TOWN OF PORTOLA VALLEY

Geologic Safety Committee Meeting
April 10, 2023
10:00 AM

IN-PERSON MEETING
HISTORIC SCHOOLHOUSE– 775 PORTOLA RD. – PORTOLA VALLEY, CA

REMOTE MEETING ADVISORY: On March 1, 2023, all committees in Portola Valley will return to conducting in-person meetings. A Zoom link will be provided for members of the public to participate remotely; however, the Town cannot guarantee there will be no technical issues with the software during the meeting. For best public participation results, attending the meeting in-person is advised.

ASSISTANCE FOR PEOPLE WITH DISABILITIES
In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the Town Clerk at (650) 851-1700 or by email at towncenter@portolavalley.net. Notification 48 hours prior to the meeting will enable the Town to make reasonable arrangements to ensure accessibility to this meeting.

VIRTUAL PARTICIPATION VIA ZOOM

To access the meeting by computer:
https://us06web.zoom.us/j/82929766412?pwd=T3hQb3cwNkFNY0FYMXBoSEs3NFFtQT09

Webinar ID: ***829 2976 6412***
Passcode: ***978768***

To access the meeting by phone:
1-669-900-6833 or
1-888-788-0099 (toll-free)

1. **CALL TO ORDER & ROLL CALL**
2. **ORAL COMMUNICATIONS FOR ITEMS NOT ON THE AGENDA**
   Speakers' time is limited to three minutes.
3. **APPROVAL OF MINUTES OF 3/13/2023 MEETING**
4. **OLD BUSINESS**
   a. Committee charter
   b. Committee's work plan for FY 23-24
   c. Approve subcommittee's report on recommendations for the Safety Element
5. **NEW BUSINESS**
   a. Status report of the Trenching and Geotechnical Reports subcommittee.
6. **ADJOURNMENT**
   The next regularly scheduled meeting date is 5/8/2023 at 10:00 AM.

The Town of Portola Valley acknowledges the colonial history of this land we dwell upon—the unceded territory of the Ramaytush (rah-my-toosh) Ohlone, Tamien Nation, and Muwekma (mah-WEK-mah) Ohlone, who endured a human and cultural genocide that included removal from their lands and their sacred relationship to the land. Portola Valley recognizes that we profit from the commodification of land seized from indigenous peoples and now bear the ecological consequences. We seek to understand the impact of these legacies on all beings and to find ways to make repair.

MINUTES OF THE GEOLOGIC SAFETY COMMITTEE MEETING
TOWN OF PORTOLA VALLEY
Monday, March 13, 2023

Meeting location: Council Chambers in the Old Schoolhouse.

Committee Members present:

Chester Wrucke [chair]
Nan Shostak [co-chair]
Gary Ernst
Bob Wrucke

Town Council liason present:

Mary Hufty

Community members present at the schoolhouse:

Troy Douthit
Rita Comes

Call to order and roll call: Chairman Chester Wrucke called the meeting to order at 10:38 and took roll.

Request for comments from the public on topics not on the agenda: no comments.

Old Business:

Approval of minutes of the 2/6/2023 and 2/21/2023 meetings: Minutes of the 2/6/2023 and 2/21 2023 meetings of the Geologic Safety Committee were unanimously approved, without changes, by the Committee.

New Business: Four topics

1. The policy or process for updating the Town's geologic maps needs to be well defined.
2. Discuss standards/requirements for trenching.
3. Discuss the Committee's work plan for FY 23-24
4. Discuss the Committee's charter

Topic 1: Updating the Town's geologic maps

Discussion: The Committee discussed the importance of the Committee's access to the Town's Consulting Geologist and the hope for a smoother working relationship with Cotton Shires. The Committee also wants to define a process for updating and maintain the Town's Geologic Map and Ground Movement Potential Map in a publicly transparent manner.

Following extensive discussion, the Committee voted to propose this new, 11-step procedure for updating the maps:

(1) The Town's Geologic Map and Ground Movement Potential Map should be updated at least once every five years, and they should be reviewed within six months after a new major geologic event.

(2) Any data for updating the maps that comes from the Geologic Safety Committee needs to be given to the Town's Consulting Geologist. Any data for updating the maps that comes from the Town's Consulting Geologist needs to be given to the Geologic Safety Committee.

(3) The Town's Consulting Geologist and the Geologic Safety Committee need to agree on any changes to the maps.

(4) The more eyes looking at a problem, the better. We will be dealing with interpretations where there will be a limited amount of data. There will always be limited data. The best way to resolve disagreements is by site visits and discussion.

(5) In case of irreconcilable differences in geologic interpretation, an agreed-upon, disinterested, outside, scientific third-party who is knowledgeable in the field will be chosen to resolve the differences. (The USGS was suggested as the arbiter of choice.)

(6) The Town's Consulting Geologist will create a draft update of the Town's maps, based on the changes that have been agreed to by the Geologic Safety Committee.

(7) The draft maps will be reviewed by the Geologic Safety Committee.

(8) The draft maps will be presented to the Planning Commission for approval.

(9) The draft maps will be presented to the Town Council for final approval.

(10) The Town's Consulting Geologist will produce the updated versions of the maps and maintain the maps.

(11) The Town will post the updated maps on its website.

Motion: Bob moved to approve the list of 11 steps (above) for the procedure to update the Town's maps, adopting the changes proposed in committee.
Second: by Gary.
Vote: The motion was unanimously approved.

Topic 2: Standards/requirements for trenching studies

Bob opened the discussion. Trenching presents two issues:

- Today the final product of a geotechnical or geological trench study is a drawing (sketch) of what was found in the trench.
- Trenches are not always properly prepared (i.e., trench wall(s) are not always cleaned and smoothed prior to examination and interpretation).

Solution: In the future, it would be useful for the Town to standardize trenching studies to require:

- Cleaning and smoothing of the trench surface(s) and
- A digital photomosaic image of the full length of the cleaned surface(s), so that reviewers can examine the photomosaic image instead of relying only on a simplified drawing. There should be a standard for the minimum resolution of the photomosaic.

Comments: Setting standards for trenching studies may be a first for any community in California. It is also important to have live access to trenches and boreholes, and Committee members should have the opportunity to make site visits. Committee members should be invited to examine open trenches and the samples and cores from boreholes, not just the interpretive trench sketches and drillers' logs in reports.

Question: Does one size fits all? Some trenches are done by large geotechnical firms, others by property owners. Are most geotechnical firms already doing these things? The requirements for documentation should not be extended to very small projects; the changes should apply to large projects, not necessarily to homeowners.

Comment: Trenching has been referred to as the gold standard for researching faults, but in reality, trenching does not always produce good data. Better communication is needed to help people have realistic expectations for the results that trenching can produce. There was a reference to research trenches dug in places outside the Town where there was good evidence on the location of a fault, but no fault was found in a trench that cut across the fault.

Motion: Bob moved to create a subcommittee to develop standards for observation of and reports on geotechnical and geological research trenches and boreholes. The Committee will produce a recommendation for new standards for the Committee to discuss and evaluate.
Second: by Gary.
Vote: The motion was unanimously approved.

Mary Hufty will check to see if this should be a subcommittee or an ad-hoc committee. Mary also recommended discussing how the Committee can work better with Cotton Shires when the Committee discusses its charter. This topic was left open until later.
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Topic 3: The Committee's work plan for the next fiscal year (FY 23-24)

Nan explained a handout showing how the Town Council's priorities and the Geologic Safety Committee's priorities are well aligned (p. 6 of the handout).

The Town Council's four stated priorities for FY 23-24 are: safety, sustainable and resilient Town, forward-thinking planning, and fiscal responsibility and accountable governance. The Committee's recommendations for the Safety Element suggest work projects for the Committee that are in line with the Council's goals.

1. Safety

- Research active seismic hazards from 1906 and other geologic hazards in and near Town
- Recognize cascading hazards—complete a hazard and risk analysis.
- Evacuation planning that takes into consideration multiple hazards, including geologic hazards.
- Earthquake Safety Education Program (this item was in the Committee's original charter)

2. Resiliency—Work to improve the resiliency of roads and utilities during and after a major geologic event.

- Meet with other safety committees, Town Staff and utility companies to define long-term goals for resiliency of infrastructure.
- Cooperate with the utility companies to develop a map of roads and utility lines crossing all known faults, not just the San Andreas fault
- Research the methods currently in use to protect major utility lines and roads during earthquakes and landslides. Find out what other communities are doing to promote resiliency of infrastructure.

Discussion:

The Draft Safety Element includes a suggestion for protecting utilities and roads in new subdivisions in fault zones. We need to protect the entire town, not just new buildings in the town. The utility companies need to develop the plans the Town needs for resiliency and perform the retrofitting work, but the Committee should work with the utilities to identify the locations of geologic hazards.

Bob noted that, in the Town of Woodside, where the San Andreas fault crosses Portola Road near Searsville Lake and Family Farm Road, there are two fire hydrants, one on each side of the San Andreas fault. It appears the water company has already figured out a way to use two fire hydrants to be able to bridge a connection across the fault after an earthquake using hoses connected to fire hydrants.

We would like to see the same thing done elsewhere in the Town. Perhaps the utilities can install special pipes with expansion or contraction joints to protect the pipes during earthquakes or install shutoff valves on each side of the fault and then bridge across the fault with hoses after an earthquake.

The highest—essential— priority is having access to water immediately after an earthquake, especially if there is a fire. The most important item is the water pipe(s) that cross the San

Andreas fault carrying water from the water tank on top of Coal Mine Ridge. There are different approaches to protecting the water supply; some are more expensive than others.

3. Long-Term Planning and Projects

- Preserve the functioning of critical utilities and roads during and after a major geologic event. (resiliency)
- Finish and update, as needed, mapping of the major fault crossings by roads and utility lines. (resiliency, transparency)
- Maintain a page on geologic hazards on the town's website. The page could have links to important resources. One goal is to inform new people who are moving into the town what and where the hazards are. (safety, transparency)
- Continue research on geologic hazards in Portola Valley. (safety)

4. Transparency and Accountable Governance

- Revise the geologic map update process to make it public and transparent.
- Within the year, scan older, hard-copy geologic and geotechnical data (maps and reports) to make them readily to the public.

Discussion:

That is a great list, but it is ambitious to try to complete all the tasks soon. How much can we get done? What other ideas should be added to the list?

Topic 4: The Committee's charter

Discussion:

We have three versions of the charter: the original charter from 1989, the 2010 version, which was a slight revision of the first, and the current charter. [The three versions of the charter are in an agenda attachment for this meeting.] There was a preference for the original charter from 1989. The current charter was confusing—it's a single sentence. It was not clear that the one sentence is the entire current charter.

The original Committee was a very informal, ad-hoc committee. The Committee met as needed by the Town. The Committee provided a recommendation on how close buildings could be built near a fault. That work was done without a formal charter.

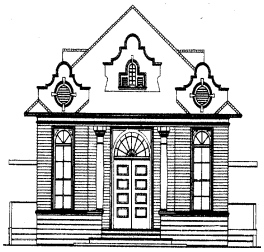
The Committee members should now think about the roles the Committee should fill and what the new charter should look like. Discussion of the specifics of the Committee's charter will be formally continued at the next meeting.

Public comment: Rita Comes said she is happy the Committee is now meeting on a regular basis. The Committee's list for the future is large. Somehow it will get done eventually.

[Still on the topic of the charter.] The Town Council has approved increasing the size of the Committee to seven. The Committee agreed unanimously to accept Troy Douthit as its sixth member, and the Committee agreed that the seventh member should ideally be a working professional geologist with a wide range of experience who also knows the local geology. Mary Hufty suggested the Chair needs to produce a letter of recommendation for Troy for the Town Council. Chet agreed to write the letter of recommendation.

The meeting was adjourned at 12:14.

Current GSC Charter
Approved by Town Council 3/8/2023



TOWN OF PORTOLA VALLEY
Geologic Safety Committee Charter

OBJECTIVES
To advise the Town Council, other Town bodies, and Town staff or officials as needed on geological hazards or matters related thereto.

DUTIES AND FUNCTIONS
1. The Committee shall serve only in an advisory role;
2. To review Town ordinances, policies, plan and procedures related to geological hazards;
3. To review the Town's Earthquake Preparedness and Education Program in light of geological hazards; and
4. To comment on other matters as requested by Town Council.

RESPONSIBLE TO
Town Council

COORDINATION
Council Liaison Town
Planner Town
Geologist

MEMBERSHIP
The Committee shall consist of seven members, appointed by the Mayor with Council concurrence for one-year terms. Rotating Chair to be selected by the Committee on an annual basis.

MEETINGS
The second Monday of each month at 10:00 a.m. ~~When needed~~

POSSIBLE CHANGES TO THE GSC CHARTER
FOR DISCUSSION ONLY

Yellow highlighting for possible changes to current charter

DUTIES AND FUNCTIONS

1. The Committee shall serve only in an advisory role.
2. Review Town ordinances, policies, plans, and procedures relating to geologic hazards.
3. Review proposed changes to the Town's Geologic Map and Ground Movement Potential Map.
4. Contribute to and review Town's Earthquake Preparedness and Education Program in light of geologic hazards.
5. Advise the Town Council, other Town bodies, staff, and officials, as needed, on geologic hazards and the implications for the safety of the Town.
6. Comment on other matters as requested by the Town Council.

LIAISON AND COORDINATION

Town Council Liaison
Town Planner
Consulting Geologist
[Director of Emergency Services/Town Manager]
[Woodside Fire Protection District]

The Town Planner, Consulting Geologist, Engineer, and Building Inspector shall be available as appropriate to confer with the Committee.

Charter 3-30-2000

1.5.8

GEOLOGIC SAFETY COMMITTEE

OBJECTIVES

To advise the Town Council, other Town bodies, and Town staff or officials as needed on geologic hazards or matters related thereto.

DUTIES AND FUNCTIONS

1. The Committee shall serve only in an advisory role.
2. To review Town ordinances, policies, plan and procedures relating to geologic hazards.
3. To review the Town's Earthquake Preparedness and Education Program in light of geologic hazards.
5. To comment on other matters as requested by Town Council.

RESPONSIBLE TO

Town Council

COORDINATION

Council Liaison
Town Planner
Town Geologist

MEMBERSHIP

The Committee shall consist of five members, appointed by the Mayor with Council concurrence for one-year terms. Rotating Chair to be selected by Committee.

MEETINGS

When needed

Original GSC Charter (3-9-1989)

TOWN of PORTOLA VALLEY

Town Hall and Offices: 765 Portola Road, Portola Valley, Calif. 94025 Tel. (Area Code 415) 851-1700

RESPONSIBILITIES AND ROLE OF THE GEOLOGIC SAFETY COMMITTEE

1. The Committee shall serve only in an advisory role.

2. To review Town ordinances, policies, plans and procedures relating to geologic hazards.

3. To review the Town's Earthquake Preparedness and Education Program in light of geologic hazards.

4. To advise the Town Council, other Town bodies, and Town employees or officials as needed on geologic hazards or matters related thereto.

Membership:

The Committee shall consist of 5 regular members.

The Town Planner, Engineer, Building Inspector and Geologist shall be available as appropriate to confer with the Committee.

ws:geosafe.com
3/9/89

GSC WORK PLAN FOR FY 23-24—FOR DISCUSSION ONLY

Town Council—FY 23-24 Priorities	Geologic Safety Committee—FY 23-24 Work Plan
Safety • Emergency Preparedness § e.g. Evacuation Planning • Emergency Response § e.g. Coordinating First Responders • Assessment and Mitigation of Hazard and Risk • Public Safety (Crime) • Community Preparedness and Awareness	**Safety** • Research and report on the active seismic hazards from 1906 and other geologic hazards in and near Town • Recognize cascading hazards ○ Hazard and risk analyses ○ Evacuation planning • Earthquake preparedness and education program ○ Write a page on local geology and geologic and seismic hazards on Town website
Sustainable and Resilient Town • Promoting Sustainability • Land Use • § e.g. Planning Affordable Housing • Protecting and Enhancing Environmental Resources • Post-Adoption Housing Element Process	**Resiliency** Resiliency of infrastructure (roads and utilities) to preserve the functioning of critical utilities and roads during and after a geologic hazard event • Map the road crossings with all known faults for the benefit of the Town and the utilities • Meet with the other safety committees, Town staff, and utility companies • Define long-term goals for resiliency • Research the methods in use to protect utility lines and roads from earthquakes and landslides
Forward Thinking Planning • Long-Term Revenue Needs • Long-Term Revenue Sources • Town Center Master Plan • Monitoring Infrastructure • General Plan Update	**Long-Term Planning and Projects–Continuing after FY 23-24** • Resiliency of infrastructure (resiliency) • Cascading hazards (safety) • Maintain and update the page on geology/geologic hazards on Town website (safety) • New research on geologic hazards in and near Town (safety)
Fiscal Responsibility and Accountable Governance • Timely Fiscal Auditing and Reporting • Operational Efficiencies • Transparency • Community Engagement/Communications	**Accountable and Transparent Governance** • Revise the map update process to be public and transparent and have the new process approved (transparency) • Scan older, hard-copy geotechnical/geologic data and reports to be readily and publicly accessible (accountability, transparency)

Priority of Goals for FY 23-24

(High, Medium, or Low)

H/M/L **Safety**

A. _____ Hazard and risk analyses (cascading hazards)

B. _____ Evacuation planning (cascading hazards)

C. _____ Write a page on local geology and geologic and seismic hazards for the Town website

D. _____ New research on geologic hazards in and near Town

Resiliency

E. _____ Map the road crossings with all known faults for the benefit of the Town and the utilities

F. _____ Meet with the other safety committees, Town staff, and utility companies

G. _____ Define long-term goals for resiliency

H. _____ Research the methods in use to protect utility lines and roads from earthquakes and landslides

Accountability, Transparency

I. _____ Revise the map update process to be public and transparent and have the new process approved

J. _____ Scan older, hard-copy geotechnical/geologic data and reports to be readily and publicly accessible

April ?, 2023

Laura Russell, Planning and Building Director

Portola Valley Town Council

re: Geologic Safety Committee's Comments on the October 2022 Draft Safety Element

Dear Director Russell,

After a thorough review of the October 2022 Draft Safety Element, the Geologic Safety Committee recommends implementation of the following changes to the Safety Element. The attached document contains explanations and implementation details of the Committee's recommendations.

1. The Safety Element needs to address cascading hazards.

2. Increase the resilience of the Town's infrastructure to preserve the functioning of critical utilities and roads during and after a geologic hazard event.

3. All new development under the new Housing Element must also comply with the new Safety Element and should wait for approval until both of these Elements have been completed.

4. Commission a new master storm drainage report and update it at least once every five years.

5. Compile and keep records of all flooding, public and private, to improve drainage.

6. For new developments, discourage construction of new curbs and incentivize maximal on-site water retention.

7. Make all of the Town's geologic and geotechnical maps and reports publicly available on the Town's website.

8. The Safety Element should encourage research on faults, liquefaction, and other geologic and seismic hazards within the Town.

9. The Safety Element must be written to have policies apply to the latest accepted versions of the Town's geologic maps instead of the 2017 edition.

10. The Town's Geologic Map and Ground Movement Potential Map should be updated at least once every five years, and they should be reviewed within six months after a new major geologic event.

11. The Safety Element should include geologic maps that show geologic hazards that are outside of the Town borders.

12. The Safety Element should define the procedure for updating the Town's Geologic Map and Ground Movement Potential Map.

13. The State's Landslide Susceptibility map, included in the Draft Safety Element, was designed as a general overview of landslide potential. For all purposes, it should be used only in conjunction with the Town's Ground Movement Potential Map.

14. Where multiple maps pertain, all the maps should be consulted.

15. The maps in the General Plan that are used to identify the locations of geologic hazards must be maps that have been peer reviewed by professionals with relevant expertise.

16. Policies protecting roads, utility infrastructure and buildings from landslide or fault hazard should apply to the entire Town. They should not apply only to new construction.

17. Create in the Safety Element a new section for General Geologic Hazards that includes all the policies that apply to a broad range of geologic and seismic hazards.

18. The Policies and Actions of the Safety Element should be implemented through the Municipal Code.

Respectfully submitted,

Geologic Safety Committee
Chet Wrucke, Chair
Nan Shostak, Vice Chair
Pat McCrory, Secretary
Gary Ernst, Member
Bob Wrucke, Member

Geologic Safety Committee Recommendations for Changes to the October 2022 Draft Safety Element

Introduction and Overview

The Geologic Safety Committee (GSC) has reviewed the October 2022 Draft Safety Element with respect to geologic and seismic hazards. On the following pages, the Committee offers its unanimously approved recommendations.

The Safety Element of Portola Valley's General Plan is the element of our constitution that establishes the policies, objectives, and procedures by which we will act to promote and protect our public safety in the face of hazards. The Safety Element must address the physical safety of all current and future residents.

The Geologic Safety Committee met during February and March 2023 to discuss and agree on its subcommittee's set of recommendations for changes to the October 2022 Draft Safety Element. The following pages outline in detail the GSC's recommended changes. The eighteen recommendations have been organized into sections as eight major topics, most of which begin with introductory information. Reading the headings and their introductory information and skipping the recommendation details can provide an 'executive summary'.

The major topics:

1. Cascading hazards
2. Resilience of infrastructure
3. Coordination with the Housing Element
4. Flooding
5. Geologic research and information
6. Geologic maps
7. Reorganization of the Geologic Section of the Safety Element
8. Implementation through the Municipal Code

Portola Valley will have an effective, enforceable Safety Element only when all of its goals and aspirations—its Policies—and its implementation detail—its Actions—are considered together, and only when they have been fully implemented and moved into the Municipal Code.

Submitted by the Geologic Safety Committee:
Chet Wrucke, Chair
Nan Shostak, Vice chair
Gary Ernst
Pat McCrory
Bob Wrucke

1 Cascading Hazards

- GSC recommendation: The Safety Element needs to address cascading hazards.

Cascading hazards occur when one hazard event causes additional hazards to occur. Cascading hazards can occur simultaneously or they can be sequential. An example of simultaneous cascading hazards is a wildfire ignited immediately after a major earthquake. An example of sequential cascading hazards is a landslide occurring during seasonal rains months after a wildfire. A common scenario for a large earthquake includes both simultaneous and sequential cascading hazards.

Cascading hazards can compound safety risks to the town. One likely scenario for cascading hazards is a surface-rupturing earthquake that both fractures the brittle asphalt surfaces of the Town's major roads and triggers landslides that compound the damage to roads. All the Town's major evacuation routes are built over faults and are at risk of substantial damage from earthquakes. If a wildfire starts after an earthquake, then the damaged roads can diminish the options for safe evacuation.

Cascading hazards, particularly those caused by earthquakes, need to be planned for and recognized in the Town's risk profile and evacuation plans.

Recommendation Detail

New Policy P-#. Recognize and prepare for cascading hazards by undertaking a hazard and risk study and a comprehensive evacuation study.

New Action A-#-1. Incorporate into the Town's Emergency Operations Plan a hazard and risk analysis for cascading hazards and the recommended emergency and longer-term responses. Develop likely scenarios for cascading hazards.

New Action A-#-2. Work with the Town's partners (Woodside Fire Protection District, surrounding towns and cities, San Mateo County, and Santa Clara County) and the Town's safety committees (Emergency Preparedness, Geologic Safety, Sustainability, and Wildfire Preparedness) to produce a comprehensive evacuation study for the Town and its sphere of influence, using: (1) best-case, likely, and worst-case scenarios for cascading hazards and (2) best estimates for future population density.

2 Resilience of Infrastructure (Utilities and Roads)

- GSC recommendation: Increase the resilience of the Town's infrastructure to preserve the functioning of critical utilities and roads during and after a geologic hazard event.

It is essential for the safety of the entire Town that critical utilities and roads continue to function during and after a geologic hazard event. To achieve resilience of its infrastructure, the Town needs to change its approach to damage mitigation to forward-thinking planning and preparedness from a purely backward-looking perspective of response and recovery.

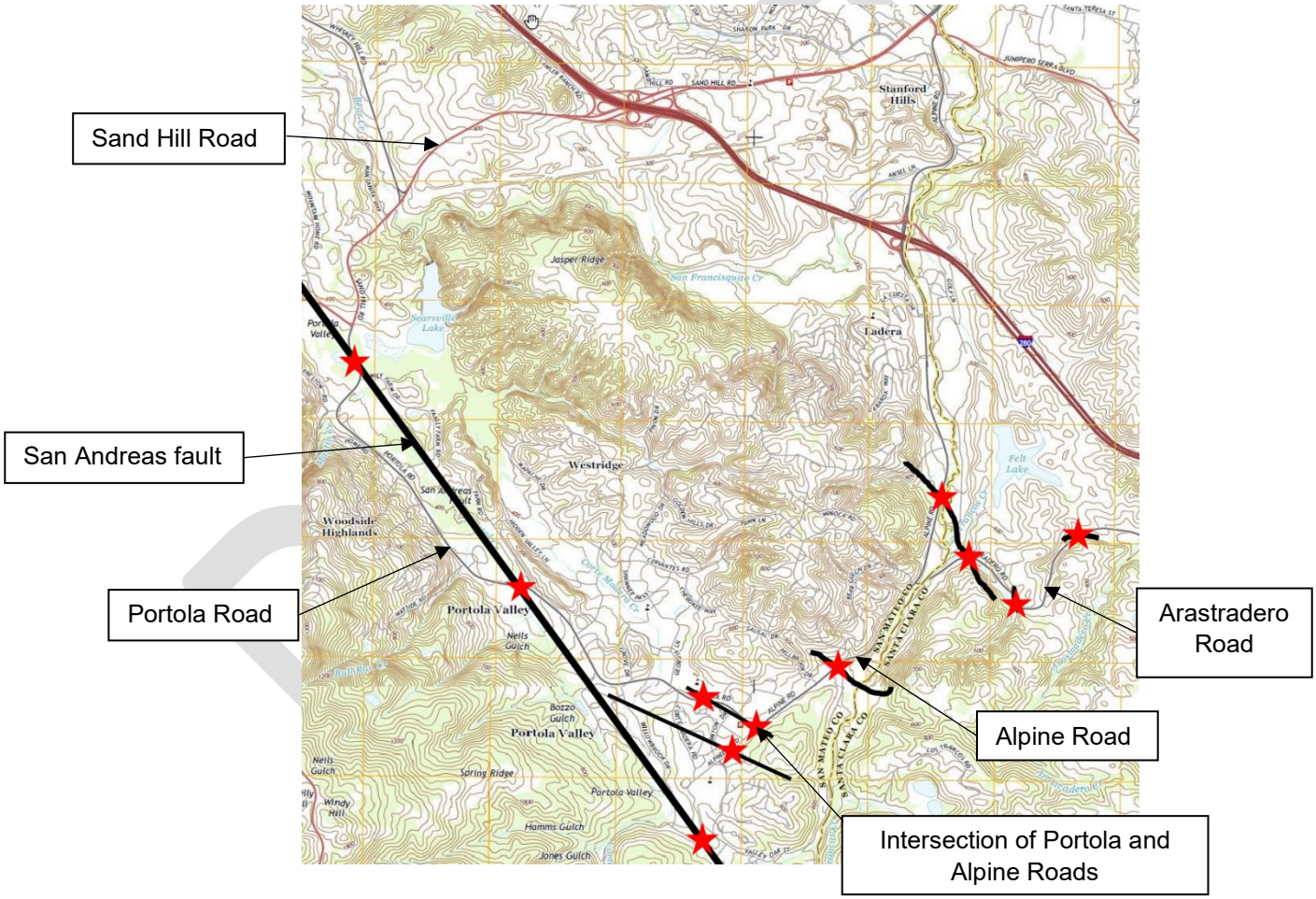
It is certain that the Town will experience a severely damaging earthquake on the San Andreas fault, along with related hazards. Only the timing is uncertain. San Mateo County's Local Area Hazard Mitigation Plan for Portola Valley also shows earthquake scenarios for smaller, local faults that could be as damaging in Portola Valley as an event on the San Andreas. Although preparation of infrastructure for earthquake resilience may seem expensive now, a study by the Federal Emergency Management Agency has shown that for every one dollar spent on resilience, six to seven dollars are saved in reduced damage.

Achieving resilient infrastructure is a long-term project that could extend over decades of preparation. The important point today is to begin a robust planning process for an Infrastructure Resilience Program for utilities and roads.

The GSC commends the authors of the Draft Safety Element for their recognition of the importance of resilience measures for utilities and roads at fault crossings. The Actions listed under Policy P-3 are an excellent guide for how we can proactively protect

infrastructure in new subdivisions that crosses a known, active fault zone (i.e., the San Andreas fault zone).

The GSC does not know the exact alignments of utility pipes and lines in Town, but it does understand the locations where earthquake faults cross the Town's emergency evacuation routes. The figure below indicates the approximate locations of these fault crossings—places where the Town's emergency routes could develop road blockages or be rendered impassable during and after an earthquake.



Red stars on Portola Road, Alpine Road, and Arastradero Road depict approximate fault crossings.
Black lines (straight or curved) show faults where they intersect with the evacuation routes. The faults are longer than shown.

Recommendation Details

The GSC recommends adding a new Policy and expanding the scope of Actions A-3-1 through A-3-5 to apply to infrastructure and roads throughout the entire Town for (1) the San Andreas fault zone, (2) all other potentially active fault zones, and (3) landslide zones.

New Policy P-#. Improve the resilience of the Town's infrastructure by anticipating damage during and after a geologic hazard event, to preserve the functioning of critical utilities and roads.

New Action A-#-1. Create and regularly update a map showing all active and potentially active faults, all landslide zones, and all infrastructure (roads and utilities) crossing those zones within Town limits, its sphere of influence, and adjacent areas.

Note: This new Action should consider all potentially active faults in Town, in addition to the active San Andreas fault zone. The 1906 earthquake on the San Andreas fault, for example, triggered surface movement on smaller nearby faults. Substantial movement on secondary faults has also occurred in the recent earthquakes in Turkey.

Note: Members of the Geologic Safety Committee are willing to work with the Town, the Town's Geologic Consultant, and the utility companies to develop this map.

New Action A-#-2. Work with the utility companies, WFPD, neighboring towns and unincorporated areas, and San Mateo and Santa Clara Counties to address anticipated damage to utility lines and roads on both public and private property following geologic hazards such as earthquakes.

New Action A-#-3. Develop a Utilities and Roads Resilience Program for crossings with fault zones and landslide zones.

Note: This program is an expansion of the Utilities Resilience Program described in Action A-3-3 for new subdivisions in fault zones. It should be developed in coordination with landslide Policies P-12 and P-13.

The expanded Utilities and Roads Resilience Program would protect the entire Town and its sphere of influence, and it would be undertaken in conjunction with its partners (utility companies, WFPD, surrounding towns and cities, San Mateo County, and Santa Clara County). For fault zones and landslide zones, this program could, for example, include flexible utility lines and provisions for implementing quick shutoff and rapid reattachment of utility lines, as have been implemented in other areas. The expanded

program would also anticipate the means for rapid restoration of passable evacuation routes. This high-priority program is a long-term project that will include a strategy for implementation.

New Action A-#-4. Develop backup plans that anticipate our major evacuation routes becoming impassible.

After an earthquake many roads can become impassible. In the 1906 earthquake, along the San Andreas fault, ground displacement was both vertical and horizontal. Below is a 1906 photograph taken at the location where the San Andreas fault crossed Alpine Road. The photograph shows there was vertical offset of more than one foot. Modern cars would be unable to drive past this place after a similar earthquake.

Vertical offset of Alpine Road 5 miles west of Stanford University. Per J. C. Branner.
1906 photograph from *The California Earthquake of April 18, 1906: Report of the State Earthquake Investigation Commission* (1908).

3 Coordination with the Housing Element

- GSC recommendation: All new development under the new Housing Element must also comply with the new Safety Element and should wait for approval until both of these Elements have been completed.

  The GSC urges the Town Council to pause development temporarily until both the new Safety Element and the new Housing Element have been completed and approved.

4 Flooding

This section has three recommendations related to flooding. Below, the GSC recommends three additional Actions for Policy P-19 and one additional Action for Sustainability Policy P-80.

Note: In Policy P-19, the Town recognizes and anticipates ongoing issues with flooding, drainage, and storm water. The Geologic Safety Committee is encouraged to see Policy P-19 and Action A1-1 in the Safety Element.

- GSC recommendation: Commission a new master storm drainage report and update it at least once every five years.

  Recommendation Detail

  New Action A-19-#. Commission a new master storm drainage report and update it on a regular basis. The update interval should be no more than five years in light of the anticipated surge in development over the next eight years.

- GSC Recommendation: Compile and keep records of all flooding, public and private, to improve drainage.

  Recommendation Details

  New Action A-19-#. Compile and retain all historical and ongoing records of flooding and near flooding from storm drains and streams, including ephemeral streams. Collect public and private reports of flooding to identify areas for improvement in the storm drainage system.

  New Action A-80-#: Identify any parcel (not just those in new developments) that is subject to flooding, and for each such parcel define the type of flooding and potential depth of flooding.

- GSC Recommendation: For new developments, discourage construction of new curbs and incentivize maximal on-site water retention.

Recommendation Detail

New Action A-19-#. Encourage and incentivize all new developments to (1) avoid installing curbs, for the purpose of increasing infiltration of water into the ground and minimizing runoff, and (2) maximize on-site water retention.

5 Geologic Research and Information

- GSC Recommendation: Make all of the Town's geologic and geotechnical maps and reports publicly available on the Town's website.

Geologic and geotechnical maps and reports that are publicly available and online will be very helpful and useful to geologists and other researchers, current residents and potential new residents.

Note: Members of the Geologic Safety Committee are willing to work with the Town and the Town's Geologic Consultant to assist with the scanning and cataloging. The GSC suggests first defining which documents are highest priority, then scanning and cataloging them as a pilot project.

Recommendation Detail

New Policy P-# (expansion of Action A-11-1): Make readily available to the public, in digital form, all existing geologic and geotechnical mapping, data, and reports. All such information should be indexed and cataloged, beginning with the scanning of old hard-copy geologic and geotechnical maps, data, and reports.

- GSC Recommendation: The Safety Element should encourage research on faults, liquefaction, and other geologic and seismic hazards within the Town.

The Town's official Geologic and Ground Movement Potential Maps likely do not include all potentially damaging faults within the Town. Such unrecognized faults could pose substantial risk to structures and residents. Finding and mapping potentially active faults and other hazards, such as liquefaction, should be encouraged.

Recommendation Detail

New Action A-1-##: The Town should encourage research to locate previously unknown faults, areas susceptible to liquefaction, and other geologic and seismic hazards within the Town.

6 Geologic Maps

- GSC Recommendation: The Safety Element must be written to have policies apply to the latest accepted versions of the Town's geologic maps instead of the 2017 edition. The GSC is concerned that the Draft Safety Element does not anticipate updates to the 2017 edition of the maps currently in use.

  Recommendation Detail

  Policy P-1 must explicitly recognize the Town's Geologic Map and Ground Movement Potential Map as living documents—dynamic in nature—that should not be treated as static documents. The Town should expect these maps will be updated as needed. Policy P-1 must be revised to refer to **the latest accepted versions** of the maps rather than the current, 2017 edition.

- GSC Recommendation: The Town's Geologic Map and Ground Movement Potential Map should be updated at least once every five years, and they should be reviewed within six months after a new major geologic event.

  Recommendation Detail

  New Action A-1-1: The Town's Geologic Map and Ground Movement Potential Map should be updated at least once every five years, and they should be reviewed within six months after a new major geologic event.

- GSC Recommendation: The Safety Element should include geologic maps that show geologic hazards that are outside of the Town borders.

  Outside the Town's borders there are geologic and seismic hazards that can significantly impact the safety of the Town. An important example occurs where the San Andreas fault crosses Portola Road in the Town of Woodside near Searsville Lake. During a major earthquake, surface rupture across the road at that location can prevent Portola Road from being a viable evacuation route for Portola Valley. The Safety Element should include maps that show the geologic and seismic hazards that are outside the Town and that threaten the Town's safety.

The Town's Geologic Map and Ground Movement Potential Map do not show geologic hazards that are beyond the town's border. If there are legal reasons why these official maps must show only the area within the Town's borders, then the Safety Element should include additional maps that incorporate important hazards that surround the town.

Recommendation Detail

New Action A-1-2: Include in the Safety Element maps that document significant geologic and seismic hazards surrounding the Town.

- GSC Recommendation: The Safety Element should define the procedure for updating the Town's Geologic Map and Ground Movement Potential Map.

The process for updating the town's official geologic maps needs to be open and publicly transparent. The Geologic Safety Committee needs to be consulted early in the process. If a disagreement arises with respect to the map updates, an independent, outside geologist who is knowledgeable about local geology should be retained to resolve the differences.

Note: The GSC is willing to provide assistance to the Town to develop the process for updating the maps.

- GSC Recommendation: The State's Landslide Susceptibility map, included in the Draft Safety Element, was designed as a general overview of landslide potential. For all purposes, it should be used only in conjunction with the Town's Ground Movement Potential Map.

Recommendation Detail

The GSC recommends that the landslide susceptibility map (CGS publication MS 58) on page 17 of the October 2022 Draft Safety Element be used only as a starting point to determine landslide potential. This map was constructed as a statewide overview of deep landslides, not shallow mudslides or debris flows; thus is not a substitute for the Town's more detailed and field-verified Ground Movement Potential Map. The authors of the map have written, "This map is not appropriate for evaluation of landslide potential at any specific site."

- GSC Recommendation: Where multiple maps pertain, all the maps should be consulted.

Recommendation Detail

The GSC recommends that all of the best available, published maps should be incorporated into the decision-making process whenever geologic hazards are concerned. Utilize the available published map and studies (e.g., from the US Geological Survey and the California Geological Survey) in addition to the relevant Town maps when evaluating sites for potential new housing development or existing structures situated on areas undergoing slope movement.

- GSC Recommendation: The maps in the General Plan that are used to identify the locations of geologic hazards must be maps that have been peer reviewed by professionals with relevant expertise.

Some of the maps in the current Draft Safety Element and Draft Housing Element simplify geologic or seismic hazard data. These are useful for providing general information, but generalized maps should not be used to define policies.

Recommendation Detail

New Action A-1-#: For implementation of all elements of the General Plan, the maps that are used to identify the locations of geologic hazards should be the best available, most detailed maps that have been peer-reviewed by professionals with the relevant expertise.

7 Reorganization of the Geologic Section of the Safety Element

- GSC Recommendation: Policies protecting roads, utility infrastructure and buildings from landslide or fault hazard should apply to the entire Town. They should not apply only to new construction.

The Safety Element must address the physical safety of all residents, current and future. Existing buildings, infrastructure, and roads in Town may not have been built to current standards for resistance to earthquake and landslide hazards. The Safety Element should provide as much protection for those as for new construction.

Recommendation Detail

The GSC recommends expanding Policies P-12 and P-13 in the Draft Safety Element (which currently apply to new construction only) to the entire Town in order to improve resilience of existing buildings, infrastructure and roads.

Add relevant Actions needed to implement the expanded Policies.

- GSC recommendation: Create a new section in the Safety Element for General Geologic Hazards that includes all the policies that apply to a broad range of geologic and seismic hazards.

The GSC recommends the new section for better clarity. This change to the Safety Element can make Policies easier to find and can help avoid inadvertent mistakes. For example, a Policy that can also apply to earthquakes can be overlooked if it is only in the Landsliding section. The change can also avoid any confusion about whether a policy in the Landsliding section is restricted only to landslides.

Recommendation Detail

The GSC recommends moving Policies P-11, P-12, P-13, and any other policy that can also be applied to other geologic and/or seismic hazards out of "Landsliding" and into a new General Geologic Hazards section to clarify that these policies apply equally for all geologic and seismic hazards, not narrowly for landslide/soil movement.

Add relevant Actions needed to implement the reorganized Policies.

8 Implementation Through the Municipal Code

- GSC recommendation: The Policies and Actions of the Safety Element should be implemented through the Municipal Code.

Recommendation Detail

The GSC recommends that the Town Council carefully review the Safety Element with the intention of implementing and empowering its Policies and Actions through specific policies, which in turn need to be implemented through the Municipal Code. Unless Policies and Actions are carried through in the Code, they will be ineffective in maintaining and improving public safety.