasonally and over a period of years because of precipitation, changes in drainage patterns, irrigation and other factors.

3.4 SEISMIC SOURCES

No faults are have been mapped as crossing the site (Underdahl, 2001). The nearest State of California-zoned, active¹ fault is the Hayward fault mapped trace about 3,500 feet southwest of the site. As discussed in the geotechnical investigation, there is a high probability that the site and any improvements will be subject to strong ground shaking and some deformation of the site slopes during the lifetime of the project.

¹ An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 10,000 years) (Hart, 1994). The State of California has prepared maps designating zones for special studies that contain these active earthquake faults.

4.0 GEOLOGIC HAZARDS

The following geologic hazards were identified for the Property in the previous site studies and are expected to remain to some extent after site grading has been completed.

- Slope instability
- Seismically induced ground shaking

4.1 SLOPE INSTABILITY

Earth stability is the GHAD's prime geotechnical concern at this site. This is not unique to this project, but is of importance for hillside projects in the San Francisco Bay Area. This section describes several types of slope instability which are within the GHAD's responsibility, subject to the provisions of Sections VI and VII.

Landslides are a common geologic phenomenon and are part of the process of mass wasting. Weathered or fractured bedrock and soil are transported downslope over geologic time as a result of gravitational and hydrostatic forces. Landslides and earth movement in this bedrock formation are typically rotational slumps and earthflows. Depth of movement is typically about 10 to 30 feet below the ground surface. Earthflows are confined to the upper 3- to 5-foot-thick clayey soil mantle. In the winter rainy season, these earthflows can move at a rate of several feet per day.

A landslide is a deposit of soil and/or bedrock moving downward from its original position under the influence of gravity. Landslides include a variety of morphologies and are further defined by type of materials, wetness, and mode of movement. They can consist of mass movements of earth materials that are primarily intact, and occur along discrete shear surfaces. These surfaces (shear or slip planes) can be rotational (conchoidal or concave), such as for earth slumps, or planar, as for translational earth slide or bedrock block slides. Most landslides are truly "complex landslides", sliding, falling and flowing with more than one type of movement and/or material. According to the Underdahl report, numerous landslides have been mapped on hillsides and within swales adjacent to the Property. Additionally, a small landslide area is mapped by Nielsen (1975) near the north boundary of the Property (DMA, 2006).

Falls are an abrupt free-fall of earth materials off cliffs, steep cuts, or steep stream banks while earthflows are mass movements of earth materials in which the type of movement is one of flowing. When composed of soil finer than gravel size, the flowing material is commonly called a mudflow. A debris flow/debris avalanche is composed of natural earth materials, artificial fill, and/or organic debris which flow downslope with speed. Most of the material is transported away from the area of initial ground failure.

Slope failures are also often triggered by increased pore water pressure due to the infiltration of rainwater. The resulting decrease of shear resistance (internal resistance to deformation by shearing) can cause the slope to move. The level of groundwater table varies with the amount of

rainfall for the area. If rainfall is higher than average during the winter season, the water table will become higher than average on a hillslope and groundwater pressures may become sufficiently high to activate the hillside.

Soil creep is the slow, often imperceptible, deformation of slope materials under low stress levels, which normally affects the shallow portion of the slopes, but can be deep seated where a weak zone of soil or bedrock exists. It results from gravitational and seepage forces, and may be indicative of conditions favorable for landsliding. Creep can be caused by wetting and drying of clays, by solution and crystallization of salts, by the growth of roots, by burrowing animals and by downslope movement of saturated ground. Colluvium refers to the mantle of loose soil and weathered bedrock debris that progresses down hillsides by creep.

The District shall also be concerned with erosion and sedimentation affecting developed lots or improvements. Erosion is defined as the process by which earth materials are loosened and removed by running water on the ground surface or in the subsurface. Sedimentation is the depositing or settling of soil or rock particles from a state of suspension in a liquid.

Hilly terrain in a natural condition or particularly on excavated slopes can be subject to erosion. Landslide deposits which are sometimes in a loosened condition are particularly prone to erosion. Earth flow-, debris flow- and mud flow-type landslides typically have an area of deposition or accumulation (sedimentation area) at their base. Graded slopes in the District, particularly those not sufficiently vegetated, can be subject to erosion, and therefore, a source of transported sediment.

It is necessary that field-verified geologic field mapping will be prepared during mass grading operations. The detailed maps showing bedrock structure, springs, and landslide limits and repairs should be provided to the GHAD when available. The cuts should be viewed by the project geologist during grading to provide mitigation schemes for unsuspected slope conditions which could decrease the slope stability. Such conditions include unfavorable bedrock attitudes and seepage conditions.

In repaired or buttressed landslide areas, the landslide debris should be overexcavated to firm undisturbed materials below the landslide plane as determined by the Geotechnical Engineer or Engineering Geologist at the time of grading. In the case of the complete removal of a landslide, systems of surface and subsurface drains should be installed to collect the subsurface waters which may have initially caused the landslide. The configuration of each subdrainage system should be tailored to the individual landslide at the time of grading. The Geotechnical Engineer and/or the Engineering Geologist should determine the location and depths of subdrains at that time. The location and elevation of subdrains and outlets should be recorded by survey. Each landslide subexcavation then would be reconstructed to final grade by keying and benching below the landslide plane with compacted, drained, engineered fill.

4.2 SEISMICALLY INDUCED GROUND SHAKING

As identified in the geologic and geotechnical reports pertaining to the project, an earthquake of moderate to high magnitude generated within the San Francisco Bay Region could cause considerable ground shaking at the Property, similar to that which has occurred in the past. To mitigate the shaking effects, all structures should be designed using sound engineering judgment and the latest building code requirements, as a minimum.

Seismic slope stability analysis has presumably been incorporated in the corrective grading plans for the graded portions of the Property; however, seismically generated slope failures could occur in open space areas outside of the development limits.

5.0 CRITERIA FOR GHAD RESPONSIBILITY

In forming the GHAD and establishing the assessment levels and budgets for the District, it is important to clearly define the limits of the GHAD's responsibilities. The GHAD will accept responsibility for property and retaining walls and appurtenant drainage facilities within the Easement and the Right-of-Way as described in Section VI of this Plan of Control. However, the intent of this Plan of Control is not to extend the GHAD's responsibilities to every potential situation of instability; rather, the following are exclusions from GHAD responsibility.

5.1 ISOLATED OR REMOTE FEATURE REQUIRING MITIGATION

The GHAD shall not have responsibility to monitor, abate, mitigate or control slope instability that does not involve damage to or pose a significant threat to damage site improvements or retaining walls and appurtenant drainage facilities within the Easement and/or the Right-of-Way.

5.2 SINGLE PROPERTY

The GHAD will not prevent, mitigate, abate or control geologic hazards which are limited in area to a single parcel of property unless the geologic hazard has damaged, or poses a significant threat of damage to site improvements located on other property within the GHAD boundaries. As used herein, the term "site improvements" means buildings, roads, sidewalks, utilities, improved trails, swimming pools, tennis courts, gazebos, cabanas, geologic stabilization features, or similar improvements.

5.3 GEOLOGIC HAZARDS RESULTING FROM NEGLIGENCE OF PROPERTY OWNER

The GHAD may, in the GHAD manager's sole discretion, decline to prevent, mitigate, abate or control geologic hazards which occurred or resulted from any negligence of the homeowner and/or the homeowner's contractors, agents or employees in developing, investigating, grading, constructing, maintaining or performing or not performing any post-development work on the subject property as long as the geologic hazard is limited to a single lot, pursuant to exclusions described herein.

5.4 PROPERTY NOT ACCEPTED

The GHAD shall not have responsibility to repair damage, which is situated on a parcel of real property, which the GHAD has not accepted in accordance with Section 6, below. The GHAD, however, may monitor, abate, mitigate or control geologic or hydrogeologic hazards on a parcel of real property which the GHAD has not accepted in accordance with Section 6, below, and is not excluded from GHAD responsibility by Paragraphs 1, 2 and 3; provided, however, that GHAD responsibility on such parcel shall be limited to the extent necessary to address damage or a significant threat to damage site improvements which are within a parcel of real property which the GHAD has accepted in accordance with Section 6, below.

5.5 GEOLOGIC HAZARD WHICH REQUIRES EXPENDITURE IN AMOUNT EXCEEDING THE VALUE OF THE THREATENED OR DAMAGED IMPROVEMENT

The GHAD may elect not to prevent, mitigate, abate or control a geologic hazard where, in the GHAD manager's sole discretion, the anticipated expenditure required to be funded by the GHAD to prevent, mitigate, abate or control the geologic hazard will exceed the value of the structure(s) and site improvement(s) threatened with damage or loss.

5.6 GHAD FUNDING OR REIMBURSEMENT FOR DAMAGED OR DESTROYED STRUCTURES OR SITE IMPROVEMENTS

In the event a residence or any other structure, site improvement or landscaping is damaged or destroyed due to, or as a result of, a geologic hazard, the GHAD may fund or reimburse the property owner for the expenses necessary to repair or replace the damaged or destroyed structure, site improvement or landscaping. Unless authorized by the Board of Directors, the dollar amount of the GHAD funding or reimbursement may not exceed ten percent (10%) of the costs incurred by the GHAD in preventing, mitigating, abating or controlling the geologic hazard responsible for the damage. In the event the geologic hazard damaged or destroyed a structure, site improvement or landscaping which violated any provisions of the City Building Code or City Ordinance Code at the time of its installation or improvement, the GHAD may decline to provide any funding, or reimbursement to the property owner, for repair or replacement of the damaged structure, improvement or landscaping.

5.7 NO REIMBURSEMENT OF EXPENSES INCURRED BY PROPERTY OWNERS

The GHAD will not be obligated to reimburse a property owner for expenses incurred for the prevention, mitigation, abatement, or control of a geologic hazard absent a written agreement between the property owner and the GHAD to that effect, which agreement has been executed prior to the property owner incurring said expenses, and following an investigation conducted by the GHAD.

6.0 ACCEPTANCE

6.1 ACTIVATION OF ASSESSMENT

An annual assessment shall be promptly authorized on all residential parcels in the GHAD. The assessment shall be levied by the GHAD on each individual parcel beginning the first fiscal year following issuance of a building permit for that parcel or at the time of legal parcel formation when the Final Map is adopted, whichever is later.

6.2 RESPONSIBILITY FOR GHAD ACTIVITIES

The party that, on the date the Final Map within the boundaries of the GHAD is approved by the City of Oakland, owns the developable parcels shown on that Final Map shall have the responsibility to perform all the activities of the GHAD on property within that Final Map. Such responsibility shall become eligible for transfer to the GHAD on the day exactly three years after the first residential building permit is issued by the City of Oakland, two years following final approval of retaining wall construction, or two years following final approval of site grading, whichever is later. This turn-over date may be extended at the sole discretion of the project developer provided that the assessments shall continue to be levied during the extension period and that notice of such extension is delivered to the District Manager at least 30 days prior to the turn-over date. The Board of the GHAD intends that the period between the levying of the GHAD assessment and the GHAD becoming responsible to perform activities on property within the Final Map will allow the District to accumulate reserve funds without incurring significant expenses.

6.3 PROCESS FOR TRANSFERRING RESPONSIBILITY FOR GHAD ACTIVITIES

After the Transfer Eligibility Date for parcel(s), the process for transferring responsibility for performing GHAD activities on such parcel(s) shall be as follows:

- A. In the calendar year of the Transfer Eligibility Date or in any subsequent year, at its discretion, the developer, HOA, or current property owner may apply to the GHAD ("Transfer Application") to transfer the responsibility for performing GHAD Activities for parcel(s) to the District.
- B. Within 30 days of receiving such notice, a representative of the GHAD shall verify that all the facilities for which the GHAD will have maintenance responsibility have been constructed and maintained according to the city-approved plans and specifications for the individual improvements, and that such facilities are operational and in good working order.
- C. Within 15 days of such inspection, the GHAD will send the developer, HOA, or current property owner a list ("Punch list") of all of the items that need to be constructed,

- repaired or otherwise modified in order to comply with the city-approved plans and specifications.
- D. The developer, HOA, or current property owner may notify the GHAD when it has completed the items identified on the Punch list.
- E. Within 30 days of receipt of such notice, the GHAD shall verify that all Punch list items have been completed and notify the developer, HOA, or current property owner that the District accepts responsibility for performing all future GHAD Activities on the parcel(s).

7.0 GHAD PLAN OF CONTROL

The GHAD shall be responsible for the maintenance of geologic stabilization and hydrogeologic features within the GHAD boundaries and retaining walls and appurtenant drainage facilities within the Easement and the Right-of-Way. The GHAD's maintenance responsibilities include prevention, abatement, vegetation control, and control of landslide and erosion hazards within the project as applicable, as provided in this Plan of Control.

General maintenance of the surface drainage improvements in the open space will be the GHAD's responsibility. Additionally, the GHAD will have the following maintenance responsibilities as outlined below:

- Inspection and maintenance of lined ditches.
- Monitoring and maintenance of measurement devices, such as piezometers, inclinometers, and tiltmeters, if any.
- Inspection and maintenance of retaining walls.
- Maintenance of designated trails or fences, if any.
- Inspection and maintenance of surface water quality treatment and detention facilities within the development, if any.

7.1 GENERAL LANDSLIDE AND EROSION HAZARD MITIGATION

The techniques which may be employed by the GHAD to prevent, mitigate, abate, or control geologic hazards include, but are not limited to, the following.

- A. Removal of the unstable earth mass.
- B. Stabilization (either partial or total) of the landslide by removal and replacement with compacted, drained fill.
- C. Construction of structures to retain or divert landslide material or sediment.
- D. Construction of erosion control devices such as gabions, riprap, geotextiles, or lined ditches.
- E. Placement of drained engineered buttress fill.
- F. Placement of subsurface drainage devices (e.g. underdrains, or horizontal drilled drains).

- G. Slope correction (e.g. gradient change, biotechnical stabilization, slope trimming or contouring).
- H. Construction of additional surface ditches and/or detention basins, silt fences, sediment traps, or backfill or erosion channels.

Potential landslide and erosion hazards can often be mitigated best by controlling soil saturation and water runoff and by maintaining the surface and subsurface drainage system. Maintenance shall be provided for lined surface drainage ditches and drainage terraces including debris benches or drop inlets.

8.0 PRIORITY OF GHAD EXPENDITURES

Emergency response and scheduled repair expenditures by the GHAD are to be prioritized by the GHAD Manager, utilizing his or her discretion, based upon available funds and the approved operating budget. When available funds are not sufficient to undertake all of the identified remedial and preventive stabilization measures, the expenditures are to be prioritized as follows in descending order of priority:

- A. Prevention, mitigation, abatement or control of geologic hazards that have either damaged or pose a significant threat of damage to residences, critical underground utilities, developer-constructed retaining walls or paved streets.
- B. Prevention, mitigation, abatement or control of geologic hazards which have either damaged or pose a significant threat of damage to ancillary structures, including but not limited to water quality facilities, pool cabanas or restroom buildings.
- C. Prevention, mitigation, abatement or control of geologic hazards which have either damaged or pose a significant threat of damage to open space amenities.
- D. Prevention, mitigation, abatement or control of geologic hazards which have either damaged or pose a significant threat of damage limited to loss of landscaping or other similar non-essential amenities.
- E. Prevention, mitigation, abatement or control of geologic hazards existing entirely on open-space property and which have neither damaged nor pose a significant threat of damage to any site improvements.

In performing its duties as described above, the GHAD may seek reimbursements from public and private entities including, but not limited to, FEMA, City and County agencies, insurance companies, etc.

9.0 MAINTENANCE AND MONITORING SCHEDULE

Geologic features and GHAD-maintained facilities should be inspected by GHAD staff or GHAD-assigned consultants as presented below. The site inspections should be undertaken at appropriate intervals as determined by the GHAD manager using supporting documents prepared for the site and its improvements. The GHAD budget should provide for three or more inspections in years of heavy rainfall. Generally, the inspections should take place in October, prior to the first significant rainfall; mid-winter as necessary during heavy rainfall years; and in early April at the end of the rainy season. The frequency of the inspections should increase depending upon the intensity and recurrence of rainfall. Site inspections should increase sufficiently to provide for mitigation of potential hazards.

The GHAD shall obtain copies of geologic or geotechnical exploration reports related to site development and keep these reports on file in the records of the GHAD. In addition, copies of any earthwork-related testing and observation reports that will be finalized at the completion of grading, when as-built drawings are available, shall be maintained as part of the GHAD records.

Following are guidelines for a monitoring plan. The actual timing, scope, frequency and other details regarding such maintenance, inspection and similar activities shall be at the discretion of the GHAD manager.

- An Engineer and/or Geologist retained by the District should carry out an inspection of lined surface ditches at least twice a year, budget permitting. One inspection should be in the fall prior to the onset of winter rains. The inspection shall check for sedimentation and cracking or shifting of the concrete lined ditches. Repairs and maintenance, as needed, should be undertaken including removal of excess silt or sediment in ditches and patching or replacement of cracked or broken ditches, prior to the beginning of the next rainy season.
- An Engineer and/or Geologist should carry out a geologic reconnaissance of the site slopes including walkways for indications of erosion or slope failures.

Developer-constructed retaining walls should be inspected for evidence of distress, such as tilting and/or structural failure. Repairs and maintenance would be undertaken only in the event that the structural integrity of the wall has been compromised or if the wall distress poses a threat to the integrity of adjacent structures.

- Subsurface drain outlets and horizontal drilled drain outlets, if any, should be checked. Water flowing from these outlets should be measured and recorded during each inspection. Piezometers to measure groundwater levels, or instruments such as inclinometers or tiltmeters measuring potential slope instability should be monitored as recommended, if installed.

- Settlement monitoring devices, if any, should be measured annually and tracked. In the event of anomalous readings or excessive settlement, the monitoring frequency should be increased.
- Inlets, outfalls or trash racks, if used, must be kept free of debris and spillways maintained. It is anticipated that initially at least once every two (2) years, cleanup of vegetation and removal of silt would be in order.
- An annual inspection shall be made by the engineer and/or engineering geologist to assess the effectiveness of the preventive maintenance program and to make recommendations as to which landslide or erosion measures should be undertaken in the next fiscal year. Any appropriate site-specific study of landslide or erosion conditions shall be determined at that time. Consultants, if necessary, will be retained to undertake the needed studies. An annual inspection report to the GHAD shall be prepared by the District Engineer and/or Engineering Geologist.

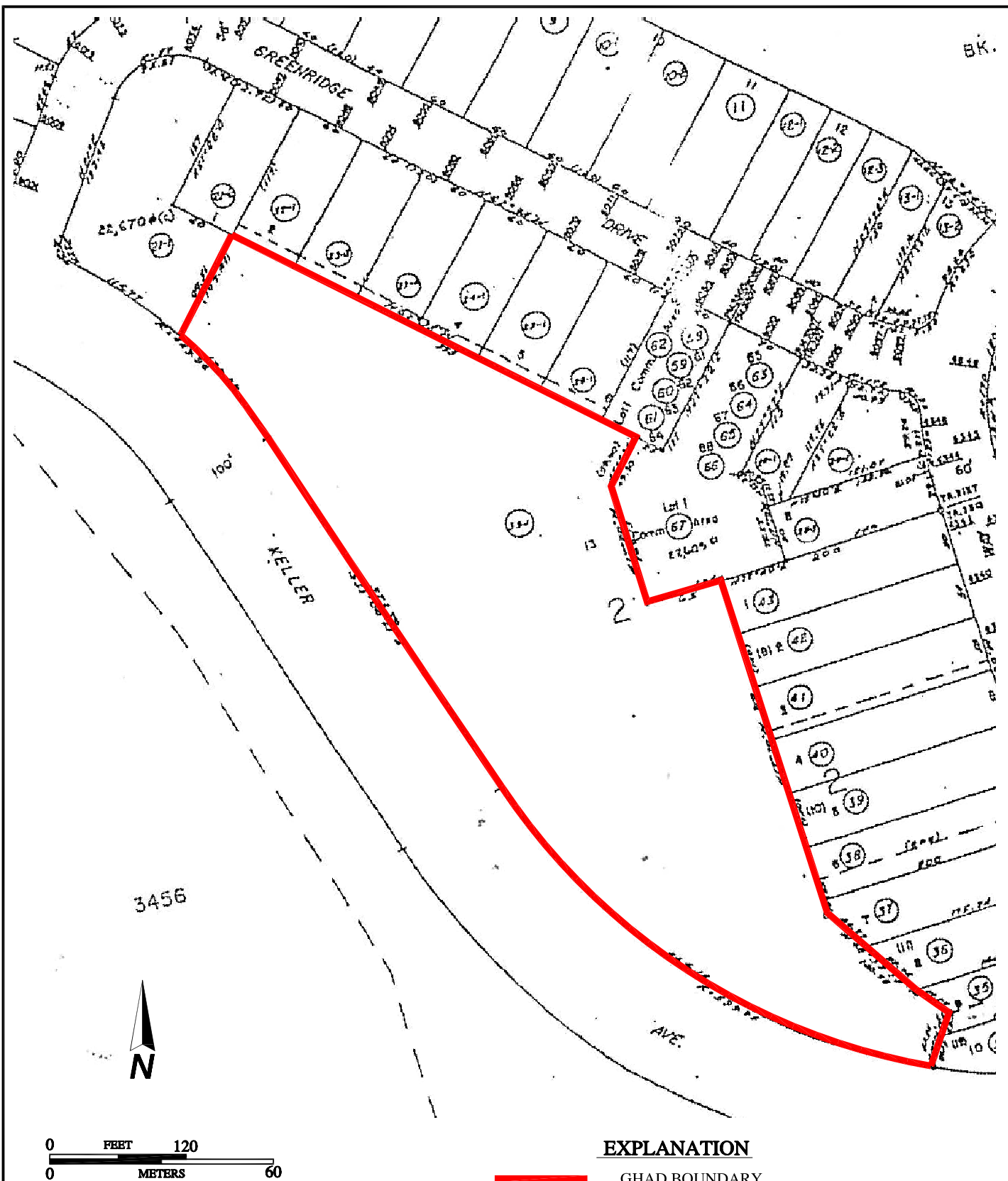
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- California Division of Mines and Geology, January 1, 1982, State of California Earthquake Fault Zones, Oakland East 7-½' Quadrangle.
- Darwin Myers Associates, April 7, 2006, Engineering Geology Peer Review, Proposed Siena Hill GHAD, Keller Avenue at Greenridge Drive, Oakland, California; Project Number 2002.06.
- Graymer, R. W., 2000, Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa and San Francisco Counties, California: United States Geological Survey MF-2342.
- Nilsen, T. H., 1975, Preliminary Photointerpretation Map of Landslide and Other Surficial Deposits of the Oakland East 7½' Quadrangle, Alameda and Contra Costa Counties, California; USGS Open File Map 75-277-14.
- Oakland City Council, Resolution No. 80058, Approving Formation of the Oakland Area GHAD and Appointing Members of the City Council to Act as the GHAD Board of Directors. July 18, 2006.
- Oakland Area GHAD, Resolution No. 1, Appointment of Chair and GHAD Officers, October 3, 2006.
- Oakland Area GHAD, Resolution No. 9, Appointment of GHAD Clerk and Treasurer, June 17, 2015.
- Radbruch, D.H., 1969, Areal and Engineering Geology of the Oakland East Quadrangle, Alameda and Contra Costa Counties, California; USGS GQ769.
- Underdahl, G. E., September 10, 2001, Geotechnical Investigation, Planned Townhouse Development, Keller Avenue, Oakland, Alameda County, California, Project Number 9460501023.

APPENDIX A

Figure and Exhibits

Figure 1	GHAD Boundary
Exhibit A	Legal Description of Siena Hill Property
Exhibit B	Legal Description of Siena Hill Easement Area
Exhibit C	Retaining Walls Outside of Project Area



BASE MAP SOURCE: OAKLAND ASSESSOR DEPT.



GHAD BOUNDARY
OAKLAND AREA GEOLOGIC HAZARD ABATEMENT DISTRICT
OAKLAND, CALIFORNIA

PROJECT NO.: **6964.1.001.01**

DATE: **MAY 2006**

DRAWN BY: **JMG**

CHECKED BY: **MS**

FIGURE NO.

1

EXHIBIT A - I

SIENA HILL PROPERTY

The land referred to is situated in the County of Alameda, City of Oakland, State of California, and is described as follows:

Lot 13 in Block 2, as said lot and block are shown on the Map of "Tract 2127, Oakland, Alameda County, California", filed July 28, 1960, in Book 42 of Maps, Page 27, Alameda County Records.

EXCEPTING THEREFROM: Those portions thereof described in Parcels 2, 3, 4, 5, 6, 7 and 8, as described in the Deed by Sterling Development Company to Oddstead Homes, dated February 12, 1962, recorded February 19, 1962, Reel 518, Image 315, Instrument No. AT/22269, Alameda County Records.

(BEING APN 040A-3457-033-01)

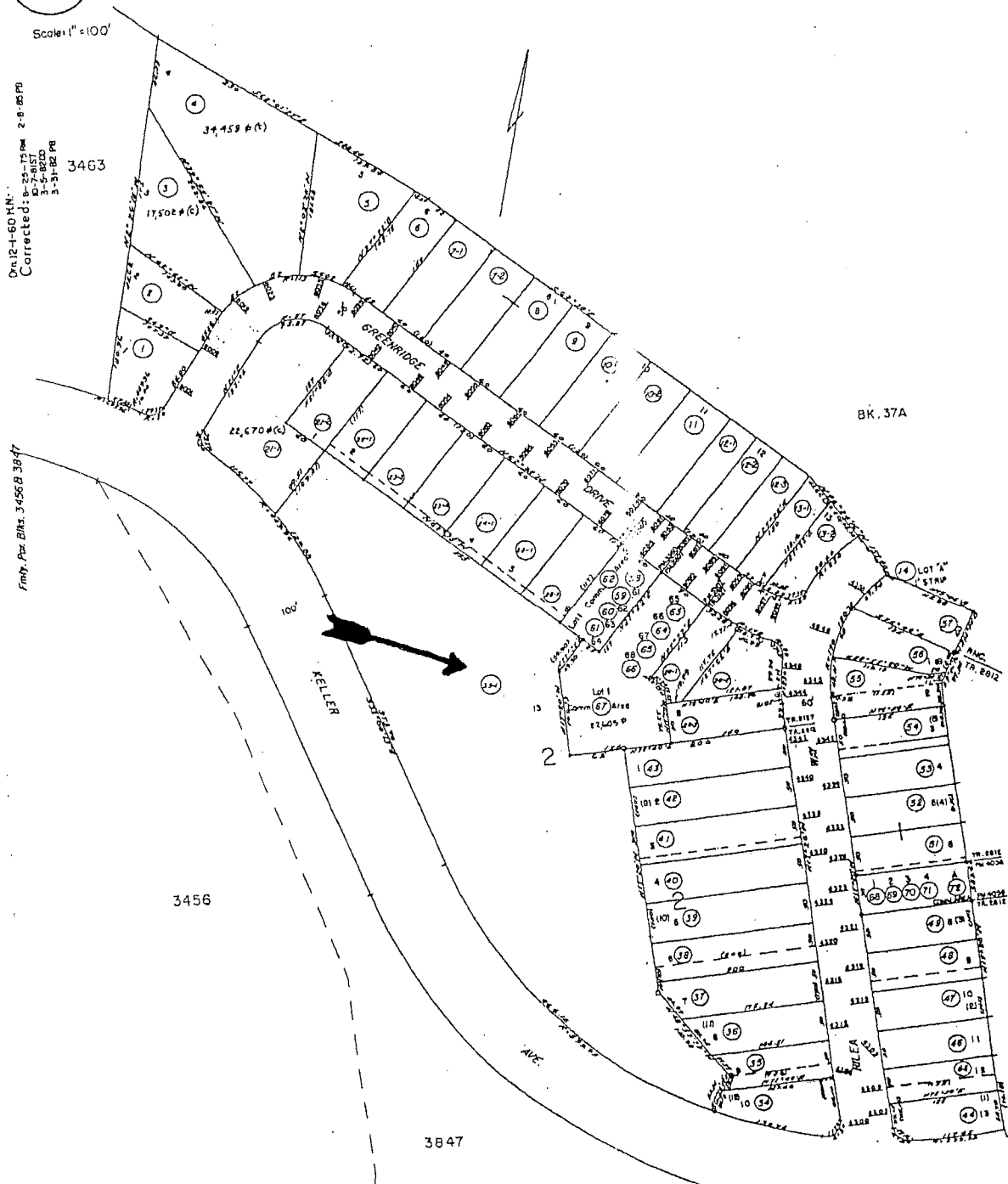
3457

SIENA HILL PROPERTY

Scale 1" = 100'

On 12-1-60 H.N.
 Corrected: 9-25-75
 2-8-85 PM
 3-31-82 PM

Final for Blks. 3456 B 3847



"Notice: This is neither a plat nor a survey. It is furnished merely as a convenience to aid you in locating the land indicated hereon with reference to streets and other Land. No liability is assumed by reason of any reliance hereon."

HPN 72

EXHIBIT B - 1

ROADWAY EASEMENT ON ADJACENT PROPERTY

EASEMENT FOR INGRESS & EGRESS

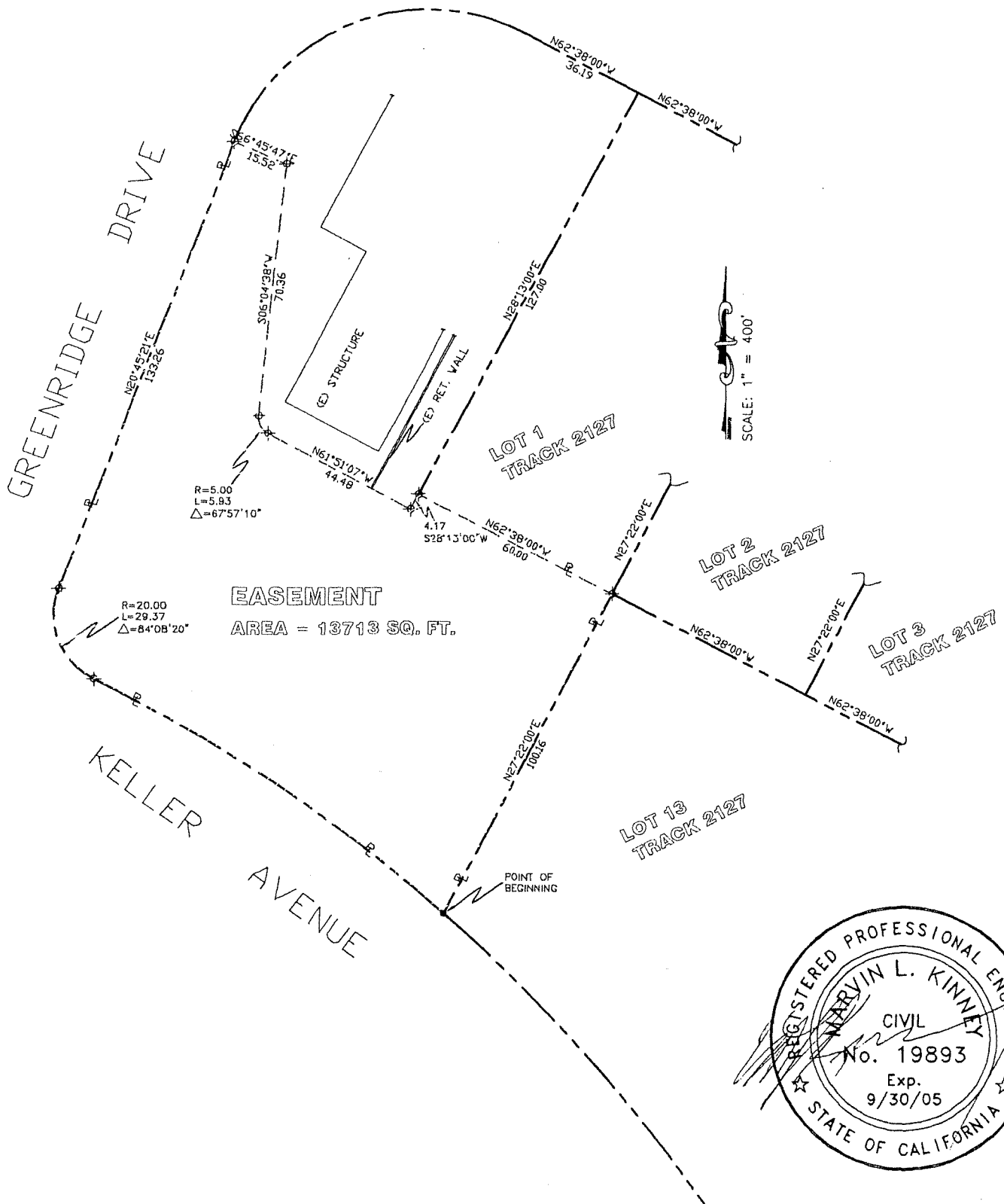
AN EASEMENT FOR INGRESS & EGRESS AND PUBLIC UTILITIES INCLUDING STORM DRAINAGE IN THE CITY OF OAKLAND, COUNTY OF ALAMEDA, STATE OF CALIFORNIA BEING DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF LOT 13 IN BLOCK 2 AS SHOWN ON THE MAP OF "TRACT 2127, OAKLAND, ALAMEDA COUNTY, CALIFORNIA", FILED JULY 28, 1960 IN BOOK 42 OF MAPS, PAGE 27, ALAMEDA COUNTY RECORDS, SAID POINT ALSO BEING ON THE NORTHERLY RIGHT-OF-WAY LINE OF KELLER AVENUE; THENCE ALONG THE WESTERLY LINE OF SAID LOT 13, NORTH 27° 22' 00" EAST, 100.16 FEET, MORE OR LESS TO THE SOUTHWEST CORNER OF LOT 1 AS SHOWN ON SAID MAP OF "TRACT 2127"; THENCE ALONG SAID SOUTHERLY LINE OF SAID LOT 1, NORTH 62° 38' 00" WEST, 60 FEET TO THE SOUTHWEST CORNER OF SAID LOT 1; THENCE SOUTH 28° 13' 00" WEST, 4.17 FEET; THENCE NORTH 61° 51' 07" WEST, 44.48 FEET, THENCE ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 5 FEET, AN ARC LENGTH OF 5.93 FEET AND A CENTRAL ANGLE OF 67° 57' 10"; THENCE ALONG A LINE TANGENT TO THE CURVE NORTH 06° 04' 38" EAST, 70.36 FEET; THENCE NORTH 66° 45' 47" WEST, 15.52 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF GREENRIDGE DRIVE; THENCE ALONG THE SAID RIGHT-OF-WAY LINE SOUTH 20° 45' 21" WEST, 133.26 FEET; THENCE ALONG A CURVE TO THE LEFT THROUGH A CENTRAL ANGLE OF 84° 08' 20", AN ARC LENGTH OF 29.37 FEET AND A RADIUS OF 20.00 FEET TO POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF KELLER AVENUE; THENCE ALONG THE SAID NORTHERLY RIGHT-OF-WAY LINE, BEING A CURVE TO THE RIGHT HAVING A RADIUS OF 449.96 FEET, AN ARC LENGTH OF 115.77 FEET AND THROUGH A CENTRAL ANGLE OF 14° 44' 31" TO THE POINT OF BEGINNING.

CONTAINING 13,713 SQUARE FEET.



ROADWAY EASEMENT ON ADJACENT PROPERTY



KELLER AVENUE
R.O.W.

MATCHLINE

RETAINING WALLS
IN KELLER AVENUE R.O.W.

EXHIBIT C-1

RETAINING WALLS NOT ON
SIENA HILL PROPERTY

SCALE: 1"=60'-0"

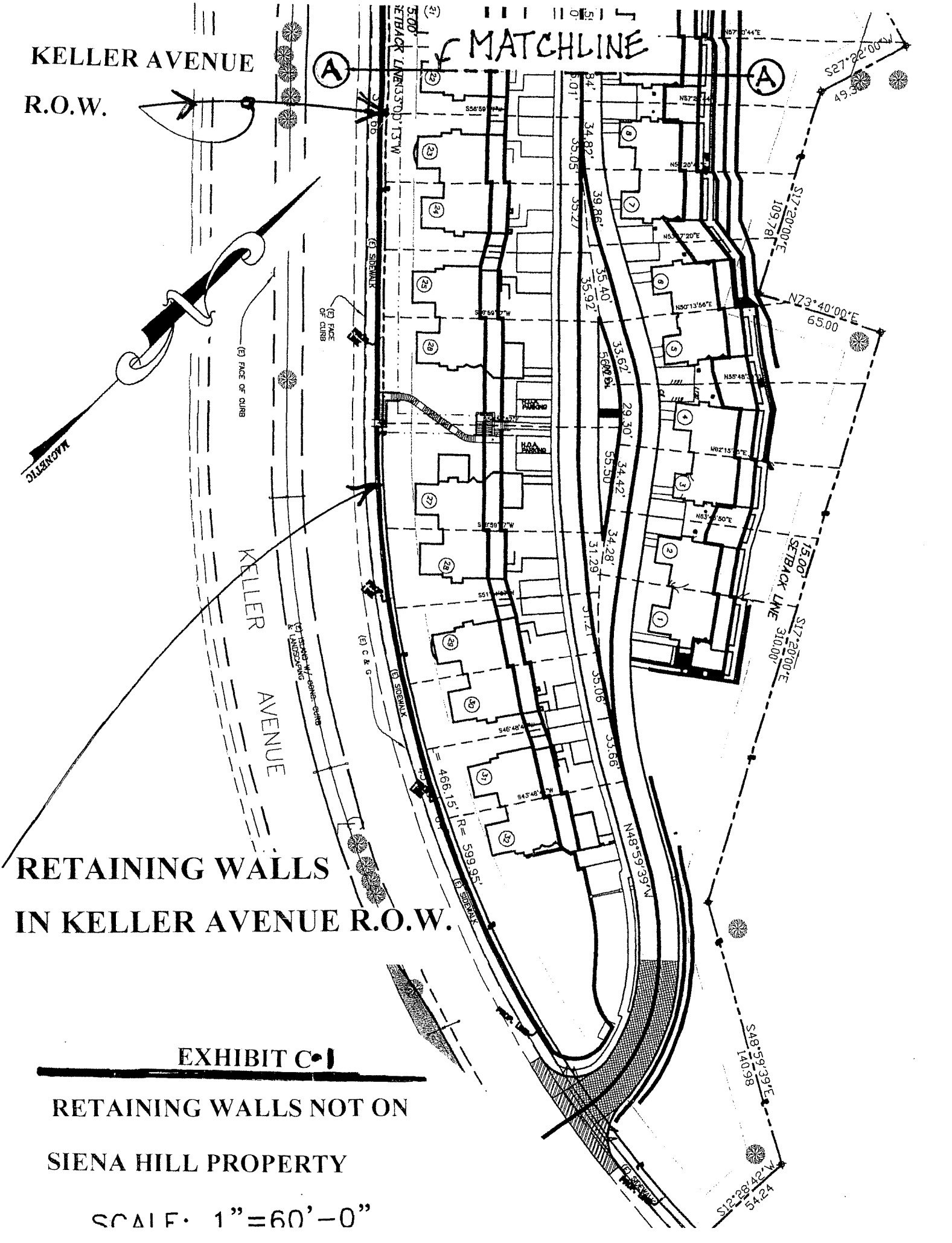


EXHIBIT C-2

**RETAINING WALLS NOT ON
SIENA HILL PROPERTY**

EASEMENT AREA

**RETAINING WALLS ON
ADJACENT EASEMENT AREA**

