

CHRONOLGY OF THE TRAMONTO / REVELLO LANDSLIDES



- 1922, slope cuts during construction of the Pacific Coast Highway.
- 1925 – 1926, development of Castellammare Mesa including installation of water main, storm drains, sanitary sewers, and grading of the basic road network. A 10-ft. promenade graded, and a parapet wall constructed on slope immediately north of the Pacific Coast Highway. First homes constructed.
- 1932-1935, widening of Pacific Coast Highway. Slope reinforcement was constructed after minor cuts.
- April 1932 – January 1933, movement east of Stretto Way during grading of Pacific Coast Highway, Location 4 [of Castellammare].
- January 1934, slope reinforcement was completed east of Stretto Way.
- March 1935, slope reinforcement completed 350 ft. west of Stretto Way.
- April 1935 slides west of Stretto Way possibly including Location 3. Slope reinforcement re-designed and is presently standing while slope reinforcement to the right and left has failed.
- April 18, 1935, slide 200 ft. west of Location 3.
- August 1935, slope reinforcement completed December 1936, movement on Castellammare Drive east and west of Stretto Way, Location 4 and probably Location 3.
- By 1936, storm drain from Revello Drive to Pacific Coast Highway abandoned due to movement at Location 2.

- February 27-31 [29], 1938, Castellammare isolated by slides. Movement west of Stretto Way,
- August 1935, slope reinforcement completed December 1936, movement on Castellammare Drive east and west of Stretto Way, Location 4 and probably Location 3.
- By 1936, storm drain from Revello Drive to Pacific Coast Highway abandoned due to movement at Location 2.
- February 27-31 [29], 1938, Castellammare isolated by slides. Movement west of Stretto Way, Location 3.
- March 1939, movement evidenced at Location 1.
- March 7-14, 1941, damage to Porto Marina Way, Location 2.
- March 14, 1941, slide at Location 1
- 1941 - Movements observed in all Castellammare slide areas.
- 1941 - Slide recorded at Location 5.
- 1946 -Water main east and west of Stretto Way was abandoned - replaced by mains with flexible couplings
- 1947- Movement recorded at Location 3.
- 1952 - Movement observed at Location 3.
- 1953 - Storm drain was constructed from Lecco Lane to the Pacific Coast Highway
- 1956 - The main from Revello Drive to Stretto Way along Posetano Road was abandoned and replaced due to damage
- 1957 - Movement recorded at Location 3.
- 1957 - The main that passed through the Tramonto Landslide was taken out of commission
- 1957 – Earth movement observed at Locations 3 and 4.
- 1957 - The sewer in Tramonto Drive was found to be fractured and was replaced with a flexible line, above ground
- 1958 - Maintenance of sewers through slide Location 3 became such a problem that sewers were rerouted downhill paralleling the Tramonto Landslide
- 1958 - Three homes in the north section of Location 3 posted unsafe.
- 1958 - Movement recorded at Locations 2, 3, 4 and 5.
- 1958 – A home in the north section of Location 4 posted unsafe.
- 1958 - Castellammare Drive sewer was abandoned.
- 1959 - Gradual movements continue at Location 3.
- 1959 - A perforated drain was placed along Castellammare through the slide all the way to the Pacific Coast Highway.

- 1959 - Tramonto Landslide reactivated and enlarged to the west and east, ultimately truncating and closing a portion of Castellammare Drive, Posetano Road, Revello Drive, and Tramonto Drive collapsing half the street.

No development or street reconstruction occurred within the limits of the failure, For 10 years except for the bulkhead shoring wall at the failure head scarp.

- 1969 - What was left of Tramonto Drive was patched with shotcrete on the bulkhead (further reinforced in 1981) Outside of the failure area to the north, west, and east, sporadic new development occurred and filled in throughout the community over the decades.
- 1978 - Significant slope failure at the Tramonto Landslide per the URS Study for City of LA
- 1981 – Tramonto Bulkhead receives partial reinforcement by the City of LA
- 1983 - Significant slope failure at the Tramonto Landslide per the URS Study for City of LA
- 1993 - Significant slope failure at the Tramonto Landslide destroying a dozen homes. “The catastrophic slope failure was the result of the 1992-1993 rains and more than 100 years of local development that included construction and maintenance of coastal and local roads, construction of hillside homes, and maintenance of the mesa.
- 1969 – Significant landslide (photo above) brings home down onto Pacific Coast Highway.
- 1978 - Significant slope failure at the Tramonto Landslide per the URS Study for City of LA.
- 1981 – Tramonto Bulkhead receives partial reinforcement by the City of LA.
- 1983 - Significant slope failure at the Tramonto Landslide per the URS Study for City of LA.
- 1989 – Malibu Earthquake 5.0 hit hardest in Malibu, Santa Monica, and Redondo Beach.
- 1993 - Significant slope failure at the Tramonto Landslide destroying a dozen homes. “The catastrophic slope failure was the result of the 1992-1993 rains and more than 100 years of local development that included construction and maintenance of coastal and local roads, construction of hillside homes, and maintenance of the mesa.
- 1994 – Northridge earthquake creates a landslide that destroys a home in Pacific Palisades.

- 2001 – FEMA determined that the Palisades Bluff damage is ineligible for funding because the site does not meet the definition of a "facility" under FEMA regulations and there is substantial evidence that the site was susceptible to landslides prior to the storm. Under the FEMA landslide policy, the stabilization of natural ground from prior existing weaknesses is ineligible for funding.
- 2005 – Severe rains triggered the entire landslide zone from the bulkhead at Tramonto Drive to PCH in 2005. Overnight the entire slope dropped approximately 15 feet, buckling some of the historic concrete stairways in the neighborhood and resulting in the red and yellow tagging of several surrounding homes including the author of this chronology. All these adjacent homes are endangered by further excavation and heavy construction in the event of a new large development next to their properties.

2010 – URS Corporation/Caltrans/L.A. City DPW, Bureau of Engineering: “Soil-Structure Interaction Modeling of a Landslide-Stabilization Scheme” prepared a proposed stabilization scheme for the Tramonto Drive Landslide.

Recommendations included geologic mapping, borings, downhole geophysics, and instrumentation that included monitoring the slide movement specifically in that area. In that report, it was stated:

“avoid large-scale grading, use drainage for basic stability and use structural support, which mean excavating to bedrock and deeper with shotcrete and installing hydraugers.”

The URS report shows a deep-bedrock failure plane between Posetano and Tramonto.

That bedrock plane also feeds into the Malibu Bowl earthquake fault directly south of the Tramonto Landslide.



The URS report suggested using solid reinforced concrete to the elevation of the hydraugers. The report showed that there should be structural-support elements in place besides just excavating to the level of the bedrock. The cost to reinforce that Tramonto slide area was estimated to be about \$25 million in July 2010. The report showed a deep-bedrock failure plane between Posetano and Tramonto. That bedrock plane also feeds into the Malibu Coast-Santa Monica Earthquake Fault Line.

The URS Corporation concludes with its “Tramonto Landslide Stabilization Study” on behalf of the City of Los Angeles and Caltrans with the goal of developing



landslide stabilization measures. Unfortunately, the City of Los Angeles has ignored these findings and recommendations.

Commenting on PCH lane closure in April 2024 a representative from Caltrans stated “That is actually a City of LA slide. And that has been moving for years. It has been determined by geologists that removing soil will make the issue worse, potentially spreading onto the entire highway and causing a complete shutdown of PCH. – Circling the News, April 5, 2024

The developer’s proposal to build the development includes an MND (Mitigated Negative Declaration). West LA Planning Commission has accepted this proposal which means the developer can proceed without an Environment Impact Report. CMHO does not agree with this conclusion and is requesting an EIR based on our answers to these key questions:

Would the project:

A) Directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving:

Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or

based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Proposal Claims No Impact
CMHO Claims Potentially Significant Impact

The fact that the proposed RTP development is situated directly on an active rotational landslide that has destroyed land and homes property scores of times in the past 100 years poses serious risk. The lack of comprehensive drainage plan that mitigates the threat of a large-scale landslide from the top of Tramonto to the tip of the toe on PCH dramatically compounds this risk. The fact that the development is located directly adjacent to the Malibu Coast-Santa Monica Fault Line, poses a serious threat to Southern California's most iconic beachside highway and the only convenient access route to thousands of residences and businesses.

Given the long history of natural disasters in this location an Environment Impact Report is essential.

Directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving:

A1) Strong seismic ground shaking?

Proposal Claims Less than Significant Impact
CMHO Claims Potentially Significant Impact

It is a well-documented fact that earthquakes can indeed cause landslides. The shaking generated by an earthquake can trigger the movement of loose or unstable soil, rock, and debris on slopes, leading to landslides. This phenomenon is known as seismic or earthquake-induced landslides. The shaking generated by an earthquake can destabilize slopes, causing soil and rock to lose their stability and slide downhill. When an earthquake causes the ground to rupture along a fault line, it can displace soil and rock layers, leading to landslides.

Directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving:

A2) Seismic-related ground failure, including liquefaction?

Proposal Claims No Impact
CMHO Claims Potentially Significant Impact

Liquefaction in areas with loose, water-saturated soils, the intense shaking of an earthquake can cause the soil to lose its strength and behave like a liquid, increasing the likelihood of landslides. This often induces changes in groundwater levels and pressures induced by seismic waves can affect the stability of slopes and contribute to

landslide initiation. Lack of mitigating the entire landslide places the entire community at risk.

Directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving:

A3) Landslides?

Proposal Claims No Significant Impact
CMHO Claims Potentially Significant Impact

Earthquake-induced landslides can pose significant hazards to communities, infrastructure, and transportation networks in earthquake-prone regions. Understanding and mitigating the risk of landslides associated with earthquakes is an essential aspect of earthquake hazard assessment and disaster preparedness planning. The severity and extent of earthquake-induced landslides depend on factors such as the magnitude and duration of the earthquake, the slope characteristics, the geology of the area, and the presence of human activities that may alter slope stability.

B) Result in substantial soil erosion or the loss of topsoil?

Proposal Claims Less than Significant Impact
CHMO Claims Less Significant with Mitigation

The Tramonto Landslide has eroded and lost topsoil for the past 100 years. It is possible that the loss of topsoil could be mitigated as a result of RTP development. However, a detailed EIR is needed to determine this.

C) Be located on a geologic unit that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Proposal Claims Less than Significant Impact
CMHO Claims Potentially Significant Impact

The instability of the Tramonto Landslide has been observed, studied and experienced by thousands of geological scholars and curious schoolkids for over 100 years. If you walk it, you will experience geo instability.

D) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Proposal Claims Less than Significant Impact
CHMO Claims Potentially Significant Impact

When expansive soils become saturated with water, they lose their strength and can become more prone to erosion or failure. If expansive soils are present in a slope and become saturated, they may increase the likelihood of slope instability and potentially trigger landslides. However, expansive soils themselves do not directly cause landslides. Landslides typically occur due to a combination of factors such as steep slopes, weak soil or rock layers, heavy rainfall, seismic activity, and human activities like construction or deforestation that alter the stability of the slope.

- E) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

Proposal Claims No Impact
CHMO Claims Less than Significant Impact

It's essential to conduct a thorough site evaluation, including soil testing, before installing a septic system or alternative wastewater disposal method to ensure that the chosen system is appropriate for the soil conditions present. In cases where the soil is deemed unsuitable, alternative solutions such as centralized sewer systems or advanced treatment systems may be necessary.

- F) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Proposal Claims Less than significant impact with mitigation
CHMO Claims Potentially Significant Impact

To mitigate the risk of destroying paleontological resources during construction, it's essential for developers and contractors to conduct thorough environmental assessments of project sites before work begins. If fossils or other significant paleontological resources are identified, appropriate measures should be taken to protect and preserve them, which may include site monitoring and excavation by



qualified paleontologists. Additionally, adherence to local regulations and consultation

with paleontological experts can help ensure that construction activities are conducted responsibly and in compliance with legal requirements.

The coastline and white-water view from the bulkhead above the Tramonto Landslide is a geological feature that will be destroyed as a result of the proposed RTP development. Members of the neighborhood as well as visitors from all over the world come to see a beautiful unobstructed sunset from this location.

ENV-2019-5520-MND: KEY GEOLOGY AND SOILS ISSUES RELATIVE TO CEQA
GEOLOGICAL RISK: The Tramonto and Revelo Landslides have a long history of failure and disaster dating back over 100 years. Since the 1920s, streets, sewer lines and roadways have been destroyed by this prehistoric and highly documented landslide. Like a muddy river beneath the surface, It is constantly on the move and will not be stopped by the proposed development. The developer's geologist contends that the new homes will remain solid in future landslides, they do not claim the proposed developments will prevent future sliding overall. Nor do they discuss the negative repercussions to the surrounding home and streets due their proposed excavation.

New homes will not stop an active landslide.

Building structures on a landslide is not a proven method of preventing further slides. In fact, it can exacerbate the risk_of a landslide for the following reasons:

1. Excavation or other ground-disturbing activities, which can weaken the ground and trigger a landslide. Even if the houses are built using specialized construction techniques, such as piling or deep foundations, the risk of a landslide cannot be eliminated.
2. Building houses on the top of a landslide slope can increase the weight on the ground, which can further destabilize the soil or rock and increase the risk of a landslide. Additionally, building structures on unstable ground can also weaken the soil or rock and reduce its ability to resist the forces of gravity.

Here is what some unpaid experts have to say.

“Building on an active landslide is never a good idea.” Safety Officer
Caltrans



“That (referring to the Tramonto Landslide) is a City of LA slide. And that has been moving for years. It has been determined by geologists that removing will make the issue worse, potentially spreading onto the entire highway and causing a complete shutdown of PCH.

“There could be numerous problems with building on an active landslide.”



Research Hydrologist Landslide Hazards Program



ARTIFICIAL INTELLIGENCE SEARCHES THE INTERNET TO FIND THE ANSWER TO COMPLEX QUESTIONS. HERE IS WHAT IT HAS TO SAY ABOUT BUILDING ON AN ACTIVE LANDSLIDE.

AI Question: Are there examples of stopping a landslide by building houses on the slide with retaining walls, shear pins, pumps and drains? Where are they located?

AI Answer: There are indeed examples of attempts to mitigate landslides by implementing various engineering measures such as building houses with retaining walls, shear pins, pumps, and drains. These measures are aimed at stabilizing the slope and reducing the risk of further movement or failure. However, it's important to note that the effectiveness of these measures can vary depending on factors such as the specific characteristics of the landslide, the local geology, and the engineering techniques employed.

One example of a location where such measures have been implemented is in hilly or mountainous regions prone to landslides, such as parts of California, the Pacific Northwest, and other areas with similar geological conditions. In these regions, communities may face the challenge of landslides impacting residential areas, and various engineering solutions may be employed to reduce the risk to homes and infrastructure.

For instance, in areas where landslides are common, homeowners and developers may use retaining walls, soil nails, or other stabilization techniques to reinforce slopes and prevent soil movement. Additionally, drainage systems, including pumps and surface drains, may be installed to manage groundwater and surface water and reduce the likelihood of saturation-induced landslides.

However, it's essential to recognize that while these measures can help reduce the risk of landslides, they may not always be entirely effective, especially in areas with extremely unstable or steep terrain. Additionally, the construction of homes and infrastructure in landslide-prone areas can sometimes exacerbate the problem by adding weight to already unstable slopes or altering drainage patterns.

Overall, while engineering measures such as retaining walls and drainage systems can be part of a comprehensive approach to landslide risk management, it's crucial to

consider the limitations of these measures and to prioritize measures such as land use planning and early warning systems to minimize the risk to communities in landslide-prone areas.



Experts believe the entire Palos Verdes Peninsula may be at risk after the most recent landslide.

WHAT GEOLOGISTS HAVE STATED ABOUT THE TRAMONTO LANDSLIDE STABILITY AND MITIGATION OVER THE YEARS.

1959 - MPMR

8.75 SUMMARY AND CONCLUSIONS – Pg. 8, Paragraph 4

It is not certain that any reasonable remedial measure can stop completely and permanently the long-continued motions on active sliding surfaces within the prehistoric failures. High perched ground water is an important contributing cause of the slide and its removal from the hillside to depths about equal to the maximum depths of the lowest shear zone should provide the factor of safety of 1.2 to 1.25, which is considered necessary for a reasonable chance of halting movements. It is recommended that this be accomplished at both active and prehistoric slide locations by two to four levels of gently sloping hydrauger drains spaced 50 ft. on centers and penetrating about 200 ft. into the hillside. These drains should be advanced into the slope on the north side of each roadway traversing a slide area, beginning with the Pacific Coast Highway. Drainage water from the hydrauger holes should be collected in a closed pipe drainage system for removal from the area. At the same time the concentration of runoff on streets should be collected and removed to prevent it from entering the sliding masses.

The active slides at Castellammare Mesa lie almost entirely within ancient landslides. Extensive regarding within the slides or relocation of the Pacific Coast Highway to provide space for a compacted fill at the toe of the slides is not considered practical or justified. It is believed that a substantial reduction of future movements and possibly complete stabilization in some cases can be achieved by a drawdown of ground water

levels. The City streets form berms within the slide areas from which hydroauger drains could be installed at the points of greatest advantage. This drainage should be combined with cross-street catch basins at critical locations for the diversion of surface runoff from the slide areas. It is important that utilities adjacent to the slide areas be checked periodically for possible leaks or breaks.

ESTIMATED COST OF REMEDIAL MEASURE FOR CASTELLAMMARE MESA (in 1959) \$95,900

2010 - URS – Pgs. 41-42

6.0 SUMMARY AND CONCLUSIONS – Pgs. 41-42

The current condition of the slide severely impairs access to the residential community. Three City Streets, Revello Drive, Posetano Road and Castellammare Drive are completely cut off, and slide debris is moving onto PCH. The main factor contributing to seasonal slide movements was concluded to be groundwater perched within 20 to 40-ft. thick terrace deposits and slide debris above the bedrock surface where most of the slide movement occurs.

A key feature of the proposed structural support measures that are 25-ft. diameter, multi-purpose shafts to be constructed at Revello Drive. They (1) provide the means for detailed sub-surface exploration during construction as part of an observational method of design; (2) serve as structural elements for lateral support of the landslide mass; (3) serve as vertical support for a road bridge traversing the landslide area; and (4) provide the means for installing horizontal drains from within the shafts at elevations identified as water-bearing during shaft excavation. The lower slide support structures proposed to be constructed on Posetano Road and Castellammare Drive consist of 6-ft. diameter CIDH piles which also serve as bridge columns.

Based on ROM cost estimates developed with input from foundation specialty contractors, the overall cost for implementing the slide stabilization scheme proposed herein is estimated to range between 16 and 22 million dollars (in 2010).

2020 - STONEY-MILLER

SLOPE STABILITY

Pg. 11, Paragraph 2

Our stability analyses indicate adequate future stability can be developed for the subject area by

means of the recommended shear pin rows, see Plates 6r thru 12r. Slope stability calculations

supporting this conclusion are presented in Appendix D. Safety factors of at least 1.5 and 1.0

were calculated for gross static and pseudo-static conditions, respectively, for the area of

proposed Revello and Tramonto Drive improvements as depicted on the Cross Sections AR-AR'

and DR-DR', with the inclusion of the shear pin array.

[NOTE: Stoney-Miller's slope stability analyses refer only to the development property and not to the entire Tramonto Landslide area as a whole.

2021 - DUDEK

ENV-2019-5520-MND – Pg. 80-81

In 2015, in California Building Industry Association v. Bay Area Air Quality Management District (CBIA v. BAAQMD), the California Supreme Court held that CEQA generally does not require a lead agency to consider the impacts of the existing environment on the future residents or users of the Project. The decision held that an impact from the existing environment to the Project, including future users and/or residents, is not an impact for purposes of CEQA; **however, if the Project, including future users and residents, exacerbates existing conditions, that impact must be assessed, including how it might affect future users and/or residents of the Project.**

2023 - E.D. MICHAEL

2.2 RTP-AREA FORMAL REFERENCES – Pg. 5, Paragraph 3

The RTP is such that even with accomplishment of the latest requirements for the issuance of building permits as specified in Jensen and Liu (2020), the **available data are insufficient to avoid adverse conditions in terms of slope stability** in the event of proceeding with development of the RTP as now proposed.

12.0 MANDATORY TRAMONTO LANDSLIDE STABILIZATION – Pg. 19

In the absence of demonstrating that the active Tramonto landslide debris can be stabilized in a manner consistent with the requirements of **the MND its issuance is technically inappropriate.**

12.1 QUESTIONABLE USE OF SHEAR PINS – Pg. 19

The absence in the record provided in support of: [i] reference to any instance of utilizing shear pins whether or not in conjunction with soldier piles to stabilize the active Tramonto landslide debris mass, or that of any other similar landslide to as to give such mass a safety factor of 1.5, or [ii] **the opinion of a State-licensed structural engineer that such a system as now proposed for the RTP is substantial evidence in the record that a mitigated declaration (MND) should not apply in such circumstances, because in the circumstances, there is a fair argument that use of shear pins as now suggested by the RTP consultants will not prevent the Tramonto landslide debris mass from continued movement with environmentally significant adverse and conceivably deadly effect in the future.**

12.2 QUESTIONABLE LANDSLIDE DEBRIS MASS DISTRIBUTION – Pg. 20

The record before the Department of Planning as Lead Agency upon which it has relied in adopting an MND for the RTP necessarily accepts the entirely undocumented assertion - **in fact mere speculation so far as the record is concerned – that the Tramonto landslide is a slump (Fig. 2) as opposed to the well documented Moran report by Rutledge and Gould (1959, Geological Section 34, Drawing No. GS-20) that it is essentially a block glide of the type described by Varnes (1958, Pl. 1r), thereby demonstrating that there is no basis at this time upon which to design a RTP stabilization system for the RTP that can assure avoidance of adverse environmental effect in the future.**

12.3 DESTABILIZING EFFECT OF GROUND WATER – Pg. 20

Clearly, the RTP in [i] the employment of retaining walls and shear pins, or in fact any other methods or procedures for stabilizing the Tramonto landslide debris mass without reliable evidence of its basal configuration necessary in order to reliably assume distribution and magnitude of stress, as is now the case, and [ii] no requirement for dewatering to assure that ground water cannot rise high enough to reduce the effective stress by acting in or at the base of the debris, are together, and in fact singly, substantial evidence in support of a fair argument that **the MND for the RTP should not have been adopted.**