

Attachment 2

Local Conditions and Findings – Fire Sprinklers

The following local conditions make the amendments to the California Building Standards Code fire sprinkler requirement for existing structures necessary in order to provide a reasonable degree of fire and life safety in San Mateo County.

CLIMATIC

Precipitation and Relative Humidity

Precipitation, in normal years, can range from 15 to 24 inches per year with an average of approximately 20 inches per year. Ninety six percent (96%) falls during the months of October through April and 4% from May through September. This is a dry period of at least five months each year. Additionally, the area is subject to frequent periods of drought – Currently, the area has been in an unprecedented drought since 2012. May 2001 was also rated as the fifth driest May in California records; 2001 also experienced the 17th driest November-February, the 16th driest November-March, the 24th driest October-May, and the 23rd driest June-May periods. Similar periods of continued drought may be expected locally in the future.

Relative humidity remains in the middle range most of the time. It ranges from 45 to 65% in the winter. It occasionally falls as low as 15 percent.

Impact

The average rainfall in the County is frequently surpassed by concentrated periods of heavy rainfall. These factors, combined with soil types, terrain and existing road systems, have led to landslides and flooding across the State, the County, and private road systems. The blockage of access routes delays or prevents the ability of fire apparatus to respond to the scene of an emergency.

During 1982 and again in 1998, these conditions resulted in closures of Highway 1 in the Devil's Slide area, Highway 84 in the La Honda area, and Pescadero Road in the Pescadero area for extended periods. Many other County-maintained roads also experience landslides, resulting in closures, or limited traffic capabilities for fire apparatus. Although roads known to be susceptible to closure have been identified by CalTrans and the County, clearing of these routes is dependent upon knowledge and availability of resources. Thus, a road closure could delay or prevent firefighter access during a critical period.

Following past rains, partial or complete road blockages occurred on Tunitas Creek Road, Bear Gulch West, Oak Knoll, Springdale, Glenloch Way, Alpine Road, Cloverdale, and Pescadero Road.

Temperatures

Temperatures from June through September average above 80° F in some parts of the County. Temperatures as high as 110° F have been recorded, and it is not unusual to experience several continuous days with temperatures in the mid to high 90s. These extended periods occurred in July 1988, July 1990, October 1991 and in August and September 1998.

Impact

High temperatures cause rapid fatigue and heat exhaustion of fire-fighters, thereby reducing their effectiveness and ability to control large wildland fires, which can endanger buildings, or large fires involving either interiors or exteriors of buildings. This limited ability results in losses of buildings without automatic fire protection systems.

Local high temperatures occasionally cause loss of electrical power in all or portions of communities within the County due to overloading from air conditioning equipment or other temperature-related stresses on the electrical utilities. Water storage and delivery systems within the County depend primarily or entirely upon electrical power for both domestic and fire flow delivery. Extended periods of power loss reduce the amount of storage available for suppression of wildland and structural fires.

Another impact from high temperatures is that combustible building materials and non-irrigated weeds, grass and brush are preheated, thus causing these materials to ignite more readily and burn more rapidly and intensely. Additionally, the atmosphere surrounding the materials being of a higher temperature reduces the effectiveness of the water being applied to the burning materials. This requires that more water be more effectively applied, which in turn requires more fire department resources in order to control a fire on a hot day. High temperatures directly contribute to the rapid growth of fires to an intensity and magnitude beyond the control capabilities of the fire departments.

Winds

Prevailing winds in the area are from the west. However, winds are experienced from virtually every direction at one time or another. Velocities are generally in the 12 miles per hour (MPH) range, gusting to 25 to 35 miles per hour. Forty (40) MPH winds are experienced and winds up to 55 MPH have been registered locally.

Impacts

Winds such as those experienced locally can and do cause fires (interior and exterior) to burn and spread rapidly. Fires involving non-irrigated weeds, grass and brush can grow to a magnitude and be fanned to an intensity beyond the control capabilities of the fire department very quickly, even by relatively moderate winds. When such fires are not controlled, they can extend to nearby buildings, particularly those with untreated wood shake or shingle roofs.

Local winds frequently cause damage to electrical transmission lines which then arc, spark and/or break. This can start fires on untreated wood shake or shingle roofs or in dry vegetation, which can spread to nearby untreated wood shake or shingle roofs. Additionally, when power lines are broken by winds, they can result in power outages in large portions of the County.

Local winds frequently cause the breakage of limbs and branches of trees. It is not unusual for local winds to cause trees to fall. In many instances, damage occurs in trees adjacent to electrical transmission and distribution lines. During December 1997, these winds caused broken tree limbs to break power lines, resulting in fires. In 1998, the fire in Frenchman's Creek burned approximately 35 acres. The fire burning concurrently in Tunitas Creek burned more than 45 acres of grass, brush, and timbered areas, and resulted in the destruction of a year-round dwelling and another structure.

When interior building fires break open windows, winds can cause smoke and fire to quickly spread to other portions of the building via interior and exterior openings. An interior blowtorch effect can be created by wind when windows on more than one side of the building are open. When an interior fire ventilates through the roof of a building, regardless of the type of roof construction, sparks and embers from the fire are carried by winds to other roofs and to dry weeds, grass and brush, thereby starting additional fires.

Winds of the type experienced locally also reduce the effectiveness of exterior water streams used by the fire department on fires involving interior areas of buildings. Local winds will continue to be a definite factor toward causing major fire losses to buildings not provided with automatic fire sprinkler systems. National statistics frequently cite wind conditions such as those experienced locally as a major factor where conflagrations have occurred.

GEOLOGICAL

Seismicity

The majority of the County encompasses areas classified as Seismic Design Category E, which is the most severe earthquake category. Buildings and other structures in Category E can experience major seismic damage. Within San Mateo County are active faults such as San Andreas, San Gregorio, Seal Cove, and other lesser faults. Earthquake activity with nearby epicenters have the potential for the following impacts.

Impact

A major earthquake could result in the cutting-off of response routes of fire companies by collapsing buildings, overpasses and bridges throughout the County.

Earthquakes of the magnitude experienced locally can cause major damage to electrical transmission facilities, which in turn cause power failures while at the same time starting fires throughout the County. The occurrence of multiple fires will quickly disperse existing fire department resources, thereby reducing and/or delaying their response to any given fire.

Even minor seismic activity has an adverse impact on fire protection. Any earth movement, which causes buildings to move, creates cracking and warping of fire walls, smoke barriers, door frames, etc., thereby negating the effectiveness of these structural elements which are intended to prevent fire and smoke from spreading throughout a building.

Soils

The area is replete with various soils which are unstable, clay loam and alluvial fans being predominant. These soil conditions are moderately to severely prone to swelling and shrinking, and are plastic and tend to liquefy, depending upon moisture content.

Impact

The swelling, shrinking, shifting and settling of local soils cause shifting and warping of buildings built upon them. As noted above, any earth movement, which causes buildings to move, creates cracking and warping of fire walls, smoke barriers, door frames, etc., thereby negating the effectiveness of structural elements intended to prevent fire and smoke from spreading throughout a building.

Additionally, these soils are susceptible to seismic shock and moisture concentrations. This may result in landslides in hilly and creek side areas, which often exceed 30% slopes and can obstruct roads used for response by the fire department. Such

restriction of response routes can result in major fire losses in locations where these structures have no automatic fire protection systems such as sprinklers.

TOPOGRAPHIC

Vegetation

Highly combustible dry grass, weeds and brush are common in the hilly and open space areas adjacent to built-up locations six to eight months of each year. When these areas experience wildland fires, they immediately threaten nearby buildings. This condition can be found throughout the County, especially in those developed and developing areas of the County, which interface and intermix with adjoining wildlands.

Examples of fires of this type include the San Mateo Highlands in 1988, Devonshire Canyon in 1990, and Palomar Park in 1991. On the morning of October 16, 1991, a structure fire occurred on Sylvan Way in Emerald Lakes Hills. The fire quickly spread to adjacent trees and vegetation, and debris and ash fell into unburned vegetation and onto adjacent structures in an area more than 400 feet around the fire. The morning fog, which cleared during suppression activities, contributed to the lack of fire spread in the vegetation. An undetected ember landed in an abandoned redwood septic tank approximately 175 feet from the fire and smoldered for nearly 12 hours before breaking into open flame and spreading to surrounding grasses.

Impact

Fire involving large areas of dry vegetation can quickly grow to a magnitude beyond the control capabilities of a fire department. When such a situation occurs, fire department resources may not be able to prevent major fire losses in locations with such conditions.

Surface Features

The arrangement and location of natural and man-made surface features, including hills, creeks, highways, housing tracts, individual dwelling units, commercial development, open space areas, streets and roads, combine to limit feasible response routes for fire department resources in and to County areas.

Impact

The limited number of response routes and lack of feasible alternate routes subject responding fire department units to significant delays in arriving at fires. As the community and environs continue to grow without compensating increases in traffic arterials, the traffic congestion problem becomes correspondingly worse. Delays result in an insufficient number of fire department resources arriving early to effectively control

fires involving buildings with interiors not having automatic fire protection systems. The result can be serious fire losses at such buildings.

Additional delays including total blockage of existing access routes must be anticipated particularly where they traverse the hilly areas serving many communities. These delays result from a combination of residents attempting to flee or enter the fire area and spectators driving and/or parking along normal or alternate access roads. Fire damage from these delays and complete inability to reach fire scenes by fire apparatus is intensified and results in the need for additional suppression resources to obtain control.

Buildings, Landscaping and Terrain

Many of the new buildings and building complexes have building and landscaping features and designs, which preclude or greatly limit any approach or operational access to their exteriors by fire department vehicles. There are many buildings to which access by firefighting personnel to all, but one side is made virtually impossible due to landscaping, fences, slopes or other buildings.

Impact

When fire department vehicles and personnel cannot gain access to the exteriors of buildings involved with fire, it becomes necessary to conduct all extinguishing and ventilating operations via the interior. It also requires that equipment must be carried for long distances from fire vehicles to the fire location. Such operations quickly exhaust fire personnel both in numbers and in stamina. Access problems often result in severely delaying, misdirecting or making impossible fire and smoke control efforts such as locating the seat of the fire, applying hose streams and locating and opening windows or roofs for ventilation. This can result in extensive heat, smoke and water damage in much of the building not originally involved in the fire. Access problems increase the potential for, and numbers of, injuries sustained by firefighting personnel.

The combination of buildings without fire sprinkler systems located in close proximity to each other, and with impeded access for the fire department, can readily result in multiple building fires and major fire losses.

Electrical Power Transmission Equipment

Above-ground electrical power transmission lines suspended on poles and towers exist throughout the County. Many power line poles are located adjacent to streets and roads and many of the transmission wires are suspended above large areas of dry vegetation and near untreated wood shake or shingle roofs. Most of the electrical power provided within the County is supplied via above-ground facilities.

Impact

Above-ground electrical power transmission lines are subject to damage from overloading, winds, trees, earthquakes and collisions from motor vehicles and aircraft.

When damaged, these facilities often start fires involving dry vegetation from the resultant arcing and sparking. Frequently, such damage results in numerous fires being started simultaneously, thereby quickly dispersing available fire department forces. This in turn results in delayed and/or limited response by the fire department to any given fire, thereby causing excessive fire damage due to limited fire department capacity.

Damaged electrical lines often fall onto streets, thereby obstructing response routes from fire stations to fire locations, which again results in excessive fire damage due to limited and/or delayed response by the fire department.

Also, damage to electrical transmission lines frequently results in large areas of the community being without power for extended periods of time. Unless a building involved in a fire located in a powerless area has its own automatic fire alarm system containing an emergency power supply or fire sprinkler system, fire can result in major damage and possible loss of life.

Additionally, the existence of above-ground electrical transmission poles and lines along streets and near buildings often results in partial to complete obstruction of exterior operations and access to the building by fire department aerial apparatus. This again limits the effectiveness and capabilities of the fire department and contributes to extensive fire losses.