CLOSE CALL/HAZARD REPORT

MAYDAY EVENT / COLLAPSE
10801 WINDCLOUD CT
JUNE 2, 2006

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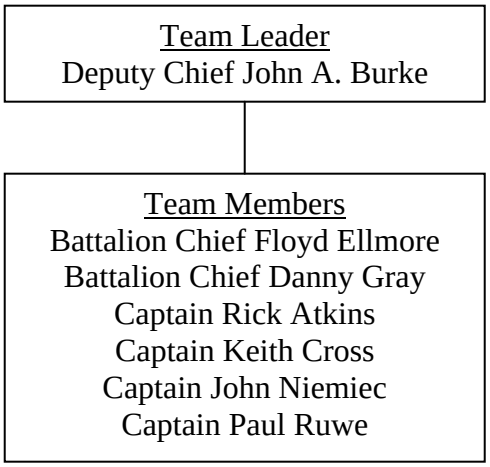
Executive Summary

On June 2, 2006, Fairfax County Fire and Rescue Department and City of Fairfax Fire Department units were dispatched to a house fire at 10801 Windcloud Court. Upon arrival, units found a large single-family house with fire involving the center portion of the roof and attic. With the exception of the roof and attic, the building was free of smoke or fire. An initial attack line was advanced, via the interior stairs, to attack the fire from the interior, beneath the attic. The Truck and Rescue Engine crews performed actions to support this tactic. Very shortly after this tactic was initiated, a significant collapse occurred in the foyer, main stairway, and on the second floor landing. The collapse cut off the escape route of three units and prevented the crews from making physical or visual contact with the other crews. A Mayday call was initiated and all crews were quickly removed from the building without injuries.

Due to the Mayday call and the fact that three crews were cut off and a fourth crew was nearly struck by the collapse, an investigation of the incident was initiated.

Investigation Team

The Firefighter Injury Investigation Team was activated on June 3, 2006, to investigate the circumstances of the Mayday event. The team was assembled under the direction of Deputy Chief Kevin Kincaid who appointed Deputy Chief John Burke as the Team Leader.



Investigative Tasks

- Review all written statements.
- Conduct interviews.
- Review pictures and videos.
- Review the transcripts of the incident communications.
- Review all relevant procedures, manuals, standing orders and pertinent documents for insight into the need for preventative action and/or procedural changes by the department.

Incident Information

Date:	June 2, 2006
Dispatch Time:	13:16 Hours
Incident number:	20061531578
Incident Address:	10801 Windcloud Ct.
Fire Box number:	3401

Weather[1]:

Time	12:52 Hours
Temperature:	82° F
Precipitation:	None
Wind:	Variable 4.6 mph
Sky:	Overcast
Humidity	60%

1. Wunderground.com, Fort Belvoir, VA.

First Alarm:

Rescue Engine 433
Engine 402
Engine 430
Engine 425
Truck 403
Rescue 418
Ambulance 434
EMS 402
Battalion Chief 402

Note: Immediately following dispatch, Engine 434 added to the incident and assumed the role of first due engine. This change, as voiced by DPSC, changed the response to:

Engine 434
Engine 402
Engine 430
Engine 425
Truck 403
Rescue Engine 433 (now the first Rescue on the incident)
Rescue 418 (now the second Rescue on the incident which was approved by BC402)
Ambulance 434
EMS 402
Battalion Chief 402

Added to the incident:

Safety Officer
Deputy Fire Chief - Operations

Second Alarm:

Engine 403
Engine 431
Engine 423
Truck 425
Medic 403
Light & Air 413
Canteen 402
EMS 404
Battalion Chief 443

Added to the incident:
- Apparatus 401
- Technical Rescue Captain 401

EMS Task Force:
- Medic 402
- Medic 408
- Medic 433
- Medic 429

RIT Level II Task Force:
- Engine 421
- Tower 430
- Rescue 401
- Medic 407
- EMS 403
- Battalion 403

Event Synopsis

On June 2, 2006, Fairfax County Fire and Rescue Department and City of Fairfax Fire Department units were dispatched to 10803 Tradewind Dr. for a report of a house fire. Prior to the arrival of fire department units, Fairfax County Police Helicopter "Fairfax One" arrived overhead of the incident and reported the correct address as Windcloud Ct. The helicopter crew also reported a working fire in a very large single family home with fire showing from the top of the structure. The helicopter also informed responding units that a fire hydrant was located immediately across the street from the house.

Fire department units arrived and found a very large house (approximately 12,000 square feet of living space), two floors in the front and four floors in the rear, with fire involving the attic space and roof in the center of the house. Operations 406, responding from Fire Station 34, arrived first immediately followed by Battalion Chief 402. The battalion chief established command upon arrival and immediately requested a second alarm. Battalion Chief 402 observed sides D and A as he arrived on the scene; he positioned on side A just beyond the address affording him a view of sides A and B. These observations supported the initial assessment that the fire was confined to the attic. Operations 406 reported the homeowner stated that all occupants were out of the house.

Engine 434 radioed to Command that they were advancing to the top level and requested that the Truck crew assist them with hooks and an attic ladder. Command assigned units to support Engine 434 with an interior attack on the attic fire including Truck 403 to pull ceiling, Rescue Engine 433 to conduct a search, and control utilities and Engine 430 to advance a back-up line. The driver of Truck 403, positioned on side D, was directed to set up the truck for a ladder pipe operation and Engine 402 was assigned to establish a water supply for Truck 403. Crews were operating and Command continued his assessment of the building and situation. He requested a progress report from Engine 434 and, before they could respond, Command observed a significant change in conditions and ordered a withdrawal from the structure. Immediately following the withdrawal order, the evacuation tones were activated by the channel 4-C dispatcher, at the direction of the Uniformed Fire Officer, at DPSC. At the conclusion of the evacuations tones, Truck 403 transmitted a Mayday.

Engine 434

Engine 434 arrived seconds after Battalion 402. Engine 434's crew stretched a 300 ft pre-connect to the front door. They found no fire or smoke conditions inside of the building as they entered a large two-story foyer in the center of the house. The foyer had a peaked roof and a domed ceiling with a large chandelier in the center. The line was advanced up the stairs and charged. The crew immediately located an open, fold-down ladder leading to the attic in a front bedroom (Quadrant A); fire was visible in the opening as well as through an HVAC return in the same room. A garden hose was also found on the floor in this bedroom. The crew proceeded to hook some ceiling and operate the hand line into the attic area. The stream was

having no visible effect. The crew relocated to the hallway to continue their operation. In the hallway, fire was observed through an HVAC vent. The situation began to deteriorate with fire visible from the edges of the trim in the foyer and visible failures of the drywall seams. Engine 434's officer was preparing to call Command on the radio to inform him of the deteriorating conditions and of the need to withdraw all units. Rescue Engine 433 was arriving at Engine 434's location at the same time, but before these communications could occur, the ceiling and roof assembly failed and collapsed into the foyer, onto the stairs, and onto the second floor hallway.

T403

Truck 403 and Rescue Engine 433 arrived immediately after Engine 434. Truck 403's crew, at the request of Engine 434, proceeded to the second floor with hooks and an attic ladder to assist with gaining access to the attic. The driver, at the direction of Command, remained outside and began to prepare for a ladder–pipe operation. Upon arrival on the second floor, Truck 403 was directed by Engine 434 to assess rooms on the third floor, at the top of a stairway adjacent to the main stairs. Truck 403 proceeded up the stairs and found heavy smoke conditions and rapidly increasing heat. The crew withdrew to the second floor to report their findings to Engine 434 when the collapse occurred.

RE433

Rescue Engine 433 reported to command to clarify their assignment, as they had initially been dispatched as the first due engine, but following a line-up change, was unclear as to their assignment. Rescue Engine 433 was assigned to conduct a search and to control utilities. Rescue Engine 433 entered the foyer and observed deteriorating conditions at the ceiling level. These conditions included visible fire at the trim at the edges of the ceiling, as well as fire visible from the HVAC returns. The crew arrived at the second floor landing and was preparing to report to Engine 434 when the collapse occurred.

E430

Engine 430 had advanced a back-up line into the foyer prior to the collapse, but had to withdraw due to a burst section of hose, most likely caused by burning material falling from the roof onto their line. Engine 430 was on the exterior of the building when the collapse occurred and, had their line not burst, they likely would have been beneath the collapsing materials, including a large chandelier.

The officers of Engine 434, Rescue Engine 433, and Truck 403 immediately assessed their crew's integrity and determined that their crews were intact, though each unit was unable to contact the other two units. Due to the amount of burning debris now in the hallway and blocking the stairs, as well as the fact that Engine 434's hand line had burst during the collapse, all crews immediately determined that they were unable to initiate a safe search for the other two units, and the decision was made to withdraw to safe locations in bedrooms.

Truck 403 relocated to a room in the rear of the building overlooking part of the deck. Upon the conclusion of the emergency evacuation tones, Truck 403 transmitted a Mayday and indicated

that they were cut off from their means of egress. The Mayday was acknowledged and the crew began to remove the windows in the room. The crew made eye contact with an officer on the exterior, a ladder arrived shortly afterwards, and the crew exited the building.

Rescue Engine 433 relocated to a room over the garages on side D in Quadrant D. They were able to make contact with the driver of Truck 403 who moved the aerial to the window, and the crew exited the building.

Immediately following the collapse, Engine 434 called Command to inform him of a catastrophic collapse and of the need to perform an accountability check. Engine 434 relocated to a bedroom on side A in Quadrant A where they were seen by members of Engine 402 from the exterior of the house. Engine 402, the initial RIT, began to deploy a ladder to Engine 434's location. Engine 402 was redirected by Engine 434 to assist Truck 403. Engine 434 reported that they were not in danger and that it was Truck 403 who was in need of immediate assistance. Engine 434 safely exited the building via another ground ladder a short time later.

No persons were injured during the initial operations, during the collapse, or during the operations to remove crews from the building.

Due to the significance of the incident (collapse, Mayday and several crews exit routes cut off) the decision was made to perform a thorough investigation of the incident.

Findings, Discussion and Recommendations:

Finding

1. **Effective and on-going size-up and risk vs. benefit decision making did not take place at the initial phase of this operation.**

   Discussion

   Most personnel involved in this event that the investigative group talked to agreed that they underestimated the amount of the attic that was involved in fire. However, all of these people also stated that, as they conducted their size-up of the building prior to and during the initial entry, they felt confident that the attic fire was within their capability to confine and extinguish. Additionally, they did not observe signs that collapse was imminent until seconds before it occurred.

   - FRD personnel need to continuously train in risk vs. benefit analysis on every incident scene.
   - FRD personnel need to use every option/tool available to assist with size-up and incident scene changes. On this incident, overhead communications could have aided the units and command on the ground. When viewing the footage from Fairfax One, most of the members who were involved in the collapse stated that they were not able to see this level of fire involvement from their vantage point on the ground.

   During the moments before the collapse, all of the personnel on the interior observed and correctly interpreted signs that the structure was unsound. These included an increase in fire volume, ineffective hose streams, signs (tape seams, smoke and fire) that the ceiling/drywall in the foyer was failing, fire from the trim, and fire visible through the HVAC returns at the ceiling. All personnel operating on the interior reported that they were preparing for immediate withdrawal, but were first going to ensure that the other crews were notified of the conditions and plan. In the seconds that it took for these thoughts to occur and prior to notification, the collapse occurred.

   Engine 430 was advancing a back-up line into the foyer when their line failed. Command immediately informed Engine 430 of the failure and, more importantly, recognized that this failure left interior crews vulnerable at this incident.

Finding

2. **The crews reacted appropriately to the changing incident scene. They followed Mayday procedures and firefighter survival practices and procedures.**

   Discussion

   This event is a testament to the value of good training in that three crews were cut off from their primary means of egress, as well as from the other crews, yet were able to assess their situation correctly and react appropriately. In the seconds following the collapse, all crew members immediately accounted for each other, assessed their situation, and moved to areas of refuge. Two of the crews were located in rooms where they were able to see and make contact with personnel on the exterior. The third crew, Truck 403, unable to make contact with personnel on the exterior, initiated a Mayday, clearly identifying themselves, their location, their situation and needs.

   All three of the crews, upon moving to their areas of refuge, had quickly formulated plans to 'bail out' of the building should conditions in their locations deteriorate. Crews awaiting the deployment of ladders closed the bedroom doors and monitored conditions above and adjacent to them until they exited the building.

   This incident stresses and reinforces the importance of firefighter survival training, Mayday procedures, and emergency 'bail out' procedures.

Finding

3. Rapid intervention team procedures and practices must be followed when a Mayday or sudden change at the incident occurs. On this incident scene, the personnel accountability system was not followed following the emergency radio traffic.

Discussion

Following the report of a catastrophic structural failure by Engine 434 and a Mayday by Truck 403, an accountability check should have been undertaken to account for all units. During this event, there is apparent confusion for several minutes at the command post regarding which unit transmitted the Mayday, which units have been cut off, where these units are, and what their needs are. Examples:

- Command stated that all units are 10-4 when in fact personnel from one crew remained inside, awaiting a ladder to exit the building for another two and a half minutes.
- Rescue Engine 433 was cut off from their exit by the collapse and exited a side-D bedroom via Truck 403's aerial moments before the bedroom ignited. Based upon radio traffic, this crew was not accounted for until they took a ladder to side-C to assist Truck 403's crew.

Finding

4. FRD Personnel need to be aware of construction features during risk vs. benefit analysis, confirmation of all occupants out of the address and the volume of fire.

Discussion

The house involved in this incident was very large (approximately 12,000 sq ft) and, as such, had some noteworthy features including lightweight wood truss construction, multiple HVAC units/zones, very large truss spans, unusual loads on the truss assemblies (in this case a large chandelier in the foyer), extremely large, open attic spaces, and varying elevations on different sides of the structure.

The initial collapse occurred in and around the foyer and stairs. This area had the largest truss span in the building and was located below where the bulk of the fire was venting through the roof. In addition to the large open area, a very large chandelier was suspended from the ceiling in the foyer.

The height of this building ranged from two to four stories. Fortunately, the crewmembers that were cut off during the collapse needed to descend only one level to escape. The potential need for 28 and 35 foot ground ladders and adequate staffing to deploy them at large single-family homes must be taken into account.

Finding

5. Ladders were not deployed in a timely fashion.

Discussion

The importance of effective ladder deployment is clearly evident at this incident. Three crews (eight firefighters) had to exit the building via fire department ladders to escape the building.

The lack of time between the arrival and collapse was the major factor that prevented ladders, other than Truck 403's aerial, from being deployed prior to the collapse (Truck 403 was still in the process of deploying the aerial, as per command's orders, when the collapse occurred). Other factors such as lack of safe staffing on trucks, the number of ladders required, and the size of ladders required all would have taxed one fully staffed truck crew if assigned to ladder a house this size. These facts do not minimize the importance of properly deploying ladders to provide secondary means of egress from all levels.

Finding

6. An effective communications system was not in place and utilized.

Discussion

There were several communications issues at this incident including:

- The initial dispatch (voice and MCT) incorrectly identified the incident channel. This created confusion for a few units.
- One crewmember initially failed to carry his radio with him, causing him to miss several critical transmissions.
- Command misinterpreted or was unable to clearly hear several transmissions during the collapse, Mayday, and rescue operations.
- Partial compliance with the department's channel 'O' policy impaired effective communications.
- Several transmissions from crews on the interior were extremely difficult to hear. Had the transmissions been understood, the scope of the Mayday/rescue problem would have been more clearly defined and focused on one crew.
- The crew declaring the Mayday waited until after the evacuation tones had ceased to make their Mayday transmission.
- Helicopter communications were under utilized by command.

Finding

7. Incident Command principles, practices and procedures were not utilized.

Discussion

All personnel who are subject to operate at or in support of the command post must be familiar with the proper use of command boards and general command post operations. The staff at the command post should be properly assigned. All personnel operating within or in support the Incident Command System must be aware of their roles, responsibilities, and the limitations of their positions. During this event, several failures occurred and instances of circumventing command occurred:

- DPSC dispatcher, at the direction of the Uniformed Fire Officer, activated the evacuation tones without receiving an order to do so from command.
- The Safety Officer, while still en route to the incident, requested that a Level II RIT response be dispatched. In addition to making this request without going through command, the request was made on a different channel and neither the request nor the dispatch was relayed to command.
- The fill-in Deputy Chief, while still en route to the incident, requested the dispatch of an EMS Task Force. In addition to making this request without going through command, the request was made on a different channel and neither the request nor the dispatch was relayed to command.
- The command channel was not effectively utilized until later into the incident than necessary. The command post was adequately staffed early in the event and should have been able to effectively manage communications with DPSC and greater alarm units.
- The units on the second alarm failed to stage and a staging area was not established in accordance with procedures. One of the results was that greater alarm units reported directly to Command.
- The command boards were not properly utilized during the early stages of the incident to track units and personnel.
- Command post equipment, such as headsets and radios, were not utilized efficiently during the early stages of the incident.

Finding

8. Personnel should adhere to Standing Order 2002-004 and NOVA Procedural Bulletin 2003-02 regarding assignments and assignment changes at structure fire responses.

Discussion

Units must adhere to the dispatch sequence when determining their initial responsibilities and positioning. When deviations occur, they must be properly communicated. At this incident, the line up was properly changed immediately following dispatch; however, units remained unclear as to their roles or their roles were not followed.

- Rescue Engine 433 was initially dispatched as the first due engine. Engine 434 added to the incident and stated they would assume the role of the first due engine. Units affected by the revised run order were not advised of the change.
- Engine 430 was the third due engine and should have established an alternate water supply.
- No staging area was established for additional alarm units.
- Numerous personnel from administrative and support positions self-dispatched to the incident. This not only overwhelms the command post, but also added to access and congestion issues on the road leading to the fire building.

Finding

9. The safety of all personnel must be taken into account when operating at fires where a defensive mode is called for.

Discussion

Most structure fires that necessitate the use of master streams present either collapse hazards or hazards from flying or falling debris. Command must ensure that all personnel are not in the collapse zone, are not 'down range' of master streams where they may be struck by debris, and that all hazard areas are clearly identified and monitored. At several times during this incident, personnel were 'down range' of the master streams and were in danger of being struck by the streams and/or debris.

Recommendations

1. All personnel should take part in ongoing training on risk vs. benefit analysis as well as the size-up process
   - Battalion chiefs, battalion training officers and shift leaders should conduct and participate in effective and ongoing risk vs. benefit training. Teach and reinforce the basic components of risk vs. benefit decision making. Training should be provided to all members.
   - Battalion chiefs, battalion training officers and shift leaders should conduct and participate in effective and ongoing size-up training. Training should be provided to all members. Personnel should review the cues and clues used to read a building, smoke, fire and indicators of life hazards. <u>The critical need to view all sides of a structure as early as possible should also be reinforced</u>. First arriving units and incident commanders must communicate their findings and strategy to all personnel.
     - Several battalions have conducted training utilizing snap-shots of structures to practice and reinforce size-up and risk vs. benefit skills.
     - Consider utilizing 'go-no go' training to reinforce risk vs. benefit and size-up skills. Several battalions have utilized simple snap-shots of structures to practice and reinforce these skills. It is a simple and effective means to train personnel in this as well as ICS skills.
     - Consider using table-top incident simulations to reinforce this training and to increase knowledge and use of the Incident Command System

2. Conduct comprehensive firefighter survival training in an OARS session. This training should be realistic and should take place in realistic structures and environments.
   - ❖ See Southern Oaks Close Call Report, page 10
   - The City of Fairfax Fire Department and surrounding stations, as their guests, have made extensive use of several acquired structures in Fairfax City over the past few years to conduct intensive survival and RIT training. The benefits of these efforts are clear. Additionally, several members of our department have attended and instructed several survival courses and could be of assistance in meeting this recommendation.
   - Prior to delivering firefighter survival training during OARS, an In-Station Drill(s) should be developed to allow members to review and reinforce 'triggers' and procedures for transmitting a Mayday.
     - This training should include special attention towards ensuring that there is NO hesitation or delay and that nobody will view this action negatively.
     - An additional component of this training should include a review of the capabilities and limitations of portable radios
       - Transmissions can be made during the evacuation tones
       - The issues with 'stacking' of Emergency Button activations
       - How to get to channel 4-A and Ocean by 'feel'.

3. All personnel, but especially unit and command officers, should practice implementing and utilizing the Incident Management System as well as the Accountability System, this training is most easily completed at the battalion level and should involve a review of the procedures as well as practice with its use and implementation.
   - Reinforce the hazards of self deployment as well as proper dispatch/response and incident check-in procedures.
   - Personnel who are subject to staffing any positions at or in support of an incident command post should be identified and receive the necessary training.
     - These personnel should also be thoroughly familiar with the operation of all equipment carried on command vehicles.
   - Reinforce the need for a structured management system. The established management system should not be bypassed through self deployment, bypassing staging, requesting the dispatch of additional resources, etc. This should include not only operations members but also staff at the Department of Public Safety and Communications.
   - Reinforce the pre-assigned roles of units and personnel to include that of the staging officer. Create opportunities for drivers to practice the position of staging officer.
   - Reinforce the necessity of obtaining and implementing a command channel as early in an incident as practicable.
   - Reinforce the need for Incident Commanders and/or aides to utilize headsets to enhance their communications abilities.

4. In conjunction with components of some of the previous recommendation, all those who may serve as incident commanders and interim-incident commanders must review and practice RIT and Accountability procedures following Mayday transmissions, sudden changes in the incident, etc. These events will be stressful and chaotic. Incident commanders must be able to systematically account for all personnel at their incidents at all times.

5. Personnel should review Standing Order 2002-004 as well as NOVA Procedural Bulletin 2003-02 regarding assignments and assignment changes at structure fire responses.
   - Adherence to these procedures should be enforced.
   - Clarification is needed regarding whether first alarm units arriving, after command has been established, need to report to the Incident Commander for an assignment or should they proceed to their pre-assigned task.

6. The department should develop guidelines governing the self-dispatch of non-operational members; additionally procedures should be developed regarding how these members are to enter the incident management system without taxing the command system.

7. Examine current dispatch complements to determine if modifications are necessary.
   - Consider the addition of a second truck company to large houses. The staffing and ladder complement on one truck can be inadequate at large houses.
   - Consider the need to enhance the initial RIT engine when operating at all 'working' fires.

8. Explore and thoroughly evaluate new equipment, systems and procedures to enhance communications for members using SCBA
   - Several transmissions at this event were difficult to hear and while the reasons are not clear and are likely varied, the need for effective communications during the worst conditions is vital.

9. Re-evaluate the effectiveness of procedures in Standing Order 2001-01 "Channel-O"; also examine alternative procedures to maintain effective communications on the fire ground.
   - All personnel who were on Channel 'O' were unaware of the evacuation tones, the collapse or the mayday transmission. This loss of situational awareness occurs routinely when personnel are on Channel 'O'.

Appendix A

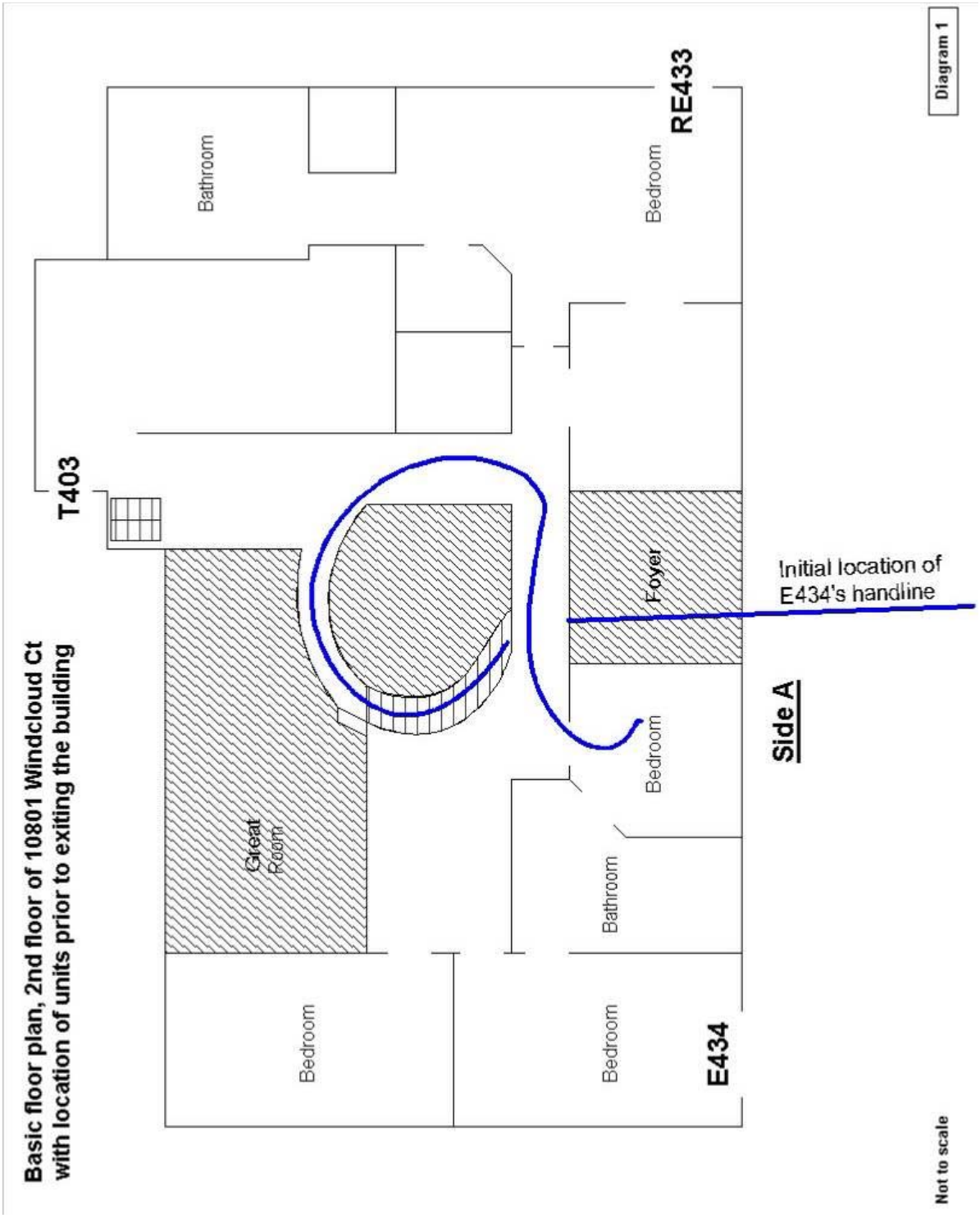


Diagram 1
RE433
Bathroom
Bedroom
T403
Foyer
Initial location of
E434's handline
Side A
Bedroom
Great
Room
Bathroom
Bedroom
Bedroom
E434
Basic floor plan, 2nd floor of 10801 Windcloud Ct
with location of units prior to exiting the building
Not to scale

Views of sides A and C from Fairfax County Police Helicopter 'Fairfax One'. Fairfax One arrived overhead of the incident with their camera on approximately 5 minutes prior to the arrival of BC402 and E434.

Views of sides A and C from Fairfax County Police Helicopter 'Fairfax One' as BC402 and E434 arrive on the scene. Fairfax One has been overhead for approximately 5 minutes.

Views of sides A and C from Fairfax County Police Helicopter 'Fairfax One' immediately following the collapse. Fairfax One has been overhead for approximately 10 minutes, BC402 and E434 have been on the scene for approximately 5 minutes.

View from the street of the house prior to E434 exiting the structure.

Crewmember from E434 exits the second floor via 24-foot ladder.

T403 prepares to operate the ladder pipe.