

November 17, 2020

LOS ANGELES FIRE DEPARTMENT

RALPH M. TERRAZAS
FIRE CHIEF

November 4, 2020

BOARD OF FIRE COMMISSIONERS
FILE NO. 20-109

TO: Board of Fire Commissioners

FROM: *RMT* Ralph M. Terrazas, Fire Chief

SUBJECT: BOYD STREET INCIDENT REPORT

FOR INFORMATION ONLY: Approved Approved w/Corrections Withdrawn
 Denied Received & Filed Other

SUMMARY

As requested by Commissioner Jimmie Woods-Gray during the August 18, 2020 Board of Fire Commissioners meeting, attached for the Board of Fire Commissioners' review is the Informational Summary Report for the Boyd Incident, which occurred on May 16, 2020.

RECOMMENDATION

That the Board:
Receive and file.

Board report prepared by Chief Alfred Poirier, Emergency Operations Chief Deputy.

Attachment

Los Angeles City Fire Department Informational Summary Report

GREEN SHEET



Injuries/Commercial Structure Fire

**May 16, 2020
Boyd Incident
CA-LFD-001073**

This report is intended as a safety/training tool, aids in preventing future occurrences, informs interested parties, and identifies lessons learned. This Informational Summary Report is prepared and distributed within thirty (30) days following the initiation of a Serious Incident Review Team to investigate a serious incident. Information contained herein is subject to revision as further investigation is conducted and additional information is developed.

SUMMARY

On Saturday, May 16, 2020, at approximately 18:27:00 hours, the Los Angeles City Fire Department (LAFD) responded to a structure fire at 327 East Boyd Street in the Skid Row area of downtown Los Angeles. The first arriving resources found a one-story commercial occupancy with light, intermittent brown smoke showing from the top of two closed rolling steel doors. The subject occupancy was doing business as a wholesale distributor to dispensaries and smoke shops, and it had closed for the day prior to the time of alarm.

Resources from the first alarm assignment secured a water supply, forced entry, deployed hand lines, laddered the building, engaged in fire attack, and initiated timely vertical ventilation operations while in the offensive mode. Due to the excessive storage encountered at the entry point, there was a delay in gaining access; nonetheless, fire attack teams quickly developed a course of action to begin their advance into the structure.

Conditions noticeably worsened over the next several minutes. Initially, members described a notable change in smoke emitting from the front of the occupancy, and then a rapidly increasing “freight train” or “jet-like” sound, accompanied by rapid and escalating “popping-like” noises. Subsequently, companies initiated a rapid retreat—both off the roof and out of the building. As firefighters began initiating their escape, a large volume of smoke ignited, and then immediately following, fire “blowtorched” out of the front of the occupancy, across the street, and out of the rear portion of the roof.

As a result of the catastrophic fire event, just eleven (11) minutes into the incident, twelve (12) firefighters were injured. The injuries were sustained when the firefighters were engulfed by a large volume of fire, some while retreating from interior firefighting positions, and others as they were descending the aerial ladder. All told, eleven (11) firefighters sustained minor to critical burns, and one (1) additional firefighter suffered a lower extremity injury.

Fireground emergency communications, which included both, “Emergency Traffic” and “Mayday” transmissions, were declared on several occasions—moments before the evacuation, during the retreat, and after the fire phenomenon. Immediately after the “blowtorching” fire receded, Company Accountability Reports (CAR) together with Personnel Accountability Reports (PAR) were requested by the IC.

In the moments that followed, injured firefighters along with firefighters working in the immediate area began to effect rescues, account for personnel, and removed Personal Protective Equipment (PPE) for the most critically burned. The burned firefighters were assisted by additional resources arriving on scene into awaiting ambulances. Additionally, a Medical Group was established to triage and transport a total of eleven (11) firefighters to the closest Medical Trauma/Burn Center.

Remaining resources continued to fight the fire defensively, utilizing large diameter hand lines and master stream appliances, until a knockdown was finally determined at approximately 20:08:00 hours.

The cab of the first arriving Truck, with its deployed aerial ladder sustained significant damage, as both were in the immediate path of the flames. The first arriving Engine sustained minor heat damage to the rear of the apparatus due to the fact that the driver had positioned the apparatus past the occupancy. Lastly, multiple tools and equipment were irrevocably damaged or deemed missing as a result of this incident. The total loss is still being tabulated.

NARRATIVE

On Saturday, May 16, 2020 at 18:26:38 hours, Metro Fire Communications (MFC) received multiple 911 calls with reports of smoke coming from a building on Boyd Street in downtown Los Angeles. The first caller provided the specific address of 327 Boyd Street and identified the building as "Smoke Tokes." The dispatcher created the incident and resources from the LAFD were dispatched at 18:27:47 hours (call processing time, one (1) minute and nine (9) seconds). The incident time clock was initiated at the time of alarm and the following resources were dispatched:

- (2) Battalion Command Teams
- (1) Truck Company
- (1) Light Force (Truck Company and 200 Series Engine Company)
- (3) Engine Companies
- (1) Hazardous Material Squad
- (1) Paramedic Rescue Ambulance
- (1) 800 Series Rescue Ambulance

An additional Paramedic Rescue Ambulance (RA) assigned to the district, but not yet attached to the incident, was a few blocks away when they were alerted of the structure fire by an incident notification, phone application. They responded to the incident address, and once on scene, they attempted to provide a still alarm size-up on

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EMS/Administrative Channel 4. MFC instructed the RA to communicate on Administrative/Channel 9 and attached them to the incident at 18:29:50 hours. No other communication was made by the RA.

Resources from the first-in district arrived on scene at 18:30:26 hours (operational response time, two (2) minutes, thirty-nine (39) seconds). The first arriving truck reported a one-story commercial occupancy with moderate smoke coming from the Alpha side. The Truck Captain declared that the resources on scene would be operating in the Offensive Mode and proceeded to assume command as "Boyd IC."



The building was approximately 25' wide by 110' long and located in a row of commercial occupancies. The one-story fire building was flanked by a two-story commercial building to the West (Bravo Exposure) and a four-story commercial building to the East (Delta Exposure). The involved structure was constructed of cinder block walls and was divided into two separate occupancies by a partition wall running from the front to the back (North to South), with a mezzanine in the middle. The store front was secured with two rolling steel doors, identified as Unit A (left side) and Unit B (right side). Closed at the time of alarm, the store was doing business as a wholesale and distribution center for supplies associated with dispensaries and cannabis smoke shops. There was excessive storage present in both of the units, and the building was not sprinklered. (See complete building description and photos under Conditions on page 16)

At 18:30:43 hours, the first aerial ladder truck pulled up to the front of the occupancy, spotted to the outside curb and placed the aerial ladder to the roof of the involved occupancy. The first two engine companies arrived on scene and developed a supply

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line in a two piece configuration from the hydrant to the fire, utilizing a hydrant located at the Southwest corner of Boyd Street and San Pedro Street

The IC (1st Truck) placed the following resources as follows:

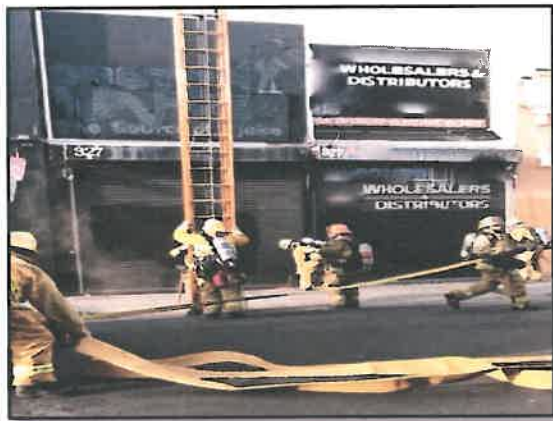
1st Truck – Roof (CII, A/O, TOP, TILL, INS)

1st Engine – Fire Attack (C1, ENG1, HYD1, NOZ1)

2nd Engine – Back up Fire Attack (C2, ENG2, HYD2, NOZ2)

3rd Engine – Delta Exposure

1st 800 Series Rescue Ambulance – Attached with Roof (DRVR8, ATTN8)



The first Engine on scene pulled past the structure, spotted the apparatus in a defensive position, and pulled a running line for supply. Multiple handlines were deployed off the transverse bed, including a 1¾" and 1½" for fire attack, and eventually a 1¾" protection line to the roof. A 35' extension ladder was thrown by the truck company personnel to Unit A and the aerial ladder was placed to the roof, over Unit B.

At 18:31:18 hours, the first arriving Battalion Command Team transitioned command with the first truck on scene and continued with offensive operations, placing the balance of the assignment as follows:

1st Paramedic Rescue – Attached with Fire Attack (DRVR1, ATTN1)

2nd Paramedic Rescue – Medical Group (DRVR2, ATTN2) *Reported to Fire Attack

2nd Truck – Bravo Exposure

Hazardous Material Squad – Standby

2nd Battalion Command Team – Asked to provide a survey lap and assess the exposure on the Delta side

The Inside Member (INS) assigned to the first truck company on scene initiated forcible entry by cutting the bottom bar slide locks on two rolling steel doors on the Alpha side (Unit B first, followed by Unit A), and then rolled up the door to Unit A.





In the order prescribed below, the remaining truck company personnel, consisting of the Tiller Member (TILL), Top Member (TOP), and Apparatus Operator (A/O) ascended the aerial ladder to the roof of the involved occupancy, carrying the roof kits and chainsaws aloft.

Brown smoke was seen filling the street as it pushed out of Unit A. In front of the structure fire attack teams donned their facepieces and prepared to deploy their hose lines.



At 18:33:04 hours, Fire Attack made access to Unit A and stated, "... it looks like it's going to be coming from the door on the right." Excessive storage in Unit A forced Fire Attack resources to look for another means of access.



A decision was made to wait for Unit B to be opened in order to determine if there was better access.

At 18:34:00 hours, difficulties in opening the Unit B slide locks caused INS to decide to cut the rolling steel door to make entry. INS and the Hydrant Member (HYD3) from the third Engine Company began making a three-sided cut on the Unit B door. Heavier brown smoke started to pour out of Unit A.

Resources assigned to exposures described the smoke as acrid and gag inducing, resulting in multiple firefighters donning their facepieces and going on air, in front of, and adjacent to the involved structure.

As the roof team transitioned from the aerial ladder to the roof of the involved occupancy, moderate, lazy smoke was observed on two fronts—emanating primarily from the alley on the Charlie side as well as from the small, lengthwise gaps that ran between the fire building and the taller Bravo and Delta exposures. Additionally, a roof vent adjacent to the parapet, towards the rear on the Delta side, also showed smoke ventilating with pressure.



At 18:33:40 hours, A/O made an inspection cut and small hole towards the Alpha/Bravo corner, out of the way of the path of travel. Once completed, pressurized, brown smoke exited out of the hole.

The roof structure was comprised of pre-fabricated wooden “1” beam joists, spaced approximately 12 inches on center, double stemmed every 4 feet, and resting on galvanized joist hangers. The roof decking consisted of plywood with rolled composition and was supported by nailing blocks spanning every 4 feet. The joists were also supported by the partition and pony wall that separated the two occupancies.

At 18:34:08 hours, the roof team sounded out toward the center of the roof, making their way toward the back of the structure. The A/O observed smoke emitting from a roof vent and decided to begin cutting the ventilation hole approximately 65’ to 70’ in from the Alpha side.

The initial heat hole was cut approximately 8’ long by 2’ wide, capturing the roof over both Unit A and Unit B. As the roof team pulled the material, pressurized brownish-grey, and sometimes what was described as, “clear” smoke, billowed from the hole and pushed toward the North (Charlie side) away from the roof team.



Firefighters from the 800 Series RA (DRVR8 and ATTN8) followed by the Truck Captain (CII) ascended to the roof and joined up with the ventilation team. DRVR8 threw a drop bag from the roof to pull up a protection hose line. The Engineer (ENG2) attached a 1¾" hose line to the drop bag and ensured the line went aloft.



At 18:34:42 hours, the IC asked Fire Attack what type of fire load was in the occupancy and what type of business it was.

At 18:34:50 hours, describing Unit B, Fire Attack responded with the following: "We've made access. We have floor to ceiling of product. We're trying to find an entrance. It's going to be real hard for us to get in. We have a moderate amount of smoke right now coming out of the Alpha side, both entrances."

After forcible entry was completed on Unit B, Fire Attack was confronted with an extensive amount of shelving and merchandise stacked up against the rolling steel door. With no viable access, Fire Attack decided to initiate their attack through Unit A.

As a result of the excessive storage and challenges with forcible entry, Fire Attack was delayed approximately six (6) minutes from the time the first resource arrived on scene.

At 18:35:10 hours, resources assigned to back up Fire Attack, which consisted of five (5) members (NOZ2, DRVR2, C2, HYD2, and ATTN1), progressed into the involved structure ahead of the assigned Fire Attack company (NOZ1, C1, HYD1) through Unit A. As they advanced into the occupancy, they experienced heavy brown smoke at the ceiling, with moderate visibility and low heat.

The aisleyway to Unit A was approximately 42" wide and was strewn with boxes and copious amounts of melted candle wax. The cluttered aisle was lined with commercial storage racks on either side. In the front, they were loaded with boxes, stacked to the ceiling, comprised of glass jars, candles, vapes, pre-rolled cones and various smoking products. In the rear portion of the occupancy, pallets of boxes blocked the aisleyway.



At approximately 10' to 15' into the structure, the fire attack team encountered a metal 6 step rolling ladder, which took up most of the aisleway. They shuffled around the moveable step ladder, and C2 asked for the ladder to be removed to the exterior. Multiple firefighters attempted to transfer the rolling ladder behind them; however, the ladder never made it outside. A minimum amount of water was flown from the 1¾" hose line, as the seat of the fire was never found. A long pike pole was used to check for extension and it was determined that a mezzanine existed over the middle of the unit, leading Fire Attack to believe the fire was above the mezzanine.

At 18:35:23 hours, a firefighter (EIT) from the second arriving Battalion Command Team communicated to the IC to order more resources.

At 18:35:28 hours, the IC ordered two additional tasks forces.



As the roof team extended the initial heat hole, Roof Division communicated with Fire Attack, "Fire Attack from roof... open up your streams. Aim them to the ceiling on the Charlie side... aim toward the Charlie side." The message was not answered and as a result, the IC clarified the message with Roof Division and then relayed the message to the fire attack team.

At 18:36:58 hours, the back-up Fire Attack team and remaining firefighters (DRVR1, ATTN2, and INS) advanced an 1½" hose line behind Fire Attack, pulled hose, and removed boxes and single sheets of oriented strand board (OSB) that was blocking the entrance.



At 18:37:00 hours Fire Attack stated, "Fire Attack copies, we're working our way back there."

At 18:37:30 hours, Roof Division communicated with the IC and stated, "IC from Roof Division... you have exposures to the Bravo and Delta side. We have a hole opened up. We're getting heavy fire out of our hole toward the Charlie side." The original ventilation hole, after being extended twice, was cut to approximately 8' long by 6' wide.

Heavy fire pushed out of the ventilation hole, forcing the roof team to back away from the operation. Deciding to don structural gloves at this point, A/O gave the chainsaw to TILL and provided direction for TILL to start a new ventilation hole approximately 6' back from the initial heat hole and to work against construction. TILL initiated a new ventilation hole and the roof team began to pull the material. Pressurized smoke surged from both ventilation holes and the flames that followed were approximately 20' to 30' high.



At approximately 18:38:00 hours, while extending the second hole, the roof team heard sounds coming from inside the structure. Initially, they described hearing loud, "popping-like" noises that escalated rapidly in volume and frequency. In a matter of seconds, the "popping" noises were accompanied by a "jet-like" rumble. The members described physically feeling the roof vibrate as the sound grew louder. The A/O decided it was time to retreat and backed the roof team away from the hole. DRVR8 opened up the 1¾" hose line on a straight stream, directly into the smoke and fire coming from the hole. The roof team — at the direction of A/O and CII — retreated to the Alpha side of the roof back toward the aerial ladder and 35' extension ladder.

At 18:38:08 hours, Fire Attack stated, "We're going to be delayed getting to the seat of the fire."

18:38:15 hours, MFC communicated to the IC that 10 minutes had elapsed in the incident.

At 1838:24 hours, the Engineer (ENG1) ran up to C1, grabbed him and stated, "We got fire, heavy, heavy black smoke coming from the back." C1 backed up into the street to visualize the conditions being described.



At 18:38:30 hours, CII walked back towards the Alpha side from the middle of the roof and stated, "IC from Roof." There was no response from the IC.

At 18:38:40 hours, CII looked over the parapet near the 35' extension ladder and communicated, "Emergency Traffic, Emergency Traffic."

As conditions on the roof worsened, the roof team began hurriedly, grabbing their tools and equipment. CII yelled at the roof team to leave the tools and get off the roof. The firefighters, one by one, pulled themselves onto the aerial ladder in the following order: ATTN8, DRVR8, TILL TOP, A/O, CII. ATTN8 climbed on first and then DRVR8 climbed on next and then slid the hand rail backwards to make room for TILL. TOP used the opposite side of the aerial so that A/O could climb on at the same time. CII eventually transitioned to the aerial ladder and was the last one off the roof.



On the inside of the structure, about 5' to 10' beyond the rolling step ladder, Fire Attack heard "popcorn-like" noises that escalated quickly in both volume and frequency. The environment darkened and shortly thereafter, a "jet-like" sound began to crescendo within the structure. At that moment, multiple firefighters started to yell, "Get out!" As the C2, NOZ2, DRVR2, HYD2, ATTN1 and NOZ1 began to turn around, fire began to encapsulate them and blowtorched past them, out through the portal. Firefighters inside ran toward the exterior openings on the Alpha side.

The firefighters who had advanced the deepest into the structure now found themselves trapped by the rolling step ladder. As they fought to escape, they crawled through boxes and shelving. Eventually, each member beyond the step ladder was able to force their way around the step ladder and out to the curb, as fire continued to race past them.



At 18:38:42 hours, in the front of the building, “dirty” black smoke pushed out from Unit A across the street, enveloping the firefighters operating in front of and adjacent to the involved occupancy. As they backed up from the entrance, the smoke ignited, sending approximately 30’ flames across the street and into the air.

As the smoke ignited and began to roll out of the Alpha side, fire began to appear from a rolling steel door on the Charlie side of Unit A, and rapidly expanded into an evolving fire ball. Small containers of nitrous oxide chargers ruptured, shot through the roof as well as out of the Charlie portal.

DRVR8, TILL and ATTN8 rapidly descended the aerial ahead of the deteriorating conditions and found temporary refuge on the trailer of the truck.

At 18:38:50 hours, EIT2 positioned on the street just to the west of the involved structure communicated, “Mayday, Mayday, Mayday.”

At 18:38:52 hours a Battalion Emergency Medical Services (EMS) Captain requested to be attached to the incident with MFC on Administrative/Channel 9.



On the Alpha side, flames disappeared momentarily and the smoke appeared to temporarily diminish. Then without warning, an enormous fire ball blowtorched out of the structure reaching across the street. The fire ball emanated from the front of Unit A, followed by Unit B. Fire was seen reaching the buildings across the street and rising into the atmosphere approximately 60’ high above the roof line. It scorched everything in its path, including the Truck and the rear portion of the Engine.

At 18:39:00 hours, the IC initiated the Emergency Tones for approximately 7 seconds followed by, “Mayday! Mayday! Mayday! All companies off, out of the building! Mayday! Mayday! Mayday! All companies we have a Mayday situation!”

As the fire engulfed the interior fire attack teams and blowtorched out of the units, C1 was outside the occupancy after being warned by ENG1. HYD1 and ATTN2 were close to the exit and were forced out across the street. ATTN1 and HYD2 had fire blow past them as they crawled to escape the intense heat. Deeper into the interior, DRVR2 maneuvered around the rolling step ladder, crawled through the flames and was pulled from the Alpha side portal into the street. NOZ1 negotiated the same step ladder and found the cinder block wall to reference for escape. NOZ2 crawled over boxes, struggled with the ladder and crawled to the portal to be pulled out by other firefighters. C2 was the last one out and managed to squeeze past the rolling step ladder and crawl through the excess storage until an awaiting firefighter pulled him out from inside the structure.



As the remaining roof team mounted the aerial ladder, flames completely engulfed the rungs, cutting off their escape. TOP descended the aerial ladder with the chainsaw. As he attempted to step on each rung, the concussive force that followed the fire ball caused his foot to slip under the rung and halted his progress. At that moment, he was enveloped by the fireball. At the same time, A/O and CII transitioned from the

roof and moved quickly down the aerial ladder behind him. CII and A/O caught up with TOP who was struggling to get loose from being trapped in the rungs. CII ran into A/O and propelled him into TOP, who had broken free and resumed his descent on the rungs. TOP fell once again as A/O unintentionally toppled over him from behind.

As TOP and A/O attempted to get free from being entangled with each other, their axes became wedged in the aerial ladder. One of the axes splintered from the force and one scabbard separated from the leather belt, leaving the axes wedged on the aerial ladder. Entangled with each other, TOP and A/O forcefully pushed themselves down the rungs until they both ended up face down in the aerial ladder. At the same time, CII fell into the ladder face first after missing a step and all three were engulfed in intense fire for several seconds. Due to the intense heat, several drop bags melted and fell to the ground. Even though TOP and A/O were still entangled, they managed to fight their

way down the aerial, each of them falling out onto the turntable deck. Eventually, CII was able to stand up and walk the remaining portion of the aerial ladder until he paused and sat down on the rungs at the base of the aerial.



The extreme fire phenomenon lasted for approximately 45 seconds before it receded back into the structure. Intense fire conditions continued to show from the roof and Charlie side for the next minute.



At 18:39:17 hours, the Battalion Chief (BC2) from the second arriving Battalion Command Team stated on Command/Channel 11, "We're going to need a lot of companies. We're going to need some rescues."

At 18:39:20 hours, the IC stated, "All companies, engage in a PAR and CAR!"

Firefighters from the interior came out one by one. At the turntable of the Truck, TOP was pulled by TILL and jumped from the turntable deck to the ground. TILL reached up and pulled A/O off the pedestal onto ATTN8 and then assisted CII down the rest of the aerial ladder. CII descended from the turntable to the ground.



The A/O from Squad (A/O2) and ENG1 utilized available hand lines to carefully spray down and cool burned firefighters prior to their transition to awaiting ambulances.

At 18:40:00 hours, the IC stated, "All companies on the Boyd incident we need to conduct an immediate PAR and CAR."

C1 communicated a "Mayday" and reported multiple firefighters down. The number increased from two (2) firefighters and then, in a subsequent radio message, to ten (10) downed firefighters. The IC communicated that a Medical Group was being established and help was on the way.

At 18:40:33 MFC dispatched multiple resources to support the incident.

Continued requests from the IC for a PAR for the Truck Company, went unanswered.

Injured firefighters made their way to the intersection of Boyd Street and San Pedro Street where a Medical Group was established. Some firefighters were assisted by arriving resources and were carried down the street. Others were assisted in walking down the street, with the most critical firefighters being placed on gurneys.

A police escort was established and EMS facilitated communication with the receiving hospital. All eleven (11) burned firefighters were loaded into three (3) RA's, including one in the driver and passenger seat of the front cab and driven to the closest Medical Trauma/Burn Center.

Remaining resources continued to fight the fire and a knockdown was established at 20:08:00 hours.

CONDITIONS

At the time of the incident, the temperature was approximately 75 degrees with a wind out of the West at 6 mph. The business was closed at the time of the fire.

Call processing times and operational response times were better than average. Crew continuity was strong. Most of the members assigned to the first alarm were working at their regular assignment or had years of experience at the assignment previously, or in the surrounding Battalion. Drivers were familiar with their routes and responded expeditiously. Company discipline was evident and Standard Operating Guidelines were followed. Supervisors were knowledgeable of the district and effectively communicated the conditions of the incident. The IC was the normally assigned Battalion Commander.

According to the Los Angeles Department of Building and Safety (LADBS), records and permits indicate that the structure was erected as new construction, on or about July 28, 1998. Building permits showed a plot plan with an original footprint of 25' wide by 94' deep and approximately 24' high.

The building was divided into two separate occupancies, separated by a partition wall that ran North to South (front to back), comprised of 2'x6' members and sheeted with dry wall that extended to the bottom of the wooden "I" beam joists. The spaces above the wall and between the joists were not blocked off, causing horizontal openings between the two occupancies. Both occupancies were outfitted with commercial grade storage racks that were being used to hold excessive storage.

An unpermitted addition was added to the rear of the structure that was approximately 18' in length and approximately 25' in width. The addition had a roof line that was 7' lower than the original building roofline. The roof supporting members were comprised of eight (8) open web bar joist trusses, approximately 6" - 8" in height. The rear wall of the addition appeared to be constructed with steel beams and an "I" beam header as the main structural component, protected by a stucco exterior.

The subject address was not found in the LAFD Fire Prevention database and records of inspection were never completed.

The fire phenomena event that trapped and simultaneously injured 11 Firefighters is attributable to the involved fire units containing large, "live" fire loads of pallets, cardboard boxes, smoking and dispensary products and supplies, butane (C₄H₁₀), nitrous oxide (N₂O), and the lack of a sprinkler system.

The cause of the fire – which originated in ordinary combustibles – is under active investigation by the LAFD Arson Section and the United States National Response Team (NRT).

Although this fire could initially be classified as a routine ventilation limited structure fire, the excessive quantity of N₂O along with smoking and dispensary supplies and products changed the normal fire progression and made this a unique and extraordinary event.

Since the two units were separated by an unpermitted partition wall that lacked fire blocking at the roofline, the fire was able to quickly communicate between joists to the neighboring unit. The fire continued to preheat and consume all available fuels in both units, including stored butane and ordinary combustibles, causing the large storage of N₂O chargers to rupture.

The release of the oxidizer (N₂O) into the fuel rich atmosphere created a volatile chain of events that caused the spontaneous release of N₂O from their containers, supplying the necessary amount of oxygen to support the type of event witnessed at the Boyd Street incident. The incredibly large, violent release of energy was the result of rapidly expanding water vapor, carbon dioxide and extreme heat.

The ventilation team executed several large ventilation openings over the seat of the fire. Nevertheless, no amount of vertical ventilation on the 110' x 25' roof would have been able to safely release the amount of energy and fire that occurred, nor is it likely to have changed the outcome of this fuel and oxidizer driven event.

The Bravo and Delta walls of the occupancy were constructed of cinder block, with no openings for the blast energy to escape or be absorbed. Although the rear of the structure had suffered some damage from exploding butane and direct fire impingement prior to the event, forcible entry had not occurred.

In addition to the ventilation holes, the only other openings for which the large, rapidly expanding heat energy could escape were the occupancy openings at the front of the structure. The rolling steel doors were completely opened; however, excessive storage conditions created small, restricted aisles and narrow openings.

The evidence suggests that this configuration created a “nozzle-like” effect that funneled the intensified energy out of the front of the structure—while firefighters were attempting to retreat from the interior and off the roof.

An extensive search of the structure determined that at the time of the fire, the occupancy contained floor to ceiling storage of dispensary products and supplies, butane, and the presence of large quantities of N₂O chargers.

Based on the investigation, it is estimated that the involved units contained hundreds of butane cartridges and thousands of 8 gram N_2O chargers.

The Boyd event was an extremely violent, hot, and rapidly expanding fire due to the abundant fuel supply in the form of smoke (carbon monoxide/ CO), plastics, butane, and N_2O . Of particular concern was the extremely large quantity of the N_2O .

Although N_2O is a non-combustible gas, N_2O , when heated, will decompose creating an exothermic reaction. During the decomposition phase, its compounds split releasing oxygen (O_2), and nitrogen (N_2). If N_2O is mixed with a fuel source it will also create a rapidly expanding pressure wave of carbon dioxide (CO_2) and water vapor (H_2O).

The small N_2O cylinders found on scene of the Boyd incident contained approximately 8 grams each of net product and have been known to release their contents in temperatures as low as 106 degrees Fahrenheit. As the fire intensity and pre-heating increased, the release of the N_2O increased. The temperature around the N_2O storage was approximately 400 – 900+ degrees Fahrenheit early into the event.

According to industry experts, when large quantities of product contained in the cylinders are stacked in quantity and exposed to heat, they can release or explode from the outer edges of the storage configuration, working inward until a critical temperature is reached. This can cause a simultaneous release of a large portion of the product to occur with violent results.

The rapidly occurring chain reaction of the heated, fuel rich environment and rapidly increasing supply of N_2O were likely the source of the “popping-like” noises and rumbling energy that many firefighters on scene of the incident reported hearing, deep within the structure, just prior to the fire event.

In contrast, a fire in this type of occupancy of ordinary combustibles would progress and free burn - utilizing all available fuel and oxygen until it begins to run out of either fuel or oxygen. If the occupancy had high amounts of storage (fuel) and limited airflow, it would become a ventilation limited fire, where the fire begins to slow until a source of oxygen is introduced. In extreme cases, a back-draft can occur if an opening is created at street level prior to vertical ventilation operations being completed. Other well-documented phenomena of these types of fires are flashover, flame-over or smoke explosion.

At this incident, the fuel rich environment's demand for oxygen was supplied by way of the oxidizer (N_2O) thus minimizing the necessary flow-path dependent supply to allow the fire to progress. In essence, the Boyd Fire was likely a self-generating, rapidly

building event that did not respond to conventional firefighting flow-path control and ventilation methods.



Alpha side looking toward the Delta exposure



Alpha side looking toward the Bravo exposure



Alpha side looking into Unit A



Alpha side looking into Unit B



Alpha side looking into Unit A



Alpha side looking into Unit B



Charlie side looking towards the Bravo exposure



Charlie side looking towards the Delta exposure



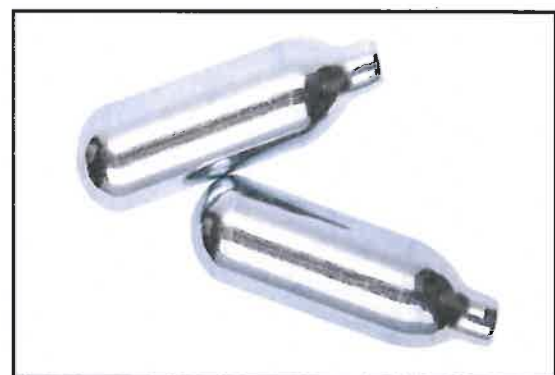
Charlie side looking into Unit B



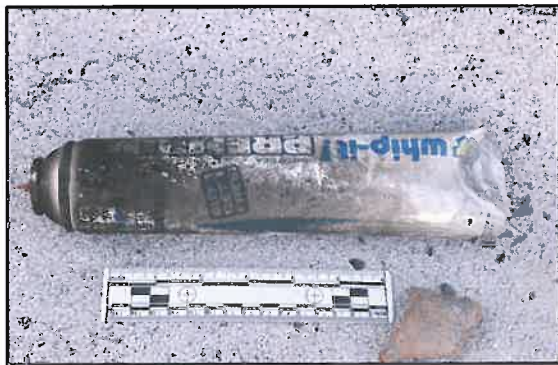
Charlie side looking into Unit A



Spent Nitrous Oxide Chargers in Unit B



Nitrous Oxide Chargers 8oz.



Butane Canisters



Spent Nitrous Oxide Chargers



Butane Canisters in Unit B



Spent Nitrous Oxide Chargers in Unit B



Contents in Unit A



Nitrous Oxide Chargers on Bravo exposure roof



Perspective of roof from Bravo exposure looking back towards the Alpha side



Perspective of roof from Bravo exposure looking back towards the Charlie side



Perspective looking back towards Alpha



Perspective looking at Bravo rooftop

INJURIES/DAMAGES

A total of 12 firefighters were injured. Injuries ranged from partial thickness to full thickness burns, respiratory involvement, and one member suffered a lower extremity injury. Significant heat damage to one Aerial Ladder Truck and minor heat damage to the rear of one Engine Company was sustained. Multiple tools were either unrecoverable or significantly damaged. Personal Protective Equipment (PPE) including: Turnout Ensemble, Self-Contained Breathing Apparatus, Portable Radios and Thermal Imaging Cameras are currently being tested and findings will be provided in a later report.

All PPE from the injured members were collected, cataloged and inspected. The PPE were displayed on a mannequin and photographed to capture normal positioning on a body. A majority of the injured members showed signs of direct thermal impingement on multiple components of the PPE ensemble.

The following is a list of the members with associated burns:

CII	Burns to: Head, shoulder, both hands, both calves
AO	Burns to: Right ear, right arm, right hand, both calves
TILL	Burns to: Left ear, left hand
TOP	Burns to: Lower back, both arms, right hand, left foot
Cl2	Burns to: Head, both ears, shoulders, back, both hands
NOZ2	Burns to: Head, back, both arms, right leg
HYD2	Burns to: Left hand
NOZ	Burns to: Head, back, both arms, both hands, both legs
ATTN2	Burns to: Head, back, both arms, both hands, both legs and buttocks
ATTN1	Burns to: Ears and back
DRVR1	Burns to: Right hand



Aerial Ladder placement



Aerial Ladder Truck placement



Aerial Ladder Truck Tractor and Trailer damage



Aerial Ladder Truck Exterior Cab damage



Aerial Ladder Truck Interior Cab damage



Aerial Ladder Truck Interior Cab damage



Aerial Ladder and Equipment damage



Aerial Ladder damage



Engine placement



Engine hose cover damage



Engine hose cover damage



1 3/4" hose line damage



Drop bag damage



35' Extension Ladder damage

SAFETY ISSUES FOR REVIEW

- Review the appropriate donning of Personal Protective Equipment during emergency operations, which includes all issued turnout-coats, turnout-pants, turnout-boots, firefighting helmets, firefighting hoods, firefighting gloves and SCBA facepieces with voice amplification systems.
 - Toxic smoke exposure continues to be the main cause of injuries and death and in the fire service. It is the long-term effects of these exposures that have a significant consequence on firefighter health. Materials have changed over time and the variability of products of combustion have become more toxic. (A. Purser, Robert L. Maynard, James C. Wakefield, 2016 *Toxicology, Survival and Health Hazards of Combustion Products*) It is the unexpected and the potential consequence that we must prepare for. These environments are identified as an *Immediately Dangerous to Life or Health* (IDLH) environment. National Fire Protection Association (NFPA), a standard in the fire service,
 1. NFPA 1-2018, 3.3.51 **Immediately Dangerous to Life or Health (IDLH)**. Any condition that would pose an immediate or delayed threat to life, cause irreversible adverse health effects, or interfere with an individual's ability to escape unaided from a hazardous environment. [1670, 2009]
 2. NFPA 1500, 7.10.7 When engaged in any operation where they **could** encounter atmospheres that are IDLH or potentially IDLH, or where the atmosphere is **unknown**, the fire department shall provide and require all members to use SCBA that has been certified as compliant with NFPA 1981.
- Review the LAFD Risk Management Policy
- Review "Mayday" procedures
- Review radio communication procedures when a "Mayday" is in progress
- Review reporting to Staging or Base procedures during emergency operations
- Review Incident Organization responsibilities
- Review the fourteen structural "watch outs"
- Review fire ground survival procedures
- Review firefighter accountability procedures
- Review apparatus spotting and placement

LESSONS LEARNED

1. **Personal Protective Equipment (PPE)** – Wearing all appropriate Department approved PPE (turnout-coats, turnout-pants, turnout-boots, firefighting helmets, firefighting hoods, firefighting gloves and SCBA facepieces with voice amplification systems) as intended — based on the ***potential*** of an incident — will save lives and reduce risk of injury. Emphasize the practice of going “on air” when working in, around, or above an IDLH. On scene members stated that their lives were saved or injuries reduced because of their decision to don their appropriate PPE’s and SCBA.

2. **Accountability** - Detailed accountability of all members before, during, and after the incident is critical to determining the scope of a firefighter emergency and ensuring firefighter safety. During a catastrophic event, the smallest details become extremely important, such as the accuracy of F-11 staffing rosters, apparatus personnel accountability magnets, company identifying helmet passports, database inputted radio identifiers, command situation status/resource status, F-666, MCI procedures, and Personal Accountability Report (PAR) procedures.

3. **Occupancy Identification** – Recognize, analyze, and base strategic decisions on the ***potential*** hazards associated with drug industry related occupancies. The hazards of this relatively new industry continue to evolve and change rapidly. Coordination between the FPB, Joint Hazard Assessment Team (JHAT), Joint Regional Intelligence Center (JRIC), and Emergency Operations field resources is essential to stay current on trends in the industry that pose operational risks to LAFD members. Continually study Blue Sheets, Green Sheets, After Action Review Reports (AARR), and Line-of-Duty Death (LODD) Reports to gain knowledge on associated risks.

4. **Incident Organization** – “Organize early” During developing incidents, it is essential to assign Division/Group Supervisors for span of control, accountability, safety, and “ground truth” situational awareness. Division/Group supervision assists in defining roles and clearing up communication, especially during “Mayday” incidents. Consideration should be given to clearly defining who is in charge when multiple companies are entering a single point of entry. According to Book 30, the use of Divisions/Groups in the Incident Command organization provides a standard system to divide the incident scene into smaller manageable components. Whenever two resources are assigned to the same geographic area or function at an incident, one of the officers shall be placed in command of that geographic area or function (Division/Group Supervisor).

5. Radio Discipline – Maintain radio discipline during all emergency incidents, with particular attention to maintaining a clear tactical channel during all phases of a firefighter emergency. Companies must remain committed and disciplined to their company's task and continue firefighting operations during a "Mayday." Utilize alternative radio channels or face to face interaction to communicate with the IC, Division/Group Supervisors, or other companies during "Mayday" events. Additionally, do not call MFC to inquire about the incident or request a move-up during chaotic incidents. Members of MFC require all efforts to be focused on supporting the incident with minimal distraction.

6. Emergency Evacuation – Due to the inherent dynamic nature of firefighting, a continually evaluated and communicated plan for rapid egress (evacuation) is essential when working at an incident. Recognize, communicate, and mitigate potential dangers of narrow or blocked aiseways, stacked contents, or excessive storage. Limiting entry and assigning companies to clear the egress route should be considered. Develop company SOG's for emergency evacuation from the interior as well as the exterior or roof.

7. Back to the Basics – LAFD operations are based on fundamental fireground tactics designed to be proactive to incident potential. Utilizing the aerial ladder instead of solely ground ladders was a significant factor in this incident. Continue to emphasize that firefighting basics are being accomplished at every incident which includes, but is not limited to, methodical hose lays, developing supply lines, additional ground ladders, organized ventilation operations, forcible entry, and establishing a medical component early. Build on the basic firefighting and command fundamentals by constantly challenging your process with increased scope and complexity of training scenarios or simulations.

8. Training Culture – Continue to promote and emphasize the LFD proactive training culture abiding by the philosophy of "Train as if your life depends on it...because it does!" Many of the members interviewed stated that they relied on skills and knowledge learned during fundamental company level training, After Action Reviews (AAR), and organizational training such as the LFD Live Fire/Smoke Recognition and Fireground Survival Programs to perform during a life-threatening emergency. Emphasize the priority of such training and use repetition to instill deep learning.

9. Crew Resource Management (CRM) – "If you see something, say something!" CRM enhances communication, increases situational awareness, strengthens decision-making, and improves teamwork. Just prior to the catastrophic event, a member on the exterior notified a company officer that there was a dramatic change in conditions

toward the rear of the building. According to accounts, the communicated awareness assisted in reducing the number of injuries or even prevented death. Emphasize that all members operating at an incident have the ability and responsibility to serve as a lookout for others.

10. Post Mayday Events – Recognize when to reassign or remove affected members of all ranks from operational and decision making positions after mayday, near-miss, or extremely stressful experiences. Cognitive ability decreases significantly during and after times of emotional duress and replacing affected positions should be considered for members' safety and mental health.

REFERENCE MATERIAL

- Departmental Bulletin 15-11, Risk Management Policy and Firefighter Emergency/Mayday Procedures
- Departmental Bulletin 16-05, Emergency Operations – Efficiency and Safety
- Volume 1 2/1-42.20 Firefighter Emergency
- Volume 1 2/3-20.30 Reporting to Base or Staging
- Volume 2 3/7-40.25 Wearing of Personal Protective Equipment (PPE)
- Volume 3 6/3-00.00 Self Contained Breathing Apparatus – General (SCBA)
- Volume 3 6/6-03.01 Module I – Laying a 4" Supply Line
- Volume 3 6/3-06.00 Lessons Learned
- Book 6 Lesson #20 Aerial Ladder Operations Spotting and Raising
- Book 6 Lesson #21 Aerial Ladder Operations Use of Aerial Ladder
- Book 8 Module #8 Apparatus Spotting and Placement
- Book 30, Incident Command Structure - Divisions/Groups, Basic Operational Approach
- Book 70 Multi-Casualty Incident Command System
- Book 101 Rapid Intervention Company- Firefighter Emergency
- Book 101 Rapid Intervention – Radio Assignments and Apparatus Roster Systems
- Book 101 Rapid Intervention – Escape Routes
- Book 101 Rapid Intervention – Look Outs/Conditions
- Training Bulletin 36, Identification of Phencyclidine and Clandestine Laboratories
- Training Bulletin 76, Company Operations
- Training Bulletin 90, Fire Burns – Structural Collapse and Fire Ground Survival
- Training Bulletin 106, LCES and "Watch Outs" for Structure Fires – Interior Firefighting "watch outs"
- Training Bulletin 152, Butane Honey Oil Recognition and Hazards
- Training Bulletin 165, Illegal Marijuana Cultivation
- NFPA 1561 – Standard on Emergency Services Incident Management System and Command Safety



Street view from Google Maps



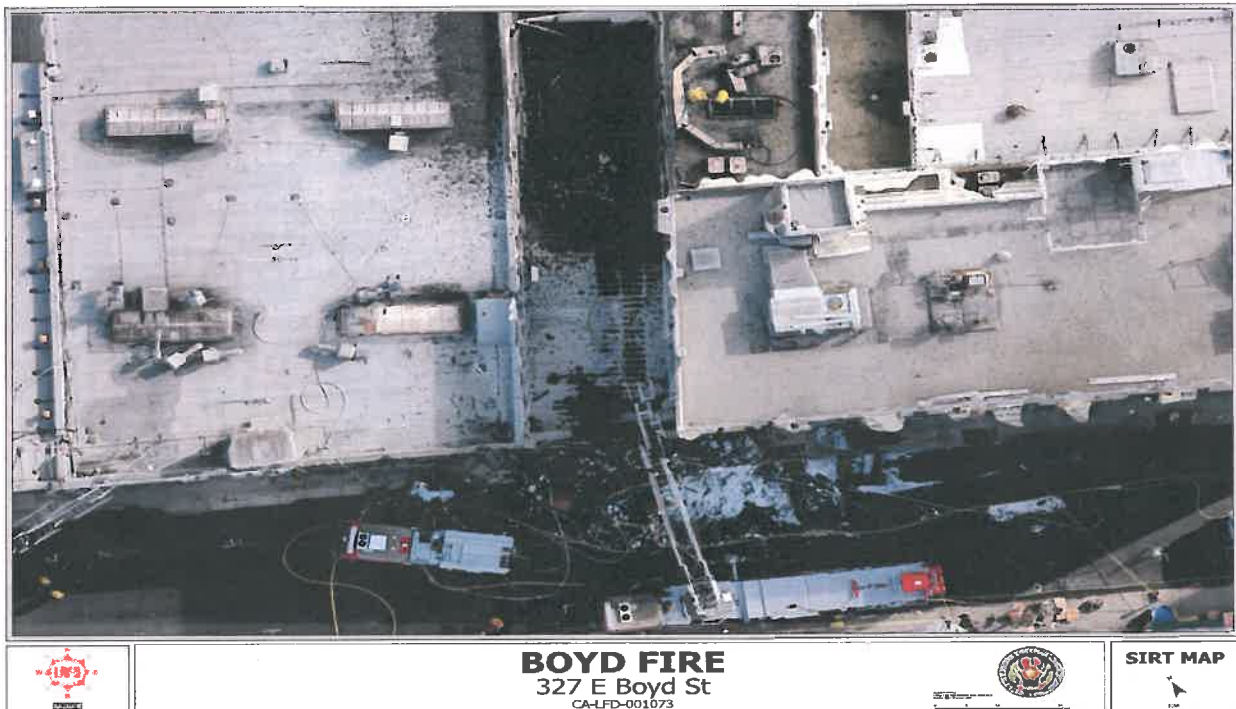
Aerial imagery of 327 East Boyd Street (indicated by arrow)

Commercial Structure Fire

May 16, 2020

Boyd Incident

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Aerial drone imagery from overhead perspective



Aerial photography from South (Alpha) perspective



	BOYD FIRE 327 E Boyd St CA-LFD-001073		SIRT MAP 
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Aerial drone photography from the West (Alpha/Bravo) perspective



	BOYD FIRE 327 E Boyd St CA-LFD-001073		SIRT MAP 
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Aerial photography from North (Bravo/Charlie) perspective

Commercial Structure Fire

May 16, 2020

Boyd Incident

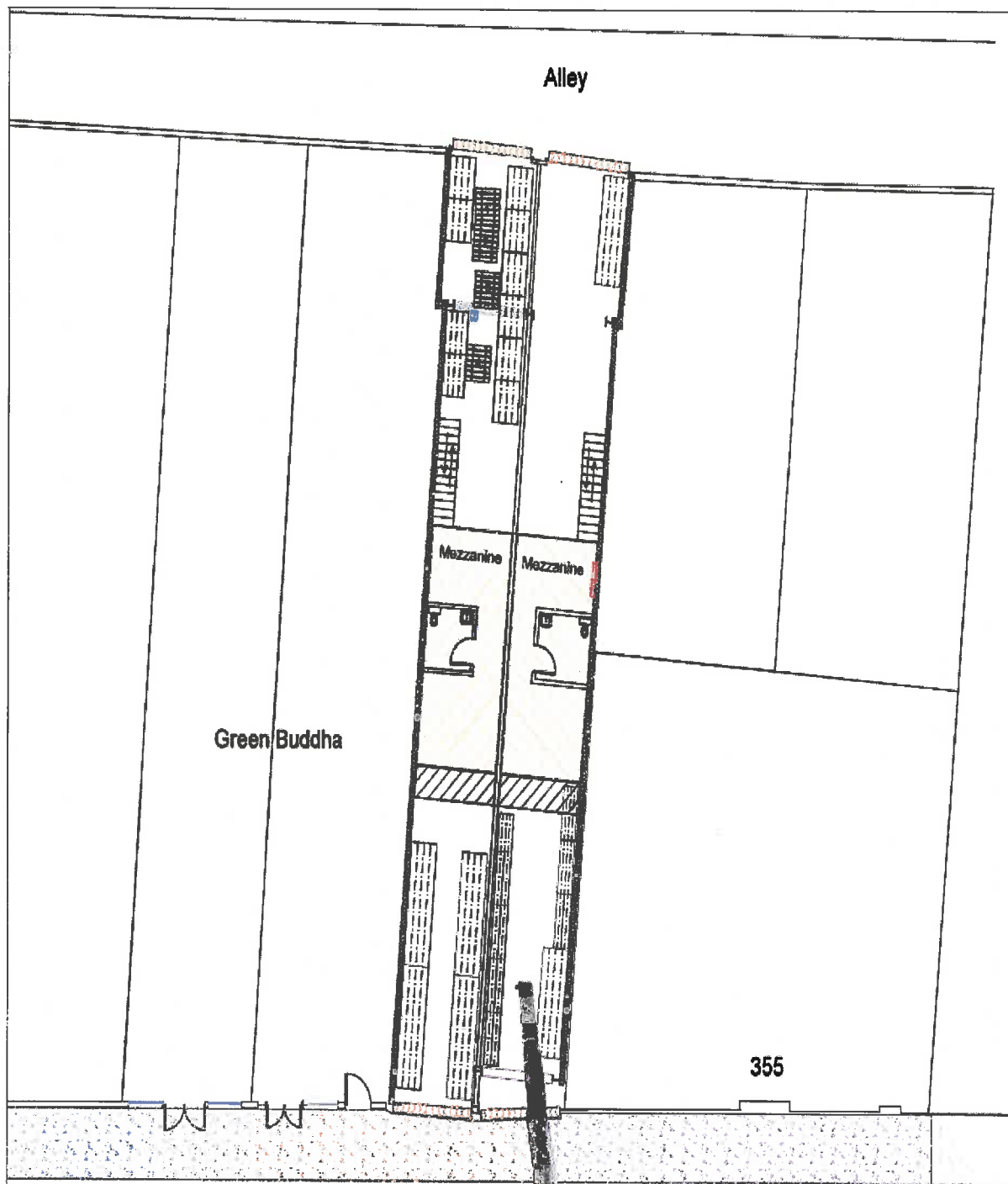
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Aerial photography from North/East (Charlie/Delta) perspective



Aerial Photography from East (Delta) perspective



2-D image of 327 East Boyd Street (Courtesy of NRT)