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BILL NO. 5-5-26-3

SUMMARY - An ordinance to amend Title 13, Chapter 04 of the Clark County Code by adding section 13.04.275 relating to the design, operation, maintenance, and commissioning of single lane tunnel systems designated Chapter 42 of the International Fire Code, and providing for other matters properly related thereto.

ORDINANCE NO. _____

(of Clark County, Nevada)

AN ORDINANCE TO AMEND TITLE 13, CHAPTER 04 OF THE CLARK COUNTY CODE BY ADDING SECTION 13.04.275 RELATING TO THE DESIGN, OPERATION, MAINTENANCE, AND COMMISSIONING OF SINGLE LANE TUNNEL SYSTEMS DESIGNATED CHAPTER 42 OF THE INTERNATIONAL FIRE CODE, AND PROVIDING FOR OTHER MATTERS PROPERLY RELATED THERETO.

THE BOARD OF COUNTY COMMISSIONERS OF THE COUNTY OF CLARK, STATE OF NEVADA, DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1. Addition of Chapter 42 to the IFC. Title 13 Chapter 13.04 Section 13.04.275 is designated to be Chapter 42 of the International Fire Code (IFC) which relates to the design, operation, maintenance, and commissioning of single lane tunnel systems. All language in this ordinance that adds to, modifies, or replaces provisions of Chapter 13.04 of the Clark County Code is indicated by underlining. All language in this ordinance that deletes or removes provisions of Chapter 13.04 of the Clark County Code is indicated by strikethroughs. Any text of Chapter 13.04 of the Clark County Code that is not underlined or struck through remains without change. Title 13, Chapter 13.04, Section 13.04.275 of the Clark County Code is hereby added to read as follows:

13.04.275 – Amendments to Chapter 42 of IFC.

Pursuant to 13.04.060, the following subsections add Chapter 42 to the IFC as follows:

A subsection designated “4201” adds Chapter 42 and section 4201 to the IFC to read as follows:

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CHAPTER 42 SINGLE LANE TUNNELS

SECTION 4201–GENERAL

4201.1 Scope. The provisions of this chapter shall apply to *single lane tunnel* design, operation, maintenance, and commissioning. It shall apply to the configuration of the *means of egress*, fire suppression systems, fire alarm and detection systems, emergency ventilation systems, emergency communication systems, monitoring and control of traffic.

For those aspects of fire protection, life safety, and emergency response that are not specifically prescribed herein, the *fire code official* shall have the authority to impose additional requirements to the construction and operation of *single lane tunnels*.

4201.2 Fire protection report. A fire protection report shall be required.

4201.3 Permits. Construction permits shall be required as set forth in Section 105.6 and shall be obtained by the project contractor and installing contractors according to the discrete tunnel segments demarcated by stations.

Operational permits shall be required as set forth in Section 105.5.

4201.4 Electrical wiring and equipment. Electrical wiring and equipment used in connection with *single lane tunnels* shall be installed in accordance with this chapter and NFPA 70.

A subsection designated “4202” is added to the IFC to read as follows:

SECTION 4202–DEFINITIONS

4202.1 Definitions. The following definitions are specific to single lane tunnels and are not found in Chapter 2.

AUTOMATED GUIDEWAY TRANSIT (AGT). A transportation system using vehicles without an on-board driver and guided by remote or autonomous means typically using rubber tires.

BACKLAYERING. The reversal of smoke and hot gases counter to the direction of the ventilation airflow

BLUE LIGHT STATION. An emergency communication station marked by a blue light that is used to communicate with *all operations control centers*.

CRITICAL VELOCITY. The minimum steady-state velocity of the ventilation airflow moving toward the fire within an enclosed *single lane tunnel* that is required to control *backlayering* at the fire site, such that a *tenable environment* is maintained along the path of egress away from the fire.

CROSS PASSAGE. A protected passageway between parallel tunnels constructed for safe egress from a tunnel with compromised tenability to a tunnel in a tenable condition.

LONGITUDINAL VENTILATION. A ventilation approach for normal and/or smoke control modes of operation based on fresh air injected into the tunnel and moving in one direction.

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OPERATIONS CONTROL CENTER. (Also known as a *fire command center*) A constantly manned location of reporting and control of the *single lane tunnel* system using operational data collected by sensors and communication input.

OPERATOR. The operator of the *single lane tunnel* system.

PORTAL. Vehicle entry to or exit from a tunnel section.

SINGLE LANE TUNNEL. A system by which certain, *approved* passenger vehicle(s) travel autonomously or with a trained driver in tunnels constructed as single lane drive aisles, where each *approved* passenger vehicle reports to and is under the control of *operations control center(s)*.

STANDPIPE VAULT. A vault used to conceal standpipe hose connections installed below the roadway surface so that the transportation roadway surface is not interrupted.

TENABLE ENVIRONMENT. An environment that can support human life as measured by an ambient temperature of less than 140°F (60°C), visibility of 30 feet, (9.1 m) and a carbon monoxide level of less than 400 ppm.

A subsection designated "4203" is added to the IFC to read as follows:

SECTION 4203–VEHICLES

4203.1 Allowable vehicles. All vehicle types shall be subject to an approval process wherein they will be evaluated by the *building official* and the *fire code official*. The maximum battery energy for a vehicle operated in the *single lane tunnel* is 123 kilowatt-hours unless *approved* by the *building official* and the *fire code official*.

4203.2 Autonomous vehicles. Each AGT vehicle, autonomous vehicle, or remote-controlled vehicle and the use thereof shall be reviewed by the Clark County Fire Department, Clark County Fire Prevention and Clark County Building Department and *approved* by the Clark County Manager.

4203.3 Speed control. All vehicles in tunnels shall be operated in accordance with the posted speed limits approved by the *fire code official*. The *operator* shall provide a monthly report to the *fire code official* of all vehicles that exceeded the posted speed limit in the prior month and the actions taken to address any speed violations.

4203.4 Maximum heat release rate. Passenger vehicles that may be conducted through a tunnel shall have a heat release rate of no more than 8 megawatts (MW). Final fire size to be determined based on the performance of the emergency ventilation system.

4203.5 Prohibited fuels. Hydrocarbon based fuels shall be prohibited for passenger transport.

4203.6 Tunnel clear width. The minimum width of a tunnel shall be the width of the largest *approved* vehicle, inclusive of side mirrors and other vehicle projections, plus an unobstructed clear width graduating from 24 inches (610 mm) at the walking surface to 30 inches (762 mm) at 62 inches (1575 mm) above the walking surface to 17 inches (432 mm) at 80 inches (2032 mm) above the walking surface.

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4203.7 Additional review. The *building official* and the *fire code official* reserve the right to additional reviews and requirements due to evolving technologies and uses of the *single lane tunnel* systems.

A subsection designated "4204" is added to the IFC to read as follows:

SECTION 4204–SINGLE LANE TUNNEL DESIGN

4204.1 Signage.

4204.1.1 Portal access signs. The destination of each tunnel shall be marked at the entrance to each *portal* with a permanent sign with plainly legible letters not less than 6 inches (152 mm) high and principal strokes at least ¾-inch (19 mm) wide.

4204.1.2 Pedestrian, bicycles and motor-driven cycles prohibited. Signage shall be provided at each *portal* entrance stating "Pedestrians, Bicycles, Motor-driven Cycles Prohibited."

4204.1.3 Tunnel signs. Tunnel signs shall be provided in tunnels at 82-foot (25 m) intervals and shall comply with the requirements of NFPA 130 and the requirements of this section. The signs shall be placed in a consistent location as *approved* by the *fire code official*.

Tunnel signs shall be a minimum of 18 inches (457 mm) wide by 12 inches (305 mm) tall and include the following information:

1. Identifier (tunnel name) and position within the tunnel, minimum 2-inch (51 mm) text.
2. The nearest exit identifier in both directions of travel, minimum 2-inch (51 mm) text.
3. Travel distance to exits, minimum 1-inch (25 mm) text.

4204.1.4 Blue light station signs. *Blue light station* signs shall be provided at each *blue light station* and shall comply with the requirements of NFPA 130 and the requirements of this section.

Blue light station signs shall be a minimum of 18 inches (457 mm) wide and 10 inches (254 mm) tall and include the following information:

1. Name of the tunnel segment, minimum 1 1/2-inch (38 mm) text
2. The nearest exit identifier in both directions of travel, minimum 1 1/2-inch (38 mm) text.
3. Travel distance to exits, minimum 1-inch (25 mm) text.

4204.1.5 Exit signs. Exit signs shall be provided at *exits* and *exit access* doors in accordance with Section 1013 and the *International Building Code*.

Exception: Exit signs shall not be required at *portals* where open to sky.

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4204.1.6 Outdoor portal and ramp signs. Outdoor portal signage shall be installed in accordance with the *approved* tunnel identification plan and as required by the *fire code official*.

4204.1.7 Hazardous materials prohibited. Signage indicating the prohibition of *hazardous materials* shall be located at *portals*, stations, and other areas required by the *fire code official*.

4204.2 Means of egress. *Single lane tunnels* shall be provided with an *approved means of egress* system in accordance with this section and Chapter 10.

4204.2.1 Tunnel exit access travel distance. The distance between *exits* within a tunnel shall not exceed 1,250 feet (381 m). For the purposes of this section, *exits* shall be directly to grade or directly open to sky.

Exceptions:

1. The distance between *exits* directly to grade or directly open to sky within a tunnel shall not exceed 1,800 feet (548 m) when *approved* fire department response vehicle(s) are provided in accordance with Section 4211.
2. The distance between *exits* directly to grade or directly open to sky within a tunnel shall not exceed 2,500 feet (762 m) when the following are met:
    2.1. *Approved* fire department response vehicle(s) are provided in accordance with Section 4211.
    2.2. *Cross passages* in accordance with Section 4204.3 are provided or *areas of refuge* in accordance with Section 4204.4 are provided.

4204.2.2 Escalators. Escalators used as a component of the *means of egress* shall comply with the requirements of NFPA 130.

4204.2.3 Illumination. Illumination shall be provided for *single lane tunnels* at all times and shall produce not less than 1 footcandle (11 lux) at the walking surface under normal and emergency power.

4204.2.4 Illumination under emergency power. *Single lane tunnel* illumination under emergency power shall be provided for a minimum duration of 2 hours or as determined by the rescue scenario.

4204.2.5 Luminous egress path markings. Luminous egress path markings shall be provided for *cross passage*, *area of refuge*, and *exit* doors. Luminous markings shall be in accordance with Section 1025.4, and where applicable, Section 1025.5. Luminous markings shall be installed in accordance with Sections 1025.2.6.1 through 1025.6.2.3.

4204.3 Cross passages. Where *Cross passages* are provided between twin bore tunnels, they shall comply with the requirements of this section.

4204.3.1 Exit access distance. *Cross passages* used as *exits* in accordance with exception #2 of Section 4204.2.1 shall be located within 1250 feet (381 m) from an *exit* directly to grade, directly open to sky, or another *cross passage*.

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4204.3.2 Construction. *Cross passages* shall be constructed as smokeproof enclosures separated from tunnels by 2-hour fire-resistance rated construction. Penetrations, joints and voids, opening protectives, and ducts and air transfer openings shall be in accordance with Chapter 7 of the *International Building Code*.

4204.3.3 Clear width. *Cross passages* shall maintain a minimum clear width of 44 inches (1118 mm) from finished floor to a height of 80 inches (2032 mm) above finished floor.

4204.3.4 Doors. *Cross passage* doors shall be 1-1/2-hour smoke doors.

4204.3.4.1 Door sizing. Doors shall be sized to accommodate a wheelchair.

4204.3.4.2 Door hardware. *Cross passage* doors shall be provided with *panic hardware* or *fire exit hardware* with self-closing devices capable of closing while the tunnel emergency ventilation system is operating.

4204.3.5. Pressurization requirements. Each *cross passage* shall be pressurized to maintain a minimum positive pressure of 0.10 inch of water (25 Pa) with respect to adjacent tunnels and occupied spaces while emergency ventilation systems are operating.

4204.3.6 Forces to unlatch and open doors. Each *cross passage* door shall require not more than a 30-pound (133 N) force to be set in motion and shall move to a full-open position when subjected to not more than a 15-pound (67 N) force as measured while emergency ventilation system and pressurization equipment is operating.

4204.3.7 Illumination. Illumination shall be provided throughout each *cross passage* at times the *cross passage* is occupied and shall produce not less than 1 footcandle (11 lux) at the walking surface under normal and emergency power.

4204.3.8 Blue light station. A *blue light station* shall be provided within each *cross passage*.

4204.3.9 Emergency power. Emergency power shall be provided for illumination, pressurization systems, and *blue light stations*.

4204.3.9.1 Duration. *Cross passage* emergency power shall be provided for a duration as determined by the rescue scenario and as required by the *fire code official* but shall not be less than 2 hours.

4204.4 Areas of refuge. Where *areas of refuge* are provided, they shall comply with the requirements of this section.

4204.4.1 Exit access distance. *Areas of refuge* used as *exits* in accordance with exception #2 of Section 4204.2.1 shall be located within 1,250 feet (381 m) from an *exit* directly to grade, directly open to sky, or another *area of refuge*.

4204.4.2 Construction. *Areas of refuge* shall be constructed as smokeproof enclosures separated from tunnels by 2-hour fire-resistance rated construction. Penetrations, joints and voids, opening protectives, and ducts and air transfer openings shall be in accordance with Chapter 7 of the *International Building Code*.

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4204.4.3 Size. Each *area of refuge* occupant load shall be determined by the sum of the passengers, including drivers or operators, from two vehicles at maximum capacity. The *area of refuge* shall be not less than 5 square feet (0.46 m^2) per occupant plus an additional wheelchair space area of 30 inches by 52 inches (762 mm by 1321 mm) or 70 square feet (7.53 m^2), whichever is greater, with minimum dimensions of 5 feet by 14 feet (1524 mm by 4267 mm) and a minimum clear height of 80 inches (2032 mm).

Where the required size of an *area of refuge* exceeds 70 square feet (7.53 m^2) and is provided through multiple rooms, each room of the *area of refuge* shall be a minimum of 70 square feet (7.53 m^2) with minimum dimensions of 5 feet by 14 feet (1524 mm by 4267 mm) and a minimum clear height of 80 inches (2032 mm). Each room of an *area of refuge* shall be contiguous with one another. *Approved* openings shall be provided in the contiguous walls to allow free movement between the rooms of an *area of refuge* without the need to leave the *area of refuge*.

Exceptions:

1. Where the ceiling of an *area of refuge* is curved or sloped, the minimum clear height of an *area of refuge* shall be permitted to be reduced by not more than 6 inches (152 mm) over not more than 25% of the required minimum size of the room.
2. For any portion of the *area of refuge* with a clear height of less than 74 inches (1880 mm), the corresponding floor area shall not be counted towards achieving the minimum size or dimension of the room.

4204.4.4 Doors. *Area of refuge* doors shall be 1-1/2-hour smoke doors.

4204.4.4.1 Door sizing. Doors shall be sized to accommodate a wheelchair.

4204.4.4.2 Door hardware. *Area of refuge* doors shall be provided with *panic hardware* or *fire exit hardware* with self-closing devices capable of closing while the tunnel emergency ventilation system is operating.

4204.4.5 Pressurization requirements. Each *area of refuge* shall be pressurized to maintain a minimum positive pressure of 0.15 inch of water (37 Pa) with respect to adjacent tunnels and occupied spaces while emergency ventilation systems are operating.

4204.4.6 Forces to unlatch and open doors. Each *area of refuge* door shall require not more than a 30-pound (133 N) force to be set in motion and shall move to a full-open position when subjected to not more than a 15-pound (67 N) force as measured while emergency ventilation system and pressurization equipment is operating.

4204.4.7 Illumination. Illumination shall be provided in *areas of refuge* and shall produce not less than 1 footcandle (11 lux) at the walking surface and the secondary means of access under normal and emergency power. Illumination shall be controlled from within the *area of refuge*.

4204.4.8 Blue light station. A *blue light station* shall be provided within each *area of refuge*.

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4204.4.9 Drainage. Sufficient drainage shall be provided to accommodate *automatic sprinkler system* and standpipe system discharge, as well as any environmental flooding such as rain or ground water seepage.

4204.4.10 Video camera system. Video camera coverage shall be provided *in areas of refuge*. The video camera system shall display at *operations control centers*.

4204.4.11 Secondary means of access. Each *area of refuge* shall be provided with an *approved* independent means of access to grade. Such access shall be sized to a minimum of 48-inch by 48-inch (1219 mm by 1219 mm), and be provided with an *approved* permanently installed fixed ladder designed for the live loads indicated in Section 1607.10 of the *International Building Code*. Final access to grade from the permanently installed fixed ladder shall be by access hatch. Force required to open the access hatch from the interior shall not be excessive and shall be *approved* by the *fire code official*. The access hatch shall be provided with an *approved* means of opening from the exterior at grade. The operation of the access hatch shall be *approved* by the *fire code official*. Clear, unobstructed access shall be provided between the access hatch at grade and the *public way*.

Exceptions:

1. The *fire chief* shall have the authority to require additional design requirements to the permanently installed fixed ladder including requirements in excess of those indicated in Section 1607.10 of *the International Building Code*.
2. An *approved* secondary means access to grade may include access with a minimum 48” in diameter provided the access includes vertical lift equipment approved by the *fire code official*.

4204.4.12 Ventilation. *Areas of refuge* shall be provided with a fresh air ventilation system.

4204.4.13 Occupant equipment. Facilities for hydration, sanitation, medical, and other support equipment shall be provided for *areas of refuge*.

4204.4.14 Signage. Signage shall be provided identifying the *area of refuge* from the tunnel.

4204.4.14.1 Occupant instructions. Signage shall be provided within *areas of refuge* providing emergency instructions to occupants.

4204.4.14.2 Secondary access signage. Access to the secondary means of access shall be identified by signage within the *area of refuge* and at the *public way*.

4204.4.15 Emergency power. Emergency power shall be provided for ventilation, illumination, *blue light station*, drainage, signage, video systems, traffic control, and any other system necessary to the life safety of the occupants within the *area of refuge*.

4204.4.15.1 Duration. *Area of refuge* emergency power shall be provided for a duration as determined by the rescue scenario and as required by the *fire code official* but shall not be less than 4 hours.

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4204.4.16 Survivability. Emergency power, ventilation, illumination, *blue light stations*, drainage, *fire alarm systems*, and signage shall be protected for survivability from fire within a tunnel.

4204.4.16.1 Duration. The duration of survivability shall be determined by the rescue scenario and as required by the *fire code official* but shall not be less than 2 hours.

4204.5 Emergency ventilation system.

4204.5.1 General. An emergency ventilation system shall be provided for tunnels, subgrade stations, and other areas required by the *fire code official*.

4204.5.2 Design. The emergency ventilation system design shall be proposed through a separate design brief which shall be reviewed for approval by the *building official*, *fire code official* and an *approved* Nevada registered independent third-party engineer qualified for this area of expertise. Chapter 7 of NFPA 130, Section 909 shall be used as reference documents for system design.

4204.5.3 Ventilation flow rate. An emergency ventilation system shall operate at a *critical velocity* sufficient to prevent *backlayering* due to a design fire based on a rational analysis performed by a *registered design professional* and *approved* by *the fire code official*, but not less than 8 MW. This ventilation rate shall be determined by *longitudinal ventilation* fire modeling prepared by a Nevada Registered Professional Engineer working within this area of expertise.

4204.5.4 Duration of tenability. Tenability shall be established in the designated egress zone within 120 seconds after activation of the ventilation system and be maintained for a minimum duration of 2 hours.

4204.5.5 Ramp up time. The emergency ventilation system fan motors shall be designed to achieve their full operating speed in no more than 30 seconds from a stopped position when started. The allowable ramp up time for variable-speed motors is 60 seconds.

4204.5.6 Ventilation flow reversal. In tunnel segments requiring the ventilation to reverse, flow reversal shall be accomplished within 60 seconds or as required based on system components.

4204.5.7 Automatic emergency ventilation system actuation. The emergency ventilation system shall be activated automatically upon a water flow alarm, or fire alarm from the *fire alarm system*.

4204.5.8 Manual emergency ventilation system actuation. The emergency ventilation system shall be allowed to be activated by manual means from an *operations control center* operator.

4204.5.9 Ventilation sound level. Where the sound level of the ventilation equipment exceeds 110 dB, the *fire code official* shall have the authority to require *approved* visual notification.

4204.5.10 Acceptance testing. Acceptance testing of the emergency ventilation system shall be in accordance with the applicable requirements of Section 909.18 or other test method *approved* by the *building official* and/or *fire code official*.

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4204.5.11 Maintenance. The emergency ventilation system shall be maintained in accordance with Section 909.22. An operational permit shall be maintained in accordance with Section 105.5.63.

4204.6 Pressurization systems. Where pressurization is required, pressurization systems shall be designed and installed in accordance with Section 909.

4204.7 Visual indication system. A visual indication system shall be provided at *portals* and in tunnels to indicate the presence of a tunnel alarm condition. The visual indication system shall be *approved* by the *fire code official*.

4204.8 Tunnel driving surface. The tunnel driving surface and roadways leading to tunnels shall be paved with an all-weather surface and shall have a running slope not steeper than 1 unit vertical in 12 units horizontal (8-percent slope) in order to qualify as an *approved means of egress*.

4204.9 Hazardous materials. *Hazardous materials* shall not be located or conveyed within *single lane tunnels*.

A subsection designated "4205" is added to the IFC to read as follows:

SECTION 4205–FIRE SUPPRESSION

4205.1 Water supplies. *Single lane tunnel* water supplies shall be provided in accordance with this section.

4205.1.1. Fire pumps. Fire pumps installed in accordance with NFPA 20 shall be provided as part of the *single lane tunnel* water supply.

4205.1.2 Fire pump service. A single fire pump shall not serve more than 12,500 feet (3810 m) of tunnels.

Exceptions:

1. When *approved* by the *fire code official*, a single fire pump shall not serve more than 12,500 feet (3810 m) of twin-bore tunnels.
2. When *approved* by the *fire code official*, where a second fire pump is provided to serve the same areas as the first fire pump, the distance of tunnels served shall not be limited to 12,500 feet (3810 m).

4205.1.3 Fire department connections. Fire department connections shall be installed in accordance with Section 912.

4205.1.3.1 Locations. Fire department connections shall be located such that each standpipe system, or portion thereof, is dual fed. The first fire department connection shall be provided near each fire pump. Additional fire department connection(s) shall be provided at location(s) *approved* by the *fire code official*.

4205.2 Standpipe systems.

4205.2.1 General. An automatic standpipe system shall be provided for *single lane tunnels*.

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4205.2.2 Installation standard. Standpipe systems shall be installed in accordance with this section, Section 905, and NFPA 14.

4205.2.3 Locations of class 1 standpipe hose connections. Class 1 standpipe hose connections shall be provided in all of the following locations:

1. In every *area of refuge*.
2. In every *cross passage* within 5 feet (1524 mm) of each *cross passage* door leading to a tunnel.
3. In enclosed passageways.
4. At each *portal* location.
5. In every subgrade station providing hose connection coverage in accordance with Section 905.4.
6. In transition shafts and similar areas.
7. In tunnel *standpipe vaults* spaced not greater than 160 feet (48.8 m) apart.

4205.2.4 Tunnel standpipe vaults. Tunnel hose connections shall be provided within a *standpipe vault*. The *standpipe vault* cover shall be flush with the travel surface. The *standpipe vault* cover shall be provided with a blue reflective marker. The design of the *standpipe vault* shall be *approved* by the *fire code official*.

4205.2.4.1 Drainage. Sufficient drainage shall be provided to accommodate the automatic standpipe system discharge and any environmental flooding such as rain or ground water seepage.

4205.2.4.2 Clearance. Hose connection clearances within a *standpipe vault* shall comply with NFPA 14.

4205.2.5 Isolation valves. Isolation valves shall be provided in tunnel standpipes between every 5 hose connections or at spacing not exceeding 800 feet (244 m) whichever distance is shorter.

4205.2.6 Tunnel standpipe design flow. Tunnel standpipe systems shall be hydraulically designed to provide a minimum flow rate of 500 gpm (1900 L/min), 250 gpm (950 L/min) through each of the two hydraulically most remote *standpipe vaults*.

4205.2.6.1 Tunnel standpipe design pressure. The flow rates required by Section 4205.2.6 shall be provided at a minimum residual pressure of 125 psi (8.6 bar).

4205.3 Automatic sprinkler systems.

4205.3.1 Subgrade stations. An *automatic sprinkler system* installed in accordance with NFPA 13 with a minimum design of ordinary hazard group 2 shall be provided for each subgrade station.

4205.3.2 Other areas. An *automatic sprinkler system* installed in accordance with NFPA 13 with a minimum design of ordinary hazard group 1 shall be provided for portal connection spaces and other non-tunnel subsurface areas.

Exception: *Areas of refuge, cross passages*, and dedicated egress shafts.

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Storage and vehicle charging shall be prohibited in portal connection spaces and other non-tunnel subsurface areas.

A subsection designated "4206" is added to the IFC to read as follows:

SECTION 4206–FIRE ALARM AND DETECTION SYSTEMS

4206.1 General. A *fire alarm system* shall be provided for *single lane tunnels*.

4206.1.1 Voice evacuation system. An emergency voice/alarm communications system shall be provided for each enclosed station.

4206.2 Installation standard. *Fire alarm systems* shall be installed in accordance with this section, Section 907, NFPA 72, and NFPA 130.

4206.3 Fire alarm control units. In addition to other fire alarm control units, a fire alarm control unit shall be provided in each *operations control center*.

4206.4 Multi-sensor detection system. An *automatic* fire detection system consisting of multi-sensor detectors providing area detection for smoke, heat, and carbon monoxide shall be provided throughout the following areas:

1. *Areas of refuge*.
2. *Cross passages*.
3. Portal connection spaces.
4. Tunnels.
5. Other areas required by the *fire code official*.

4206.4.1 Detector spacing. Detector spacing in areas other than tunnels shall be in accordance with NFPA 72.

4206.4.2 Tunnel detector spacing. Detector spacing in tunnels shall be in accordance with NFPA 130.

4206.5 Fiber optic linear heat detection system. All tunnels, and similar areas, shall be provided with an *approved* fiber optic linear heat detection system.

4206.6 Valve supervision. Supervision of *automatic sprinkler system* and standpipe system valves shall be in accordance with Sections 903.4.1 and 905.9.

4206.7 Occupant notification. Occupant notification shall be provided in accordance with this section.

4206.7.1 Audible alarms. Audible alarm notification appliances shall be provided throughout *single lane tunnels* to achieve the sound pressure level requirements set forth by Sections 907.5.2.1.1 & 907.5.2.1.2.

> **Exception:** Tunnels, portal connection spaces, *areas of refuge*, *cross passages*, *stairways*, areas dedicated solely to occupant egress.

4206.7.2 Visible alarms. Visible alarm notification appliances shall be provided throughout *single lane tunnels* as set forth by Section 907.5.2.3.

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Exceptions:

1. Tunnels shall be provided with visible notification appliances spaced not greater than 330 feet (100 m) apart.
2. Portal connection spaces.
3. *Stairways*, *areas of refuge*, *cross passages*, and areas dedicated solely to occupant egress.

4206.8 Signal disposition. *Fire alarm system* signals shall be transmitted as follows:

4206.8.1. All *fire alarm system* signals shall be transmitted to each *operations control center*.

4206.8.2. Where a station, single lane tunnel or portion of either are connected to another *facility*, signals necessary to initiate any required responses shall be transmitted to the connected *facility* by an *approved* means.

4206.9 Fire safety functions.

4206.9.1. In addition to other requirements contained throughout this code and NFPA 72, water flow alarm, fire alarm, and carbon monoxide alarm signals shall initiate the following:

1. Occupant notification in accordance with the *approved fire alarm system* input-output matrix.
2. Emergency ventilation system in accordance with the *approved fire alarm system* input-output matrix.
3. *Area of refuge* and *cross passage* pressurization systems in accordance with the *approved fire alarm system* input-output matrix.
4. Vehicle evacuation in accordance with Section 4206.9.2 and the *approved fire alarm system* input-output matrix.
5. Tunnel visual indication system in accordance with Section 4204.7.

4206.9.2 Vehicle evacuation. Upon receipt of a water flow alarm, fire alarm, or carbon monoxide alarm at an *operations control center*, operators shall immediately perform the actions required by the vehicle evacuation plan.

A subsection designated “4207” is added to the IFC to read as follows:

SECTION 4207–OPERATIONS CONTROL CENTER

4207.1 Where required. An *operations control center* shall be provided for *single lane tunnels* and shall be subject to the approval of the *fire code official*.

4207.2 Redundant operations control centers. A redundant *operations control center* shall be provided and shall be subject to the approval of the *fire code official*.

4207.3 Required features. Each *operations control center* shall contain the features required by NFPA 130 Chapters 9 and 10 and the following:

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1. *Approved* fire alarm control unit in accordance with Section 4206.3 with full annunciation capabilities.
2. *Approved* panel containing status indicators and controls for the emergency ventilation system(s).
3. *Approved* panel containing status indicators for the water supply and fire pump system(s).

   Exception: When *approved* by the *fire code official*, a combined graphics panel shall be acceptable containing status indicators and controls for the emergency ventilation system(s) and status indicators for the water supply and fire pump system(s).
4. Status indicators for emergency and standby power systems.
5. Controls for unlocking locked *exit* doors in the tunnel transportation system.
6. Status indicators and controls for air distribution systems, if applicable.
7. A means for viewing full size plans shall be provided in accordance with one of the following:

   7.1. A new worktable with a minimum size of 3 feet by 7 feet (914 mm by 2134 mm) capable of holding plans in an open position.

   7.2. A method *approved* by the *fire code official*.
8. A means for viewing and recording all fire alarm, supervisory, and trouble signals shall be provided in accordance with one of the following, and shall be connected to a UPS battery system and/or an emergency power supply:

   8.1. A printer connected to the fire alarm control panel.

   8.2. A method *approved* by the *fire code official*.
9. An *approved* whiteboard with a minimum size of 3 feet by 4 feet (914 mm by 1219 mm) capable of easy erasure with a marking device and an eraser attached.

4207.4 Proprietary monitoring. Each *operations control center* shall meet the requirements of a proprietary supervising station facility in accordance with Appendix P.

4207.5 Vehicle evacuation plan. A vehicle evacuation plan shall be prepared and maintained for *single lane tunnels*. Vehicle evacuation plans shall be *approved* by the *fire code official*.

A subsection designated “4208” is added to the IFC to read as follows:

SECTION 4208–EMERGENCY POWER

4208.1 Emergency power. Emergency power shall be provided for the features given in Section 4208.3 below. It shall be provided by permanent installations including *approved* separate electrical feeds from the electric utility or an emergency power installation in accordance with NFPA 110.

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4208.2 Fuel-fired equipment. Fuel-fired equipment meeting the requirements of Section 4208 shall not be provided in areas of the *single lane tunnel* that are below grade.

4208.3 Required system connections. The following systems shall be connected to the emergency power systems:

1. All systems necessary to the life safety of the occupants within *areas of refuge*.
2. *Blue light stations*.
3. Closed-circuit television / video.
4. Egress illumination.
5. Emergency communication.
6. Exit signs.
7. Firefighting equipment, i.e. fire pumps
8. *Fire alarm systems*.
9. *Operations control center*.
10. Smoke control / smoke removal systems.
11. Tunnel closure and traffic control.

A subsection designated "4209" is added to the IFC to read as follows:

SECTION 4209–COMMUNICATION SYSTEMS

4209.1 Emergency responder communication enhancement systems (ERCES). *Single lane tunnels* shall be provided with an *approved* emergency responder communication enhancement system in accordance with Section 510.

4209.2 Blue light stations. *Approved blue light stations* shall be provided at the following locations:

1. *Areas of refuge*.
2. *Cross passages*.
3. At each subgrade exit stairway located at the bottom of the stairway.
4. *Approved* locations in subgrade stations.
5. In tunnels located at the halfway point between exits in accordance with Section 4204.2.1, *cross passages*, or *areas of refuge*.

4209.2.1 Installation standard. *Blue light stations* shall be installed in accordance with the requirements for Two-Way Emergency Communications Systems for Rescue Assistance, per NFPA 72.

A subsection designated "4210" is added to the IFC to read as follows:

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SECTION 4210–CONSTRUCTION PERIOD REQUIREMENTS

4210.1 Scope. This section shall apply to *single lane tunnels* in the course of construction, *alteration* or demolition, including those in underground locations. Compliance with NFPA 241 is required for items not specifically addressed herein.

4210.2 Purpose. This section prescribes minimum safeguards for construction, *alteration* and demolition operations to provide reasonable safety to life and property from fire during such operations.

4210.3 Construction access plan. A construction access plan (site map) shall be filed with the Clark County Fire Department. The plan shall show the major features for Clark County Fire Department response including:

1. Fire apparatus access points.
2. Temporary fire department connections including signage.
3. Temporary standpipe hose connections with signage.
4. Mining control center (TBM operational office).
5. Fire hydrants.
6. Electric power sources and disconnects.
7. Overhead power lines.
8. Fuel storage.
9. *Hazardous material* storage.
10. Method of tracking individuals underground (commonly known as a “brass board”).

The plan shall be reviewed and/or modified as required by the *fire code official*.

4210.4 Vertical access. Vertical access elements including but not limited to stairs, scaffolding and ramps and the like shall be reviewed by the Clark County Fire Department and modified if found to be unacceptable for fire and rescue operations.

4210.5 Temporary standpipes. Temporary class I standpipe hose connections supplied from a fire department connection shall be provided. The fire department connection shall be within 100 feet (30 480 mm) of an active private or public fire hydrant. The standpipe system shall be a minimum of 2-1/2-inch (DN 65) pipe that may also be a construction water service line.

4210.6 Communication systems. The construction site, including the tunnel bore shall have Wi-Fi or LTE capability that allows the fire department to communicate via fire department radios.

4210.7 Training and drills. Public safety shall have access to the construction site and tunnels for training and drills at various stages of construction at mutually agreed times with at least one week advance notice. The *operator* shall notify the appropriate public safety agencies of safety critical events i.e. boring machine cutter head interventions within 24 hours of the scheduled event

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4210.8 Notification of hazardous events. The Clark County Fire Department shall be notified of hazardous events within 24 hours of their occurrence. These include, but are not limited to:

1. Cutter head interventions.
2. Flooding.
3. Flammable liquids release, handling or incidents.
4. Environments immediately dangerous to life or health.
5. Events or environments likely to require emergency response; especially technical rescue.

4210.9 Additional safety measures. Additional safety measures shall be provided where required by the *fire code official*.

A subsection designated "4211" is added to the IFC to read as follows:

SECTION 4211–FIRE DEPARTMENT RESPONSE VEHICLES

4211.1 Response vehicles. Where required by Section 4204.2.1 *approved* fire department response vehicles shall be provided at the sole cost and expense of the *operator* to be used exclusively for fire department use, which includes any costs related incurred by the Clark County Fire Department related to use of the vehicle, including but not limited to charging station, if necessary.

4211.2 Vehicle specifications. The *fire chief* shall have the authority to specify all aspects and functions of a fire department response vehicle. Once a response vehicle is *approved* by the *fire chief*, the response vehicle specifications cannot be revised without the *approval* of the *operator*.

4211.3 Vehicle access and storage. The Clark County Fire Department shall have access to any fire department response vehicle including for non-emergencies and shall be responsible for the storage of the response vehicles.

4211.4 Vehicle maintenance. All fire department response vehicles shall be maintained by the *operator* to the satisfaction of the *fire chief*. The cost of maintenance and repair including replacement, if necessary of fire department response vehicles shall be borne by the *operator*, so long as the damage caused was a result of CCFD efforts related to the tunnel transportation system.

4211.5 Number of Response Vehicles. Where required by Section 4204.2.1 the *operator* shall provide one response vehicle for each tunnel segment that exceeds 1,250 feet (381 m) without an *exit* directly at grade or directly open to the sky plus one spare response vehicle.

SECTION 2. If any section of this ordinance or portion thereof is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such holding shall not

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invalidate the remaining sections of this ordinance. It is the intent of the County Commission in adopting this ordinance that no portion or provision thereof shall become inoperative or fail by reason of any invalidity or unconstitutionality of any other portion of provision, and to this end all provisions of this ordinance are declared to be severable.

SECTION 3. All ordinances, parts of ordinances, chapters, sections, subsections, clauses, phrases, or sentences contained in the Code of Clark County in conflict with this ordinance are hereby repealed.

SECTION 4. This ordinance shall take effect and be in force on July 1, 2026 after the publication thereof by title only, together with the names of the County Commissioners voting for or against its passage, in a newspaper published in and having a general circulation in Clark County, Nevada, at least once a week for a period of two (2) weeks.

PROPOSED on the_____ day of _____, 2026

PROPOSED BY: _____

PASSED on the_____ day of _____, 2026

AYES: _____

_____

_____

_____

_____

_____

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NAYS: _____

ABSTAINING: _____

ABSENT: _____

BOARD OF COUNTY COMMISSIONERS
CLARK COUNTY, NEVADA

By: _____
Michael Naft, Chair

ATTEST:

_____
LYNN GOYA, County Clerk

This ordinance shall be in force and effect from and after the 1st day of July, 2026.