Costco Escondido

Fire Protection Technical Report / CW19-0406-00

Escondido, California

REPORT

October 24, 2022

WJE No. 2022.1266.0

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INTRODUCTION

A new Costco Wholesale Warehouse is proposed to be constructed in place of a retail building to be demolished on the north end of the Westfield North County mall located at E. Via Rancho Parkway, Escondido, California. WJE was retained to summarize the general fire protection and life safety requirements for the proposed building in the form of a fire protection technical report. The following report summarizes the applicable requirements for the allowable building height and area, fire resistant construction, water supply, fire sprinkler system, fire alarm system, and fire apparatus access roads.

PROJECT DESCRIPTION

The proposed Costco building will have Type IIB construction, approximately 156,298 square feet in total building area, a single story, and a building height of approximately 30 feet. The building will primarily serve as a Group M (mercantile) occupancy with minor uses including Group B (business) and Group S-1 (storage) occupancies. An automatic fire sprinkler system, fire alarm and detection system, and smoke and heat vents will be provided throughout the building.

APPLICABLE CODES

The following codes, standards, and reference documents were used in the preparation of this report:

- California Building Codes with City of Escondido Amendments (CBC), 2019 Edition
- California Fire Code City of Escondido Amendments (CFC), 2019 Edition
- National Fire Protection Association 13 (NFPA 13), "Standard for the Installation of Sprinkler Systems," 2019 Edition
- National Fire Protection Association 72 (NFPA 72), "National Fire Alarm Code," 2019 Edition

ALLOWABLE BUILDING HEIGHT AND AREA

Allowable Area

The proposed Costco building will be an anchor building for the covered mall. As an anchor building having single-story and Type IIB construction, the proposed Costco will be an unlimited area building (CBC Section 402.4.1.2).

Allowable Height

In order to comply with the requirements that allow the new Costco to be an unlimited area anchor building, the building is required to not have more than three stories above the grade plane (CBC Section 402.4.1.2). The proposed building will have one single story and therefore complies with the requirements for the allowable number of stories.

Additionally, fully sprinklered buildings having Type IIB construction are required to have a height not more than 75 feet above the grade plane (CBC Section 504.3). The proposed building will have a height of approximately 30 feet above the grade plane and therefore complies with the requirement for allowable building height in feet.

FIRE RESISTANT CONSTRUCTION

Required Fire Resistance of Building Elements

The proposed Costco building will have Type IIB construction and therefore is not required to have fire resistance rated building elements with the expectation of exterior walls (CBC Table 601). The exterior walls of an anchor buildings are required to comply with the following requirements specific for covered mall and anchor buildings.

The occupancy classification of the proposed Costco will be the same as that permitted for the mall tenants (Group M). Therefore, the exterior wall of the Costco building adjacent to the mall is required to be a two-hour fire resistance rated fire wall (CBC Section 402.4.2.2).

Additionally, covered malls and attached anchor buildings are required to be surrounded on all sides by a permanent open space not less than 60 feet in width (CBC Section 402.2). The width of the open space is permitted to be reduced to a minimum width of 40 feet. However, the exterior wall of the building adjacent to the reduced space is required to have a fire resistance rating of three-hours with three-hour rated opening protection. Also, the portion of the building perimeter adjacent to the reduced yard is required not to be greater than 75 percent of the total building perimeter (CBC Section 404.2). The current site plan shows that the open space provided between the proposed Costco building and fuel canopy is 59 feet. This portion of the exterior wall will not constitute more than 75 percent of the building exterior perimeter. Therefore, the 59-foot open space is allowed so long as the exterior wall adjacent to the fuel canopy has a three-hour fire resistance rating with three-hour rated opening protection. If the open space is widened to 60 feet or more, the wall would not be required to have a fire resistance ratting.

The remaining exterior walls of the proposed Costco building have a fire separation greater than 10 feet and therefore are not required to have a fire resistance rating (CBC Table 602). A summary of the required fire resistance ratings of building elements for the proposed building is provided in Table 1.

Table 1. Building Element Fire Resistance Ratings for Type IIB with B, M, S-1

Building Element	Required Fire Resistance Rating (hour)
Primary structural frame	0
Exterior bearing walls, nonbearing walls and partitions	0[a, b]
Interior bearing walls	0
Interior nonbearing walls and partitions	0
Floor construction and associated secondary members	0
Roof construction and associated secondary members	0

a. The exterior wall of adjacent to the mall building is required to have a two-hour fire resistance rating (CBC Section 402.4.2.2).

b. The exterior wall of the proposed Costco is required to have a fire resistance rating of three-hours due to the separation distance between the building and the adjacent fuel canopy being less than 60 feet. (CBC Section 402.2).

Occupancy Separation

The occupancies included in the Costco project include Group M, B, and S-1. Fire rated separation is not required between these occupancies (CBC Section Table 508.4).

FIRE SPRINKLER SYSTEM

The building will be protected throughout with an automatic sprinkler system. The hazard classification and sprinkler design criteria for each space in the building are shown below.

Warehouse

The fire sprinkler system design will consist of overhead sprinkler protection only; in-rack sprinklers are not required. The fire sprinkler system will utilize sprinklers with a K-factor of 25.2 designed to deliver a density of 0.60 gpm/ sq. ft. over a 2,000-sq. ft. area. The sprinkler protection will be adequate for the storage of Class I through IV commodities and unexpanded Group A plastics stored to a height of 22 feet (NFPA 13 Section 21.9.1).

Offices Spaces

Office spaces will have required sprinkler protection for Light Hazard occupancies and will be designed to deliver 0.10 gpm/ sq. ft. over a 1,500-sq. ft. area.

Front Canopy and Gas Canopy

The front canopy is required to be sprinklered. The fuel canopy is not required to be sprinklered.

Food Preparation

The food preparation area will have required sprinkler protection for Ordinary Hazard Group I.

Coolers and Freezers

Coolers and freezers within the facility are protected for a design density of 0.42 gpm/ sq. ft. over a 2,000-sq. ft. area. The POS coolers are protected for a design density of 0.60 gpm/sq. ft. over a 2,000 sq. ft. area. Dry-pendent sprinklers will be required for the coolers and freezers.

WATER SUPPLY

Fire Flow

For buildings equipped with a fire sprinkler system, the water supply is required to be capable of providing the automatic sprinkler system demand including hose stream allowance or the required fire flow (CBC Section B105.3). The most demanding portion of the fire sprinkler system is expected to be in the main warehouse where the sprinkler system will utilize sprinklers with a K-factor of 25.2 designed to deliver a density of 0.60 gpm/ sq. ft. over a 2,000-sq. ft. area for a duration of two hours. In addition, a hose stream allowance of 500 gpm is required. Therefore, the total demand for the sprinkler system is 204,000 gallons.

For a fully sprinklered Type IIB building having an area of 156,298 sq. ft. the minimum required fire flow is 2,000 gpm for a duration of four hours. Therefore, the total water demand based on the required fire flow is 480,000 gallons. Since the water supply based on the required fire flow is larger than the demand for the sprinkler system, the water supply is required to be capable of supplying 480,000 gallons. The water from the city water mains will be capable of providing this water supply.

Fire Hydrants

The building will be fully sprinklered and therefore on-site fire hydrants will be required if a portion of the facility is more than 600 feet from a hydrant on the fire apparatus access road (CBC Section 507.5.1). In addition, a fire hydrant will be required within 40 feet of the fire department connection in accordance with the City of Escondido engineering standards. The required fire flow for the new building will be 2,000 gpm and therefore the minimum of two fire hydrants required (CFC Table C102.1) will be exceeded to comply with the City of Escondido engineering standards requiring hydrants spaced at 350 feet. The maximum hydrant spacing is required not to exceed 225 feet from any point on the street or road frontage to a hydrant (CBC Table C102.1).

Hydrants are required to be maintained in an unobstructed condition (including obstruction from vehicles) (CBC Section 507.5.4). Additionally, a clear space having a radius of three feet is required to be maintained around each hydrant (CBC Section 507.5.5).

Water Supply Analysis

Based on the fire flow analysis performed by WJE and the fire flow test conducted at the site, the water distribution system will be capable of supplying flow and pressure provided in Table 2 below. In addition, the flow test requires a 10% reduction by the local fire authority. The reduced supply flow and pressure is provided in Table 3.

Table 2. Measured water supply

Static Pressure (psi)	Residual Pressure (psi)	Flow at Residual Pressure (gpm)	Effective Point
87	82	1121	200 feet north of Sears Tire Center

Table 3. Measured water supply with required 10% reduction

Static Pressure (psi)	Residual Pressure (psi)	Flow at Residual Pressure (gpm)	Effective Point
78.3	73.3	1121	200 feet north of Sears Tire Center

The City water supply is adequate to meet the required hydrant fire flow of 2,000 gpm. A water storage tank will not be required. Also, the City water supply is adequate to meet the fire sprinkler demand. A fire booster pump is not required.

The available fire flow was calculated as follows:

$$Q_2 = Q_1 \left[\frac{(S - R_2)}{(S - R_1)}\right]^{0.54}$$

Where:

Q_2 = Desired hydrant flow (gpm)

Q_1 = Test hydrant flow (gpm)

S = Static pressure (psi)

R_1 = Test residual pressure (psi)

R_2 = Desired residual pressure (psi)

The calculated fire flow at 20 psi is 4,552 gallons.

FIRE ALARM SYSTEM

The proposed building will have a Group M occupant load exceeding 500 persons and is therefore required to have a manual fire alarm system that activates the occupant notification system (CBC Section 907.2.7). The fire alarm system will consist of monitoring tamper-switches on sprinkler system control valves, sprinkler system flow-switches, duct smoke detectors on air handlers, and manual pull stations. Distinctly different alarm signals are required to be transmitted to a central station for fire alarms, supervisory signals, and trouble signals. Visual and audible notification appliances will be required throughout the building. External fire alarm notification consists of an outside horn and strobe or 10 inch electric bell installed on the exterior side of the sprinkler riser room.

FIRE APPARATUS ACCESS ROADS

The fire apparatus access road is required to extend to within 150 feet of all portions of the facility and all portions of the exterior walls (CFC Section 503.1.1). The fire code official is authorized to require more than one fire apparatus access road based on the potential for impairment of a single road (CFC Section 503.1.2). Access roads are required to have a minimum unobstructed width of not less than 20 feet and an unobstructed vertical clearance of not less than 13 feet 6 inches (CFC Section 503.2.1). The road surface is required to have an asphalt, concrete, or other approved driving surface capable of supporting the imposed load of a fire apparatus weighing 75,000 pounds and to provide all-weather driving capabilities (CFC Section D102). The fire apparatus access road turning radius, grade, and angles of approach and departure are required to be determined by the fire code official. Additionally, the fire code official is authorized to require more than one fire apparatus road based on the potential for impairment of a single road and to require or permit the modification to the access widths where they are inadequate fire or rescue operations. Fire access roads with dead-ends having a length in excess of 150 feet are required to be provided with an approved area for turning around fire apparatus (SCFC Section 503.2.5).

Permanent signs which read NO PARKING – FIRE LANE and have a minimum dimension of 12 inches wide by 18 inches tall with red letters on a white reflective background are required to mark fire apparatus access roads (CFC Section D103.6). For roads that measure between 20 and 26 feet in width, signs are

required to be posted on both sides of the road (CFC Section D103.6.1). Where the road measures more than 26 feet in width, the signs are required to be posted on one side of the road (CFC Section D103.6.2).

CONCLUSION

This report has been prepared for Costco Wholesale to assist in identifying the local code requirements and conditions that may affect the development of the proposed site. It is not considered to be a comprehensive identification of all requirements, provisions, criteria, or local interpretations. It does not relieve design professionals and contractors from complying with the project specifications, design drawings, contracts, and code requirements.