RESOLUTION NO. 19-8773

A RESOLUTION OF THE CITY OF SANTA CLARA, CALIFORNIA, FINDING AND DETERMINING THE NEED FOR MODIFICATIONS TO THE CALIFORNIA FIRE CODE, 2019 EDITION

BE IT RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

WHEREAS, the State of California recently adopted and amended the 2018 International Fire Code, establishing the 2019 California Fire Code;

WHEREAS, the 2019 California Fire Code will automatically go into effect on January 1, 2020;

WHEREAS, the 2019 California Fire Code is contained within, and is a subset of, the California Building Standards Code, which may be amended by a local jurisdiction to establish more restrictive standards, pursuant to California Health and Safety Code, §18941.5 and §17958, et seq.;

WHEREAS, restrictive standards established by a local jurisdiction pursuant to this authority must be reasonably necessary because of local climatic, geological, or topographical conditions;

WHEREAS, restrictive standards established by a local jurisdiction must be supported by the findings required by Health and Safety Code §17958, et seq.;

WHEREAS, the City of Santa Clara Fire Department has worked with other Santa Clara County Fire Agencies in the Santa Clara County Fire Code Work Group to develop necessary amendments to the California and International Fire Code; and,

WHEREAS, the City of Santa Clara ("City") finds it necessary to amend the 2019 California Fire Code, as adopted and amended by the State of California, in order to maintain a reasonable degree of fire and life safety within the City because of local climatic, geological, and/or topographical conditions.

NOW THEREFORE, BE IT FURTHER RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

1. That it finds and determines there is a need to adopt the changes or modifications because of local climatic, geological, and/or topographical conditions.

A. Climatic.

a. Precipitation. Average annual rainfall for the City is approximately 18.9 inches per year. The region continues to experience extended periods of drought. The most recent drought required implementation of the City's Water Shortage Contingency Plan in 2014. Following the 2016-2017 winter season, which brought record levels of rain and snow, the region experienced widespread flooding. This cyclical pattern of extreme weather is expected to continue, increasing the fire and flood risk as the impacts of global warming intensify. Each of these cycles has the potential of adversely impacting the fire department's capabilities, from staffing to response times.

b. Relative Humidity. The average relative humidity ranges from 50% during daytime to 70% at night. It drops to approximately 40% during the summer months and occasionally exceeds 80% in the winter months.

c. Temperatures. Temperatures have been recorded as high as 109° F. and as low as 19°F. Average summer highs are in the 78°–82° F. range and winter lows average 28°–35° F.

d. Winds. Prevailing winds are from the Northwest. However, winds are experienced from virtually every direction throughout the year. Velocities are generally in the 5-mph to 15-mph range, with a mean speed of 5.8 mph, and gusts ranging from 7.4 mph to 30 mph, particularly during the summer months. Extreme winds, up to 60 mph, have been recorded.

e. Climatic Summary. These local climatic conditions affect the acceleration, intensity, and size of fires in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to vegetation and combustible construction. These impacts are only expected to grow as the region's population increases and the

effects of global warming intensify. The winds experienced in the Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City. During structure fires, winds can carry embers and burning brands to other structures, spreading the fire and posing the risk of conflagration. In building fires, winds can force fires back into the building and can create a "blowtorch effect," increasing the fire's intensity and speed of spread throughout the building.

B. Geological and Topographical

a. Geographic Location. The City of Santa Clara is located in Santa Clara Valley and is approximately 45 miles south of San Francisco and 382 miles north of Los Angeles.

b. Seismic Location. The City of Santa Clara is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes its taller and older structures particularly vulnerable to damage caused by significant seismic events. The relatively young geological processes that created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments, the City of Santa Clara is located in a very high-risk seismic zone. This zone includes the City's industrial area, which contains the largest concentration of hazardous materials, and has seen a significant increase in high-density residential development.

c. Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake may potentially cause greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City have combustible roofs, which add significantly to the risk of structural fires after an

earthquake. Should a significant seismic event occur, hazardous materials, particularly toxic gases, could pose the greatest threat to the largest number of people. In the event of a widespread catastrophic event, public safety service resources would be seriously impacted, and possibly unavailable to effectively respond to all emergencies.

d. Other variables increase the risk from fire and hazardous material releases after a major earthquake including:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. The time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industrial zones.

e. Soil Conditions. The City lies at the southern end of San Francisco Bay and is built atop the alluvial deposits that surround the margins of the Bay. The alluvium was created by the flooding of the many streams emptying into the San Francisco Bay depression, and from intermittent seawater inundation that has occurred over the last 2 or 3 million years. The areas closest to the Bay are overlain by unconsolidated fine silty clay, known as Bay Mud, which varies in thickness from a few feet to as much as 30 feet. Generally, the older, more stable alluvium is located to the south and the younger, less stable material is located to

the north. Bedrock lies beneath the area at depths of 300 feet or more.

f. Topography. The topography is essentially flat, dropping from an elevation of 94 feet to sea level. The slope across the City is in a northeasterly direction from the high point in the southwest corner to the Bay. The average slope is approximately 0.9%.

g. Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the Fire Department. Beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 and 1989 earthquakes and the poor performance of alluvial deposits during earthquakes, the City of Santa Clara areas could be subject to severe damage as a result of a major earthquake.

C. Related City Information:

a. Size and Population. The City of Santa Clara is the third largest city in Santa Clara County. The City occupies a total of 19.3 square miles and has a population of 129,499 according to 2018 US census data. With the opening of the Levi's Stadium in 2014 we have seen the transitory population increase to more than 200,000 during events.

b. Future Development. The City is in the process of developing three sites North of the Bayshore Freeway. Over the next 10-20 years the number of residential units could grow by as many as 15,000 units. The City is also in the planning phase of two major Specific Plans that could see a significant increase in density, as well as much taller buildings over the next 20 years.

c. Public Safety. The Fire Department is comprised of 167 employees in ten stations located throughout the City. The City Fire Department Insurance Service

Organization Classification (ISO Rating) is Class 2, with adjacent areas rated between Class 2 and Class 9.

d. Fire Prevention. The City's fire prevention and hazardous materials philosophy requires that fire detection and suppression occur as quickly as possible to minimize loss of life, property, and the environment. For these reasons, the most advanced fire detection, suppression, and hazardous materials alarms and mitigation measures (such as scrubbers) are required for most new development within the City. The City has also participated in the County Fire Marshals Association code development process for more than four decades, developing local amendments specific to our needs while maintaining consistency within the county.

e. Traffic. The number of vehicle miles driven in the City has steadily increased over the past decade. Considerable effort is being made to improve conditions impacting traffic in order to ease the crush of commuters through the City. Due to the City's high concentration of jobs, much of the peak traffic (about 75%) consists of nonresidents travelling to or through Santa Clara. The impact of current and future planned developments on traffic conditions will continue to affect the delivery of emergency services.

f. Industry. The City of Santa Clara is the site of more than 1,000 regulated manufacturing, and research and development companies. In addition, to the Fire Code regulations, the Fire Department is a designated Certified Unified Program Agency (CUPA) by Cal-EPA. The largest of these regulated facilities produce a wide range of products, including but not limited to electronic equipment, communication equipment and fiberglass. Many of these manufacturing and research industries use toxic, flammable and explosive chemicals, and other materials in potentially hazardous combinations. Special precautions are required

to minimize the risk to adjoining properties which have recently seen the development of high-density housing around many of these facilities.

g. Zoning. The City of Santa Clara is updating its Zoning Code. The City's update will make the code consistent with state and federal law and the direction provided in the 2010–2035 General Plan. All property and land uses in the City are governed by the City's General Plan. The Santa Clara General Plan is a road map to the future that encompasses the hopes, aspirations, values and dreams of the community. The time frame of the Plan is 2010-2035. The Plan contains the City's official policies on land use and community design, transportation, housing, environmental resources and health and safety.

h. Proximity of Industrial and Residential Uses. High-density residential uses are located near high-risk industries, necessitating specialized fire protection, and hazardous materials regulations being implemented to ensure an adequate level of safety for life, property and the environment.

i. Transportation. The City of Santa Clara is divided by an interstate highway, which could potentially negatively affect fire suppression response times during any nature disaster or significant event.

j. Buildings, Landscaping and Clearances. Many of the designs of the newer large buildings and building complexes greatly limit visibility, approach and accessibility by Public Safety resources. Many houses and other buildings with wood roofs and/or siding are so close together that fire can readily spread by both radiation and convection.

k. Water Supply. The City of Santa Clara supplies its own water for commercial and residential needs. Water services are provided to residents and businesses in the City of Santa Clara by the Water Utility. The Water System consists of approximately 335 miles of water mains, 26 wells and 7 storage tanks

with approximately 28.8 million gallons of water capacity. Sources available to the City include an extensive local underground aquifer and imported water supplies delivered by two wholesale water agencies: the Santa Clara Valley Water District (SCVWD) and the San Francisco Hetch-Hetchy system.

I. Electric Power. The City of Santa Clara operates its own electric utility company, Silicon Valley Power (SVP). SVP currently provides over 40 percent of Santa Clara's electricity from carbon free renewable resources. In addition to using green energy from large-scale wind, solar, geothermal and hydroelectric projects outside of the area, SVP employs innovative ways to locally produce electricity by capturing and burning methane gas from a closed city landfill and using power from solar generating systems on city-owned garages and vacant, unusable land. SVP participates in new technologies such as fiber optic networks, citywide Wi-Fi, advanced metering, digital substation controls, fuel cells, and server virtualization, working to enhance the electric utility.

D. **Specific Findings**. In addition to changes justified on administrative grounds or by all of the general findings, several substantive sections are justified specifically.

2. The following amendments to the 2019 Fire Code are considered building standards and are listed with the applicable climatic, geologic and topographic conditions:

315.8 Lithium Battery Storage and Handling. The storage and handling of lithium ion and lithium metal batteries or cells in quantities exceeding 1,000 pounds (4086 kg) shall comply with Section 315.8.1 through 315.8.10, and Chapter 32 where applicable.

315.8.1 Permits. Permits shall be required as set forth in Section 105.6.27.

315.8.2 Maximum quantity in a fire area. The aggregate amount of lithium batteries stored and handled in a single fire area shall not exceed 9,000 pounds (4086 kg).

315.8.3 Construction requirements. Fire areas shall be separated from each other by fire barriers having not less than 2-hour fire resistance rating constructed in accordance with Section

707 of the Building Code and horizontal assemblies constructed in accordance with Section 711 of the Building Code.

315.8.4 Number of fire areas. The maximum number of fire areas within a building shall be four.

315.8.5 Group H, Division 2 occupancy. Storage and handling of more than 9,000 pounds of lithium batteries per fire area shall be in an approved Group H, Division 2 occupancy constructed in accordance with the Building Code and provided throughout with approved automatic smoke detection and radiant-energy detection systems.

315.8.6 Automatic sprinkler system. Buildings containing fire areas used for lithium battery storage or handling shall be equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. The design of the sprinkler system within each fire area shall not be less than that required for Extra Hazard Group 2 with a minimum design area of 3,000 square feet. Where the storage arrangement is required by other provisions of this code to be provided with a higher level of sprinkler system protection, the higher level of sprinkler system protection shall be provided.

315.8.7 Automatic smoke detection system. An approved automatic smoke detection system that activates an approved occupant notification system shall be provided throughout each fire area in accordance with Section 907.

315.8.8 Radiant energy detection. An approved radiant-energy detection system that activates an approved occupant notification system shall be installed throughout each fire area in accordance with Section 907.

315.8.9 Collection containers. Containers used to collect or store lithium batteries shall be noncombustible and shall not have an individual capacity exceeding 30 gallons (113.6 L), or be approved for transportation in accordance with the Department of Transportation (DOTn).

315.8.10 Storage configuration. Lithium batteries shall be considered a high-hazard commodity in accordance with Chapter 32 and where applicable, lithium battery storage shall comply with Chapter 32 in addition to Section 315.8.

General Finding: Energy storage systems are susceptible to cataphoric failure from flooding and seismic events. These energy storage systems produce hydrogen which can cause the rapid development of a fire and the metal components are high water reactive. The decomposition of the batteries also pose a significant environmental hazards if not properly contained.

CLIMATIC FINDINGS:

Climatic Summary. The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

GEOLOGIC AND TOPOGRAPHIC CONDITIONS:

Seismic Location. The City of Santa Clara is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes its taller and older structures particularly vulnerable to damage caused by significant seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the

potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City have combustible roofs which add significantly to the risk of structural fires after an earthquake. Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of a widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.
Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

504.5 Access Control Devices. When access control devices including bars, grates, gates, electric or magnetic locks or similar devices, which would inhibit rapid fire department

emergency access to within and throughout the building, are installed, such devices shall be approved by the fire code official. All electrically powered access control devices shall be provided with an approved means for deactivation or unlocking from a single location or otherwise approved by the fire code official or his/her designee. Access control devices shall also comply with Chapter 10 Egress.

General Finding: Unimpeded access into buildings during a natural disaster like an earthquake or flood are essential to public safety. Access control devices can directly and negatively impact the ability of emergency responders to rescue individuals that may be trapped within a building.

CLIMATIC FINDINGS:

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GEOLOGIC AND TOPOGRAPHIC CONDITIONS:

Seismic Location. The City of Santa Clara is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes its taller and older structures particularly vulnerable to damage caused by significant seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the

Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

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7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during

earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

508.1.2 Separation. The fire command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 707 of the California Building Code or horizontal assembly constructed in accordance with Section 711of the California Building Code, or both.

General Finding: After a seismic event the upgraded construction of the room will provide emergency responders a protected area in which operate safely for longer durations if a fire were to occur.

CLIMATIC FINDINGS:

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Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City have combustible roofs which add significantly to the risk of structural fires after an earthquake. Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of a widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

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Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during

earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

903.2 Where required. Approved automatic sprinkler systems in new and existing buildings and structures shall be provided in the locations described in this Section or Sections 903.2.1 through 903.2.12 whichever is the more restrictive. For the purposes of this section, firewalls and fire barriers used to separate building areas shall be constructed in accordance with the California Building Code and shall be without openings or penetrations.

1. An automatic sprinkler system shall be installed throughout all new buildings and structures greater than 1,000 square feet.

Exception: Group S-2 or U occupancies used exclusively for vehicle parking or solar arrays that do not exceed 5000 square feet.

2. An automatic sprinkler system shall be provided throughout existing Group A, B, E, F, I, L, M, R, S and U buildings and structures, when additions are made that increase the buildings square footage by more than 1200 square feet or the building total square footage exceeds 3,600 square feet.

3. Any change of occupancy or change in use of any building when that change in use would place the building into a more hazardous division of the same occupancy group.

General Finding: The weather, including high temperatures and winds, can significantly increase the chance that a structure fire can spread to neighboring properties. Automatic fire sprinkler systems have a proven track record for containing fires and allowing for the control of fires by fewer firefighters than structures not protected by fire sprinklers. Structures equipped with automatic fire sprinklers significantly reduce the likelihood that a fire will spread to neighboring properties.

General Finding: The weather, including high temperatures and winds, can significantly increase the chance that a structure fire can spread to neighboring properties. Automatic fire sprinkler systems have a proven track record for containing fires and allowing for the control of

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Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could

pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

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Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

3304.9 Fire Walls. When firewalls are required in combustible construction, the wall construction shall be completed (with all openings protected) immediately after the building is sufficiently weather-protected at the location of the wall(s).

General Finding: The risk of fire for a building is usually greatest during its construction phase. The intensity of a fire involving a building under construction is directly influenced by

challenging weather conditions, including but not limited to high temperatures, and winds. Firewalls have demonstrated effectiveness in aiding in the control of fires involving buildings under construction.

CLIMATIC FINDINGS:

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Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

3308.5 Fire protection. All wood frame construction projects exceeding three stories in height, except R-3 occupancies shall be provided with a listed fire alarm system provided with linear heat detection during construction. The fire alarm system is required to be monitored by a listed

monitoring company. A permit for the installation and subsequent modifications of the system are required. The design and installation shall comply with the fire departments fire alarm for construction sites standard.

General Finding: The risk of fire is greatest during the construction when wood members are exposed and fire suppression, and detection system are not installation or functional. The intensity of a fire involving a building under construction is directly influenced by challenging weather conditions, including but not limited to high temperatures, and winds. Given the rapid development of these fires and the impacts posed to construction works, emergency responders, and the community early detection and initiation of an effective response is essential.

CLIMATIC FINDINGS:

Climatic Summary. The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

GEOLOGIC AND TOPOGRAPHIC CONDITIONS:

Seismic Location. The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes its taller and older structures particularly vulnerable to damage caused by significant seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the

City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments, the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand,

gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

3308.9. Construction Site Security. Construction projects exceeding three stories in height, or when determined necessary by the fire code official shall have an electronic security system installed, except for R-3 occupancies, during construction. The electronic data is required to be maintained 24-hours a day, seven days a week. The data is required to be maintained for a minimum of 30-days off-site and made available to the fire department upon request. The electronic security camera layout plan shall be incorporated into the construction safety plan and is required to be approved prior to the start of construction.

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3311.1 Stairways Required. Each level above the first story in multi-story buildings that require two exit stairways shall be provided with at least two usable exit stairways after the floor decking is installed. The stairways shall be continuous and discharge to grade level. Stairways serving more than two floor levels shall be enclosed (with openings adequately protected) after exterior walls/windows are in place. Exit stairs in new and in existing, occupied buildings shall be lighted and maintained clear of debris and construction materials at all times.

Exception: For multi-story buildings, one of the required exit stairs may be obstructed on not more than two contiguous floor levels for the purposes of stairway construction (i.e., installation of gypsum board, painting, flooring, etc.).

General Finding: The risk of fire for a building is usually greatest during its construction phase. The intensity of a fire involving a building under construction is directly influenced by challenging weather conditions, including but not limited to high temperatures, and winds. Since a building under construction does not generally have active fire protection systems, it is essential to have two unobstructed means egress for the occupants to evacuate the building in

an emergency.

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5003.1.5 Additional Spill Control and Secondary Containment Requirements. In addition to the requirements set forth in Section 5004.2. An approved containment system is required for any quantity of hazardous materials that are liquids or solids at normal temperature, and pressure (NTP) where a spill is determined to be a plausible event and where such an event would endanger people, property or the environment. The approved containment system may be

required to include a combination of spill control and secondary containment meeting the design and construction requirements set forth in Section 5004.2.

General Finding: The potential for hazardous material releases during a seismic event are an outcome that must be addressed. Additional spill and secondary containment requirements address the potential hazards essential for the protection of occupants, emergency responders, and the community.

CLIMATIC FINDINGS:

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5003.2.2.1 Design and Construction. Piping, tubing, valves, fittings and related components used for hazardous materials shall be in accordance with the following:

1. Piping, tubing, valves, fittings and related components shall be designed and fabricated from materials compatible with the material to be contained and shall be of adequate strength and durability to withstand the pressure, structural and seismic stress, and exposure to which they are subject.

2. Piping and tubing shall be identified in accordance with ASME A13.1 and the Santa Clara Fire Department Marking Requirements and Guidelines for Hazardous Materials and Hazardous Waste to indicate the material conveyed.

3. Readily accessible manual valves or automatic remotely activated fail-safe emergency shutoff valves shall be installed on supply piping and tubing at the following locations:

    1. The point of use.

    2. The tank, cylinder or bulk use.

4. Manual emergency shutoff valves and controls for remotely activated emergency shutoff valves shall be identified and the location shall be clearly visible accessible and indicated by means of a sign.

5. Backflow prevention or check valves shall be provided when the backflow of hazardous materials could create a hazardous condition or cause the unauthorized discharge of hazardous materials.

6. Where gases or liquids having a hazard ranking of:

    1. Health Class 3 or 4

    2. Flammability Class 4

    3. Instability Class 4

    in accordance with NFPA 704 are carried in pressurized piping above 15 pounds per square inch gauge (psig)(103 Kpa), an approved means of leak detection,

emergency shutoff or excess flow control shall be provided. Where the piping originates from within a hazardous material storage room or area, the excess flow control shall be located within the storage room or area. Where the piping originates from a bulk source, the excess flow control shall be located as close to the bulk source as practical.

Exceptions:

1. Piping for inlet connections designed to prevent backflow.
2. Piping for pressure relief devices.

7. Secondary containment or equivalent protection from spills or leaks shall be provided for piping for liquid hazardous materials and for highly toxic and toxic corrosive gases above threshold quantities listed in Tables 6004.2 and 6004.3. Secondary containment includes but is not limited to double-walled piping.

Exceptions:

1. Secondary containment is not required for toxic corrosive gases if the piping is constructed of inter materials.
2. Piping under sub-atmospheric conditions if the piping is equipped with an alarm and fail-safe-to-close valve activated by a loss of vacuum.

8. Expansion chambers shall be provided between valves whenever the regulated gas may be subjected to thermal expansion. Chambers shall be sized to provide protection for piping and instrumentation and to accommodate the expansion of regulated materials.

General Finding: The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Specialized piping, and secondary containment measures are designed to help reduce the chances of an accidental release of hazardous materials.

CLIMATIC FINDINGS:

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Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to

effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

5003.2.2.2 Additional Regulation for Supply Piping for Health Hazard Materials. Supply piping and tubing for gases and liquids having a health hazard ranking of 3 or 4 shall be in accordance with ASME B31.3 and the following:

1. Piping and tubing utilized for the transmission of toxic, highly toxic, or highly volatile corrosive liquids and gases shall have welded or brazed connections throughout except for connections within an exhausted enclosure if the material is a gas, or an approved method of drainage or containment is provided for connections if the material is a liquid.

2. Piping and tubing shall not be located within corridors, within any portion of a means of egress required to be enclosed in fire-resistance-rated construction or in concealed spaces in areas not classified as Group H Occupancies.

Exception: Piping and tubing within the space defined by the walls of corridors and the floor or roof above or in concealed space above other occupancies when installed in accordance with Section 415.8.6.3 of the California Building Code as required for Group H, Division 5 Occupancies.

3. All primary piping for toxic, highly toxic and moderately toxic gases shall pass a helium leak test of 1x10-9 cubic centimeters/second where practical, or shall pass testing in accordance with an approved, nationally recognized standard. Tests shall be conducted by a qualified "third party" not involved with the construction of the piping and control systems. General Finding: The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Threaded or flanged connections pose a significant risk of a release of hazardous materials.

General Finding: The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Additional piping safeguards are designed to help reduce the chance of an accidental release of hazardous materials.

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5003.9.11 Fire Extinguishing Systems for Workstations Dispensing, Handling or Using Hazardous Materials. Combustible and non-combustible workstations, which dispense, handle or use hazardous materials, shall be protected by an approved automatic fire extinguishing system in accordance with Section 2703.10, unless otherwise approved.

General Finding: The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Quickly detecting and extinguishing fires involving hazardous materials is the most effective means of controlling an event.

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6004.1 General. The storage and use of highly toxic and toxic compressed gases shall comply with this section. Materials stored and used as a gas whether or not the material meets the definition of a compressed gas, and meets the definition of a highly toxic, and toxic shall comply with this Section.

6004.1.1 Special limitations for indoor storage and use by occupancy. The indoor storage and use of highly toxic, and toxic compressed gases in certain occupancies shall be subject to the limitations contained in Sections 6004.1.1.1 through 6004.1.1 .3.

6004.1.1.1 Group A, E, I or U occupancies. Highly toxic and toxic compressed gases shall not be stored or used within Group A, E, I or U occupancies.

Exception: Cylinders not exceeding 20 cubic feet (0.566 m3) at normal temperature and pressure (NTP) are allowed within gas cabinets or fume hoods.

6004.1.1.2 Group R occupancies. Highly toxic, and toxic compressed gases shall not be stored or used in Group R occupancies.

6004.1.1.3 Offices, retail sales and classrooms. Highly toxic, and toxic compressed gases shall not be stored or used in offices, retail sales or classroom portions of Group B, F, M or S occupancies.

Exception: In classrooms of Group B occupancies, cylinders with a capacity not exceeding 20 cubic feet (0.566 m3) at NTP are allowed in gas cabinets or fume hoods.

General Finding: The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Limiting the quantity of material and in which occupancy toxic gases can be stored is an effective means of controlling those hazards.

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6004.1.5 Emergency Control Station. Signals from emergency equipment used for highly toxic and toxic compressed gases shall be transmitted to control stations, which are continually staffed by trained personnel. The signals to the emergency control station shall also be monitored by an approved third-party monitoring company that will contact 911 in the event of an alarm.

General Finding: The accidental release of toxic gases can threaten large numbers of people due to the spread of the gases by winds. Early detection and accurate notification to emergency responders is essential to the control and mitigation of an emergency event.

CLIMATIC FINDINGS:

Climatic Summary. The local climatic conditions in the City of Santa Clara can affect the acceleration, intensity, and size of fire in the community. Times of little or no rainfall, low humidity, and high temperatures create extremely hazardous fire conditions, particularly as they relate to wood shake and shingle roof fires. The winds experienced in the City of Santa Clara area can have a tremendous impact upon structure fires where buildings are in close proximity to one another, which is commonly found in the City of Santa Clara. During wood shake and shingle roof fires, or exposure fires, winds can carry sparks and burning brands to other structures, thus spreading the fire and causing conflagrations. In building fires, winds can literally force fires back into the building and can create a blowtorch effect, in addition to preventing "natural" ventilation and cross-ventilation efforts.

GEOLOGIC AND TOPOGRAPHIC CONDITIONS:

Seismic Location. The City is situated on alluvial soils between San Francisco Bay and the San Andreas Fault zone. The City's location makes its taller and older structures particularly

vulnerable to damage caused by significant seismic events. The relatively young geological processes that have created the San Francisco Bay Area are still active today. Seismically, the City sits between two active earthquake faults (San Andreas and the Hayward/Calaveras) and other potentially active faults. According to the Association of Bay Area Governments the City of Santa Clara is located in a very high-risk seismic zone. This includes the industrial area, which contains the largest concentration of hazardous materials.

Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
4. Climatic conditions (hot, dry weather with high winds);
5. Time of day will influence the amount of traffic on roadways and could intensify the risk to life during normal business hours;
6. The availability of timely mutual aid or military assistance;
7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

Geographical and Topographical Summary. The stated local geological and

topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

6004.4 General indoor requirements. The general requirements applicable to the indoor storage and use of highly toxic, and toxic compressed gases shall be in accordance with Sections 6004.3.5.1 through 6004.3.10.

6004.4.1 Cylinder and tank location. Cylinders shall be located within gas cabinets, exhausted enclosures or gas rooms. Portable and stationary tanks shall be located within gas rooms or exhausted enclosures.

Exceptions: Where a gas detection system is provided in accordance with 6004.4.8

6004.4.2 Ventilated areas. The room or area in which gas cabinets or exhausted enclosures are located shall be provided with exhaust ventilation. Gas cabinets or exhausted enclosures shall not be used as the sole means of exhaust for any room or area.

6004.4.3 Piping and controls. In addition to the requirements of Section 5003.2.2, piping and controls on stationary tanks, portable tanks, and cylinders shall comply with the following requirements:

1. Stationary tanks, portable tanks, and cylinders in use shall be provided with a means of excess flow control on all tank and cylinder inlet or outlet connections.

   Exceptions:

   1. Inlet connections designed to prevent backflow.
   2. Pressure relief devices.

6004.4.4 Gas rooms. Gas rooms shall comply with Section 5003.8.4 and both of the following requirements:

1. The exhaust ventilation from gas rooms shall be directed to an exhaust system.

2. Gas rooms shall be equipped with an approved automatic sprinkler system. Alternative fire- extinguishing systems shall not be used.

6004.4.5 Treatment systems. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, required in Section 6004.4.1 shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The treatment system shall be designed in accordance with Sections 6004.2.2.7.1 through 6004.2.2.7.5 and Chapter 5 of the California Mechanical Code.

Exceptions:

1. Highly toxic, and toxic gases - storage. A treatment system is not required for cylinders, containers and tanks in storage where all of the following controls are provided:

   1.1 Valve outlets are equipped with gas- tight outlet plugs or caps.

   1.2 Hand wheel-operated valves have handles secured to prevent movement.

   1.3 Approved containment vessels or containment systems are provided in accordance with Section 6004.2.2.3.

2. Highly toxic, and toxic gases - use. Treatment systems are not required for highly toxic, and toxic gases supplied by stationary tanks, portable tanks, or cylinders where a gas detection system complying with Section 6004.4.8 and listed or approved automatic-closing fail- safe valves are provided. The gas detection system shall have a sensing interval not exceeding 5 minutes. Automatic-closing fail- safe valves shall be located immediately adjacent to cylinder valves and shall close when gas is detected at the permissible exposure limit (PEL) by a gas sensor monitoring the exhaust system at the

point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room.

6004.4.5.1 Design. Treatment systems shall be capable of diluting, adsorbing, absorbing, containing, neutralizing, burning or otherwise processing the contents of the largest single vessel of compressed gas. Where a total containment system is used, the system shall be designed to handle the maximum anticipated pressure of release to the system when it reaches equilibrium.

6004.4.5.2 Performance. Treatment systems shall be designed to reduce the maximum allowable discharge concentrations of the gas to one-half immediately dangerous to life and health (IDLH) at the point of discharge to the atmosphere. Where more than one gas is emitted to the treatment system, the treatment system shall be designed to handle the worst-case release based on the release rate, the quantity and the IDLH for all compressed gases stored or used.

6004.4.5.3 Sizing. Treatment systems shall be sized to process the maximum worst-case release of gas based on the maximum flow rate of release from the largest vessel utilized. The entire contents of the largest compressed gas vessel shall be considered.

6004.4.5.4 Stationary tanks. Stationary tanks shall be labeled with the maximum rate of release for the compressed gas contained based on valves or fittings that are inserted directly into the tank. Where multiple valves or fittings are provided, the maximum flow rate of release for valves or fittings with the highest flow rate shall be indicated. Where liquefied compressed gases are in contact with valves or fittings, the liquid flow rate shall be utilized for computation purposes. Flow rates indicated on the label shall be converted to cubic feet per minute (cfm/min) (m3/s) of gas at normal temperature and pressure (NTP).

6004.4.5.5 Portable tanks and cylinders. The maximum flow rate of release for portable tanks and cylinders shall be calculated based on the total release from the cylinder or tank within the time specified in Table 6004.4.6 Where portable tanks or cylinders are equipped with approved excess flow or reduced flow valves, the worst-case release shall be determined by the maximum achievable flow from the valve as determined by the valve manufacturer or compressed gas supplier. Reduced flow and excess flow valves shall be permanently marked by the valve manufacturer to indicate the maximum design flow rate. Such markings shall indicate the flow rate for air under normal temperature and pressure.

6004.4.6. Emergency power. Emergency power shall be provided for the following systems in accordance with Section 604:

1. Exhaust ventilation system.
2. Treatment system.
3. Gas detection system.
4. Smoke detection system.

6004.3.6.1 Fail-safe systems. Emergency power shall not be required for mechanical exhaust ventilation and treatment systems where approved fail-safe systems are installed and designed to stop gas flow.

6004.4.7 Automatic fire detection system. An approved automatic fire detection system shall be installed in rooms or areas where highly toxic, and toxic compressed gases are stored or used. Activation of the detection system shall sound a local alarm. The fire detection system shall comply with Section 907.

6004.4.8 Gas detection system. A gas detection system complying with Section 916 shall be provided to detect the presence of gas at or below the PEL or ceiling limit of the gas for which detection is provided.

Exceptions:

1. A gas detection system is not required for toxic gases when the physiological warning threshold level for the gas is at a level below the accepted PEL for the gas.

2. A gas detection system is not required for highly toxic, and toxic gases where cylinders, portable tanks, and all non-continuously welded connects are within a gas cabinet or exhausted enclosures.

6004.4.8.1 Alarms. The gas detection system shall initiate a local alarm and transmit a signal to an approved location.

6004.4.8.2 Shut off of gas supply. The gas detection system shall automatically close the shut off valve at the source on gas supply piping and tubing related to the system being monitored for whichever gas is detected.

Exception: Emergency shutoff valves that are ready access and constantly attended/supervised.

General Finding: The accidental release of hazardous materials can threaten large numbers of people and the environment due to the spread of the gases by winds. Gas detection and automated shut-down are effective means of limiting the impacts of a potential release.

CLIMATIC FINDINGS:

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"natural" ventilation and cross-ventilation efforts.

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Seismic Events, Fire and Hazardous Material Releases. Fire following an earthquake has the potential of causing greater loss of life and damage than the earthquake itself. A large number of residential dwellings in the City of Santa Clara have combustible roofs which add significantly to the risk of structural fires after an earthquake.

Should a significant seismic event occur, hazardous materials, particularly toxic gases could pose the greatest threat to the largest number of people. In the event of widespread catastrophic event, public safety service resources would be seriously impacted and maybe unavailable to effectively respond to all emergencies.

Other variables may tend to increase the risk from fire and hazardous material releases after a major earthquake:

1. The extent of damage to the water system;
2. The extent of isolation due to bridge and/or freeway overpass collapse;
3. The extent of roadway damage and/or amount of debris blocking the roadways;
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7. The concentration of combustible structures (wood frame) in the residential, mercantile and light industry zones.

Geographical and Topographical Summary. The stated local geological and topographical conditions increase the magnitude, exposure, accessibility problems and fire hazards presented to the fire. Lying beneath the City of Santa Clara are thick layers of sand, gravel and clay, known as alluvium, which amplify the effects of earthquakes. Based on the damage caused in Santa Clara Valley by the 1906 earthquake and the poor performance of alluvial deposits during earthquakes, areas in the City of Santa Clara could be subject to severe damage as a result of a major earthquake.

6101.3 Construction documents. Where a LP-gas container is 250 gallons or greater in water capacity, the installer shall submit construction documents for such installation.

General Finding: Floods and seismic events can relocate and damage smaller LP-Gas systems. Reducing the threshold amount that requires a plan review to ensure the cylinders are properly secured is essential to the safety of emergency responders, the community, and the environment.

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6405.3.4 Silane distribution systems automatic shutdown. Silane distribution systems shall automatically shut down at the source upon activation of the gas detection system at levels above the alarm level and/or failure of the ventilation system for the silane distribution system.

General Finding: The City of Santa Clara is located in an area that experiences significant seismic activity. Automatic shut off valves are designed to shut-off the flow of gases from the source, thereby reducing the chance of accidental release after a significant earthquake.

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3. Effective date. This resolution shall become effective immediately.

I HEREBY CERTIFY THE FOREGOING TO BE A TRUE COPY OF A RESOLUTION PASSED AND ADOPTED BY THE CITY OF SANTA CLARA, CALIFORNIA, AT A REGULAR MEETING THEREOF HELD ON THE 5TH DAY OF NOVEMBER, 2019, BY THE FOLLOWING VOTE:

AYES:	COUNCILORS:	Chahal, Davis, Hardy, Mahan, O'Neill, and Watanabe, and Mayor Gillmor
NOES:	COUNCILORS:	None
ABSENT:	COUNCILORS:	None
ABSTAINED:	COUNCILORS:	None

ATTEST: _____
NORA PIMENTEL, MMC
ASSISTANT CITY CLERK
CITY OF SANTA CLARA

Attachments incorporated by reference: None