UNDER RIVER RAIL OPERATIONS

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1. **INTRODUCTION**

1.1 Purpose

New York City is served by several mass transit systems (NYC Transit Authority, PATH and Amtrak) that utilize under river rail tubes to transport hundreds of thousands of passengers within New York City and between the City and New Jersey. The FDNY responds to routine incidents in the under river sections of transit systems using procedures such as Light Train Procedures (AUC 207, Addendum 7).

This bulletin describes how to recognize and operate at incidents, ranging from serious to catastrophic, involving under river rail facilities. A review of the history of global terrorist attacks shows that terrorists have repeatedly targeted mass transit facilities, often deploying multiple and/or simultaneous devices. These attacks have produced significant numbers of casualties.

The Department recognizes the dangers and difficulties inherent in operations at under river tubes. Extreme caution must be exercised before committing members to dangerous locations, (e.g., deep emergency exits, remote sections of under river tubes). A deliberate approach must be adopted similar to one employed at Haz-Mat incidents. Potential actions must be evaluated on a risk/benefit basis.

1.2 Scope

- The main body of this bulletin pertains to operations within the New York City Transit Authority (NYCT) under river sections.
- Addendum 1 contains Operational Guides for specific NYCT under river tunnels.

1.3 Related Documents

For additional information, please refer to the following bulletins:

- AUC 207 titled Subway and Railroad Track Operations
- Fire Tactics and Procedures, Emergency Response Plan, Addendum 2 titled Suspected Chemical Attack in an Underground Transit System
- Fire Tactics and Procedures, Emergency Response Plan, Addendum 3 titled Improvised Explosive Devices
2. CONSTRUCTION AND FIRE SAFETY FEATURES

In order to operate effectively, it is necessary to have a working knowledge of the physical properties of underground and under river transit facilities (Table 1).

2.1 Tunnels

Tunnel is a general term which describes a below-grade passageway. There are numerous underground tunnels between transit stations throughout the NYCT system. The Transit Authority also refers to its 14 sets of under river crossings as tunnels. Most under river tunnels actually consist of two separate structures referred to as tubes.

2.2 Under River Tubes

2.2.1 Construction

• Tubes are cylindrical in shape and are constructed of brick, concrete or tubular cast iron (Figure 1). Some cast iron tubes are lined with concrete. Tube walls are between 2 and 2½ feet thick.
• Most tubes were bored into solid bedrock but a few tubes run through composites of clay, sand, and silt.
• Most tubes are between 14 and 19 feet wide, which is only large enough to contain 1 track.

![Figure 1](image)

Typical under river NYCT subway tube. Note the following features: Cylindrical tube shape, drainage trough between running rails, benchwall, dry chemical extinguisher, blue light phone and standpipe. Also note that it would be unsafe to walk between the running rails due to the drainage trough. Personnel and evacuating passengers should walk in the area outside the rails, opposite to the third rail; be aware that the 3rd rail alternates sides as it goes through the tunnel.
2.2.2 Operational Considerations

- Most tubes have no access to the adjacent tube throughout the underwater areas. You cannot ride a train halfway across the river, get out of the train and cross over to the adjoining tube.
- Under river tubes are narrower than underground tunnels. There is very little space between the train and the tube. In the event of a collision or an explosion, it may be impossible to obtain access to the side of the train from the exterior.
- The force of an explosion may be magnified in such a confined area. A large enough explosion could cause the structure of the tube to fail and possibly flood.

<table>
<thead>
<tr>
<th>Constructio n</th>
<th>Underground Tunnel</th>
<th>Under river Tube</th>
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<tr>
<td>Access</td>
<td>• Numerous crossovers between tracks.</td>
<td>• Generally no crossovers between tracks (Exceptions: 63 St., 161 St., Lexington Ave. tubes).</td>
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<td></td>
<td>• In most cases, members can operate from the sides of a train.</td>
<td>• Distances vary from 650 feet to 1 mile.</td>
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<td></td>
<td></td>
<td>• There is limited room to operate on the sides of a train.</td>
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<td>Ventilation</td>
<td>If exhaust fans are operating, make-up air can be pulled from many open areas.</td>
<td>The only openings for air flow are at the ends of the tube. A disabled train in a tube will impede air flow.</td>
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Table 1
Description of differences between Underground Tunnels and Under River Tubes

2.3 Exceptions to Typical Tube Layout

The following three tunnels, 63rd Street, 161st Street and Lexington Avenue, were constructed differently than previously described:

- 63rd Street Tunnel (Between Manhattan and Queens) (Figure 2)
  The 63rd Street tunnel is the most recently constructed tunnel; it is a large, two-level, precast concrete tube that was laid down on top of the river bed. The two tracks that run through the upper level are separated by a concrete partition. Many openings exist in this partition throughout the under river areas.
Figure 2
The 63rd Street tunnel. Openings exist between adjacent tracks throughout the under-river areas. Due to construction features, the 63rd Street Tunnel would be the most susceptible to flooding if damaged.

- Lexington Avenue Tunnel (Between Manhattan and the Bronx)
  The Lexington Avenue Tunnel contains four tracks separated by concrete partitions. Openings exist between tracks throughout the under river areas.

- 161st Street Tunnel (Between Manhattan and the Bronx)
  The 161st Street Tunnel is a set of three tracks separated by concrete partitions, with openings between tracks.

2.4 Tunnel-to-Tube Transition Areas (Figures 3A and 3B)
- This is the point where the underground tunnel connects to the under river tube.
- In most cases, it is the location of the last emergency exit and the last crossover to the adjacent tube until the other side of the river.
- Members must recognize this construction feature as the entry/exit point of the tube.

Figure 3A
Tunnel-to-Tube Transition Area. Square underground tunnel section connects to the round under river tube. These pictures illustrate construction differences between underground tunnels and under-river
2.5 Emergency Exits

2.5.1 Exit Types

The NYCT Guidebook for Emergency exits distinguishes between two types of emergency exits:

- Standard exits. Doors of standard exits are flush with the sidewalk. (Figure 4A)
- Upright exits. Doors of upright exits are vertical, located in the side of a structure. (Figure 4B)

Photographs of Subway Exits. **Figure 4A** is a photograph of a standard subway emergency exit. **Figure 4B** shows an upright subway emergency exit. Both exits are opened with a subway emergency tool, the Triangle Key. **Figure 4C** shows a triangle locking device in a standard exit door. The ring around the lock is a security device designed to prevent the opening of exit doors by unauthorized persons. **Figure 4D** illustrates the use of Triangle Key and Billy Bar to open a standard exit. The Billy Bar has two points that fit into the holes in the ring, preventing its movement, allowing the locking device to be opened. Although not essential, the Billy Bar aids in opening the doors more quickly and easily.
2.5.2 Exit Stairways

- Some exit stairways are narrow and steep, while others are wider, with a pitch that is comfortable to walk on. Stairways are constructed of either concrete or metal. The metal stairs are often steeper, with open treads. (Figures 5A and 5B)
- The depth and pitch of stairways corresponds to the depths of the under river tubes, which range from 24 to 130 feet deep. Consult the Operational Guides for information about specific emergency exits.

2.5.3 Operational Considerations

- It is critical that members are familiar with the location and configuration of subway emergency exits in their response area, especially exits in the vicinity of under river tubes.
- Evacuating civilians and Fire Department members wearing PPE will have difficulty exiting through the stairways which are narrow and steep.
- Lighting is present but may need to be enhanced. Glow sticks will provide illumination without adding extra heat.

![](Figure 5A)

2.6 Crossovers

2.6.1 Location

Crossovers, also known as cross passageways, are connections between adjacent tunnels. They are located only in underground areas and at the ends of under river tubes. (Exceptions: The NYCT 63rd St. Tunnel, 161st St. Tunnel, and the Lexington Ave. tubes, all of which have openings between tracks under the river (Figures 6A and 6B).
Crossovers. Figure 6A shows a crossover at track level, the most common configuration. With this type of crossover, the emergency exit stairway comes down to a platform between two tracks. The platform is at the same level as a station platform, making it easy to board or leave a train. There may be a sliding door in the passageway that separates the tracks. Figure 6B shows a crossover passage that is above track level. A separate stairway leads from this passage to each track.

2.6.2 Operational Considerations

- Use extreme caution moving through crossovers. Be prepared for live tracks and/or moving trains on the other side.
- Crossovers associated with emergency exits are usually at track level but they may be one or more levels above the tracks. Each situation is unique. Consult the pertinent Operational Guide for specific information.
- Important decisions about victim movement will be made on a case by case basis, based on knowledge of the configuration of emergency exits, stairs, and crossovers, coupled with an assessment of conditions.

2.7 Fire Protection Systems and Equipment

2.7.1 Standpipes (Figure 7)

- All under river standpipes in the NYCT system are wet.
- Standpipes are city-main fed. There are no pumps to augment pressure.
- Siameses are usually located at the emergency exits closest to the river. In all cases, check the sign attached to the siamese to ensure that the correct system is supplied.
- 2½ inch outlets are located every 200 feet throughout under river tubes.
- Section valves are located approximately 600 feet apart. (Figures 8A and 8B)
- Sound-powered phone jacks are located at standpipe outlets (exception: Joralemon Tube).
Figure 7
Standpipe outlet and sound-powered phone outlet. Note the standpipe outlet number, which can be used to pinpoint the location of the incident. Also note the sound powered phone jack, located at all under-river standpipe outlets (except in the Joralemon Tubes between Brooklyn and lower Manhattan).

Figure 8A
Figure 8B
Section valves. Section valves are located every 600 feet throughout the under-river tubes. They are often found at the base of emergency exits. It may be necessary to close section valves to isolate a ruptured standpipe.

2.7.2 Other Equipment

- 20-pound dry chemical extinguishers are located at power removal boxes, approximately every 600 feet.

- Emergency Evacuation Devices (EED) (Figures 9A, 9B, and 9C) (refer to AUC 207, Addendum 11) - EED are located at both ends of each under river tube at the base of the emergency exits. EED can be used as a ladder from the benchwall or a train to track level, or as a bridge between adjacent subway cars.

- Rail Carts (Figures 10A, 10B and 10C) - Rail carts are utilized by personnel to transport tools and equipment into the tubes and to remove patients from scene.
NYCT Emergency Evacuation Devices (EED) are located at the base of emergency exit stairs nearest the under river tubes. They are also located near stations, at the first blue light south of the station, on the southbound track. EED are secured by Transit Authority locks, keys are located at the token booth in the station. Bolt cutters or forcible entry tools will be required. With the flat side up they can be used to move passengers from one train to another. When this is done, ropes or hooks should be used as guides. When the EED is reversed, it can be used as a ladder to take passengers on and off trains, or from the track to an emergency exit landing.

The Nolan Rail Cart. A lightweight, aluminum cart brought to the scene and assembled at track level by members.

2.7.3 Operational Considerations

- Engine Company Chauffeurs must be aware of head pressure when calculating the appropriate pressure to supply to siamese connections. Units may be operating 50 to 100 feet below grade.

- The discovery of a water-flow in a tube is cause for concern. An explosion could rupture the standpipe, making it necessary to shut section valves to isolate leaks. A less likely but much more serious cause of a water flow is that the tube itself has been damaged by an explosion.

- Standpipe numbers are sequential and can be used to provide an approximate location of an incident. Operational Guides provide a diagram of the standpipe numbers in each tube for which the information is available.
2.8 Power

All subway trains are powered by a direct current (DC) third rail. Power removal and stopping of train traffic shall be requested and confirmed through the borough dispatcher as per AUC 207. See section 4.5 for operational considerations.

2.9 Communications

2.9.1 Handie-Talkie Radio

If enough personnel are on scene and conditions warrant, the handie-talkie (HT) relay should be established as per AUC 207. The HT relay remains the basic means of communication in the subway system. This relay should be augmented as necessary.

2.9.2 The Subway Repeater System

The NYCT is in the process of installing a radio repeater system for all below grade subway stations and tunnels. Refer to AUC 207, Addendum 16, regarding use of the NYCT Repeater System for more information. The following points pertain specifically to under river tunnels:

Breaks between repeater zones occur inside under river tubes. At present, members inside the tube on opposite sides of the break will not be able to communicate with each other. For maximum repeater coverage, the IC should ensure that a member operating on the repeater channel is at street level in a position at the closest station on both sides of the river. Members operating at street level on opposite sides of the tunnel should relay important messages across the river.

At present, there are no repeater antennas at most emergency exits, and no repeater coverage inside most emergency exit stairways. A HT relay on the tactical channel shall be used.

2.9.3 Sound powered phone systems have been installed in every under river tube except the Joralemon Tubes between Brooklyn and Lower Manhattan. AUC 207, Addendum 10 explains sound powered phone systems and equipment in detail.
2.9.4 Blue Light Phones
AUC 207 provides detailed instructions on the use of the blue light phone system. This is a Centrex system, similar to the FDNY phone system. In the under river tubes, phones are designated by blue lights and are found near the emergency power removal boxes, approximately 600 feet apart. A member using a blue light phone in the tube can call the TA Trainmaster or the phone in the token booth of the nearest station.

2.9.5 TA Portable Radios
TA portable radios are carried by conductors, train operators and TA supervisors. These radios may not work above ground. A communications link may be established from a TA portable radio to the trainmaster, who could then relay information to the borough dispatcher.

2.9.6 Post Radio
Do not use Post Radios in immediate vicinity of signals, communications equipment or train operator cabs, due to the possibility of electrical interference. Notify NYCT when Post Radios are in use within the subway system. The increased wattage of these Post Radios may increase our operating range. Post Radios may be useful to communicate above ground from one side of the river to the other.

2.9.7 Operational Considerations
• Redundant means of communication must be established between the street and the tube, in case any one method fails.
• The Sound Powered Phone system is an extremely important option for communications in under river tubes. Members using Sound Powered Phones in the tubes should use headphones and amplifiers to overcome high levels of background noise.
• A blue light phone cannot be used to call outside the system, but can receive calls from outside the system. To call a blue light telephone from outside of the system, dial 1 + the area code (usually 718) + the three digit exchange + the four digit extension number.

Figure 11A
Sound powered phone hookups. Figure 11A is a handset and Figure 11B is a headset. The headset use is recommended inside the tubes due to high levels of background noise.
2.10 Ventilation

All NYCT under river tubes have reversible fans at both ends, usually in the vicinity of the emergency exits nearest to the water (exceptions: there are no fans on the Brooklyn side of the Greenpoint-Jackson Ave Tubes, or on the Bronx side of the 149St Tubes). There are no ventilation fans or ductwork in the tubes themselves. See AUC 207, Addendum 8 and Section 4.6 of this bulletin for information about ventilation management.

2.11 Operational Guides

Two-sided, Operational Guides have been developed to provide information regarding each individual under river tube. An example of one appears below. Side “A” contains maps, pictures and information to locate a particular set of tubes, the associated emergency exits, and stations. Side “B” contains a diagram of the tube and information about emergency exits, distances, and crossovers. The Operational Guides for all NYCT under river tubes are contained in Addendum 1 (Figures 12 and 13).

![OPS GUIDE 3A - IRT 2,3 LINES- CLARK STREET TUBES (AKA WESTSIDE/7TH AVE/FURMAN STREET TUBES)](image)

Figure 12

Side “A” of the Operational Guide for the Clark Street Tubes. The IC can use this side of the guide to determine where to assign resources. Individual units can use it to understand where they need to go to carry out their assignments.
Figure 13
Side “B” of the Operational Guide for the Clark Street Tubes. The lengths of the under river sections of the tubes are shown, along with the distances from the closest stations to the emergency exits at the start of the tubes. Column numbers provide a means to estimate the distance from an incident to an exit or a station. Standpipe outlets throughout most of the tubes are numbered, as indicated by the numbers in the red circles. In every tube, except the Joralemon Tubes, sound powered phone jacks are located at the standpipe outlets. The information in the lower corners pertains to the land-side of the tube directly above. For example, the information bullet in the lower left corner of this guide pertains to the emergency exit and crossover on the Manhattan side.

3. FIRST ARRIVING UNITS

3.1 Recognition of a Serious Event
It is critical that Fire and EMS units responding to incidents in under river tubes or nearby stations evaluate all available information to distinguish between routine and more serious incidents.

Indications of a serious incident:
• Reports indicating heavy smoke or fire, an explosion, or a chemical release.
• Dispatcher receives information from several sources, possibly from both sides of tube.
• One or more trains are stuck in the tube.
• Reports of numerous sick or overcome passengers.
• Unusual smoke or vapors in the station.
• Other information obtained from rail personnel or passengers.

If a potentially serious incident is suspected, assume a defensive position while performing a thorough size-up and hazard assessment.
3.2 Size-Up

The acronym “LIVES” can be used to organize a preliminary size-up: **L**

**Location of Incident**
- Is the incident in an under river tube?
- Identify the line and direction (e.g., Brooklyn bound “F” Train).
- Which borough is the incident closer to?

**Life Hazard**
- Will vary based on time of day (rush hour vs. off-peak).
- During rush hour, several crowded trains may be in one tube at the same time.

**I Incident Information**
- Determine nature of the incident (fire, explosion, CBRNE).
- Establish contact with TA.
- Obtain information from passengers who have self-evacuated. Observe passengers’ physical condition. How far did they walk?
- Take meter readings (RAD-50, CO, Chemicals)
- Are incidents occurring elsewhere that may be related? **V**

**Ventilation**
- Ventilation put into operation prior to FD arrival.
- Ventilation options available.

**E Evacuation**
- Are passengers remaining on the train, or are they self-evacuating?
- Has evacuation been initiated by TA personnel?
- If passengers are evacuating, can they be directed to walk in one direction, or are they walking both ways?

**Egress and Access Points**
- Emergency Exits
- Crossovers
- Train stations

**S Safety**
- Secondary device awareness.
- Supervision. Special call additional Battalion Chiefs as needed.
3.3 Initial Actions
   Initial efforts should focus on assisting self-evacuating passengers. Units assigned to stations should check nearby tunnels for victims. Units assigned to emergency exits should do the following:
   - Consult the Emergency Exit Guide Book or Operational Guide to verify that operations are being conducted at the correct emergency exit.
   - Open exit door and assess the situation:
     - Presence of smoke, haze, odors.
     - Meter results.
     - Presence of unusual sounds (explosions, persons in tunnel or exit shaft, water flow indicating ruptured standpipe or damage to tube).
     - People heard or observed in exit stairwell.
   - Assist/guide ambulatory persons to a safe location.
   - Inform dispatcher which emergency exit you opened. If passengers are self-evacuating, request power-off on the affected track(s).

4. FIRST ARRIVING BATTALION CHIEF

4.1 Size-Up
   Refer to the Chief Officer Operational Checklist (AUC 337). Consult the appropriate Operational Guide to determine the locations of stations and/or emergency exits which provide the most direct access to the incident.

4.2 Request Necessary Resources
   - Special call a Battalion Chief, at least one engine and one ladder, and a unit with monitoring capability to stage at the stations and the emergency exits nearest to the under river tube.
   - At an incident like this, SOC resources may be stretched thin and should be used only as necessary for monitoring, structural assessment, and technical rescue. If use of the SOC Rebreather System is being considered, request it as soon as possible, due to the time it takes to put into operation.
   - Ensure that EMS requests appropriate resources for a Rapid Transit/Rail incident.
   - Special calls or additional alarms for victim removal.
   - Emergency Rail Cart equipped units.

4.3 Coordinate and Control Actions of Units
   - Members should assist evacuating civilians, but they should not be committed too far into a dangerous area until a proper hazard assessment is completed.
   - Tight control of the scene must be exercised. It is critical that we prevent well meaning personnel from crowding tunnels and emergency exits, thereby impeding the rescue effort. We need to develop a plan of action, and then commit the minimum amount of personnel under the maximum supervision.
4.4 Establish Command Post
The best location for the Command Post may not be evident until the situation is more well-defined. The Command Post location should provide:

- Communication capability between the Command Post and the under river tube.
- Protection from smoke, hazardous materials and excessive noise (upwind and a safe distance from the ventilation system exhaust fans).
- Sufficient room for representatives from numerous agencies.
- In most cases, the initial Command Post will be located at the station closest to the tunnel, in the borough of the first assigned Deputy Chief.

4.5 Power Removal

- Members must be aware that the TA will be attempting to move any operable trains out of the affected tube in the early stages of operations. It is important that the IC considers this when requesting power removal. Moving trains out of the tube may save lives and lessen the rescue problem, even if it delays power removal.
- If contact has been made with the train, determine if passengers can be sheltered in place on the train. If so, consult with the TA Trainmaster about the possibility of leaving power on and providing a rescue train on the affected track.
- If there is any indication that civilians are on the track, power removal must be requested in the affected tube.
- If a member in the tube operates the power removal box, make immediate notification to the trainmaster via the emergency phone. (Figures 14A and 14B) Also, notify the IC who shall relay information to the borough dispatcher.
- A decision will need to be made regarding the power status of the adjacent tube, which may be accessible via the crossover at the emergency exit. If passengers and/or firefighters are in the adjacent tube, request power removal. After the adjacent tube is searched and secured, the IC may request a “Rescue Train” be routed through this tube, in which case the power would have to be restored.
- Extreme caution is required at all times. As always, operate as if power is still on.

Figure 14A shows the power removal box and emergency telephone box. There is a separate set of power removal boxes in each tube. Figure 14B shows the emergency telephone. See AUC 207 for information on emergency (blue light)
4.6 **Control Ventilation**

- It is critical to contact the trainmaster to determine fan status, and to obtain available information about smoke conditions in the tube, especially in the vicinity of any stalled trains. Initially, the dispatcher provides this information. The IC may also contact the Trainmaster by cell phone. Ventilation will be one of the highest priorities of the TA Liaison Battalion Chief upon his/her arrival at the TA Command Center.

- As stated in AUC 207, Addendum 8, evacuation should take place away from any fan operated in the exhaust mode. This may not be possible at an incident in an under river tunnel. If a fire or explosion occurs in the middle of a train, passengers may self-evacuate in both directions.

- Be cautious when changing the ventilation actions that were initiated by the Trainmaster. These actions may have been based on specific information that we are not aware of. Also, there may be unintended consequences of such a change. For example, smoke that was previously pushed away from the scene may still be in the tunnel and could be drawn back if fan direction is reversed.

- If possible, exhaust smoke and other contaminants away from evacuating passengers by using the fans on one side in the supply mode while using fans on the opposite end in the exhaust mode. Be aware that a stationary train may block much of the airflow through the tube. Also, any damage to the train due to a derailment or an explosion may further obstruct airflow.

- Due to the complications outlined above, it is impossible to provide strict guidelines for fan operation. Decisions will have to be made by the IC on a case-by-case basis. When making decisions, choose actions that maximize safety and rescue opportunities. Monitor results of actions taken and make the necessary adjustments.

If the IC is considering deployment of members into a tube in which a smoke condition exists:

- The operation of the ventilation system must be coordinated with the movement of personnel. For example: determine the best side from which to enter and exhaust the smoke in the opposite direction. It may be necessary to withdraw members from the opposite end of the tube.

- If SCBA will be needed at the incident location, the ventilation system must be operated to create a clear area near the point of operations, where storage and replacement of SCBA cylinders can take place.

- Consider the use of one-hour cylinders.

- Request the response of the SOC Rebreather System. Be aware of the time it takes to put rebreather masks into operation. If multiple incidents are occurring simultaneously, SOC units will be severely taxed. A determination may need to be made as to which incident is most in need of the Rebreather System.

4.7 **Communicate with TA Liaison**

A Battalion Chief will be dispatched to the TA Command Center as soon as it is apparent that a serious incident has occurred. The TA Liaison will be a tremendous asset to operations by providing current information to the IC and explaining FDNY concerns to the Trainmaster. See AUC 207, Addendum 13 for more information on TA Liaisons.
5. **FIRST ARRIVING DEPUTY CHIEF**

5.1 Actions Enroute to Incident
- Request any additional information from dispatcher.
- Consult the Operational Checklist and the Operational Guide for that specific tube.

5.2 Ensure Hazard Assessment is Performed and Updated
- Ensure metering of atmosphere at emergency exits and stations. If an explosion has been reported, suspect a dirty bomb.
- If a terrorist act is suspected, communicate with the NYPD about possible secondary devices. Provide security for the Command Post (CP), Staging Areas etc.
- A serious explosion or a high speed derailment could cause structural damage to the tube, resulting in localized or generalized collapse, or flooding due to damaged tube walls. Ensure that FD units perform a structural analysis. Consult with TA structural engineers.

5.3 Develop Communications Plan
- Special call a BC to serve as Communications Unit Leader.
- If another significant incident is ongoing in the vicinity, determine alternate Primary Command and Primary Tactical Channels. Select from HT channels 3-8, based on Communications Manual, Chapter 11. Advise dispatcher for transmittal to incoming units.
- Ensure communication between branches.
- Identify available means of communication from the CP to the tube and emergency exit shafts. Implement at least two methods.
- Establish inter-agency communications.
- If an improvised explosive device (IED) is suspected, do not allow HT or cell phone use within 150 feet of incident.
- Utilize the Field Communications Unit.
- Refer to Section 2.9 of this document for more information

5.4 Re-evaluate Ventilation Procedures

5.5 Perform a Risk/Benefit Assessment before committing members
- What is the potential for viable victims? What do we need to do to save them?
- What are the risks to rescuers? Are the potential benefits worth the risks?
- What measures can be taken to maximize safety of operating members?

5.6 Implement ICS as Necessary
- Establish branches on each side of river.
- Establish sectors, groups, and teams as necessary.
- Staff Safety, Information and Liaison functions of ICS staff.
- Identify potential locations for Staging Areas.
5.7 CIMS
A significant incident will result in the response of numerous city, state and federal agencies. The following points will assist in the establishment of CIMS compliant Incident Command:
• FDNY is the Primary Agency at fires in the NYCT system.
• NYPD is the Primary Agency at CBRNE/hazardous materials incidents (terrorist/criminal event), and may choose a unified or single command. In either case, there will be a unified operations section, where FDNY directs lifesaving operations.
• Other transit incidents call for unified command.
• FDNY Core Competencies include: Fire Suppression, Pre-hospital Emergency Medical Care, Search and Rescue, and CBRNE/hazardous materials, Life Safety and Mass Decontamination.
• FDNY will provide tactical direction for the search and rescue of victims at fires, emergencies, confined space, collapse, CBRNE/hazardous material, aviation, railroad and auto incidents, utility emergencies, etc.

6. OPERATIONS INSIDE UNDER RIVER TUBES
Preparations for operations in under-river tubes have three main elements:
• Reconnaissance
• Planning
• Logistics

6.1 Reconnaissance
Depending on the results of the size-up and hazard assessment, the IC may authorize limited entry into the tube for reconnaissance (recon). This would provide us with invaluable first hand information about incident conditions.

6.1.1 A Rescue or Squad Company would be a logical choice as a recon unit for the following reasons:
• Metering capability
• 1 hour SCBA cylinders
• Knowledge of structural issues

6.1.2 Before committing the recon unit:
• Establish a communications link.
• Attempt to determine the best borough to approach from.
• Check status of TA ventilation equipment. Make sure that fan operation is compatible with entry of the recon unit.

6.1.3 Starting at the point of entry into the tube, the recon unit shall operate their meters to determine if the atmosphere is compromised. Meter detection shall include any or all of the following:
• Chemical
• Radiological
• Biologic
• Oxygen and CO levels
6.1.4 Report to the IC
   • What happened
   • Location
   • Structural damage to train and/or tube due to explosion, derailment, etc.
   • Other hazards: atmosphere, electric, water flow
   • Estimated casualties
   • Are there viable victims
   • What will be required to perform rescues: tools, shoring, backboards, rebreather masks, etc.

6.2 Planning
Due to the cramped, hazardous work environment encountered in under river tubes, careful planning is mandatory prior to commitment of members.

The planning process should include the following steps:

6.2.1 Analyze information obtained from all sources (TA, FD members operating in stations and emergency exits, evacuating passengers, Operational Guides, NYCT maps, etc.)

6.2.2 Set realistic goals
   • What are we trying to accomplish?
   • What can be accomplished?

6.2.3 Determine what can be done to maintain the highest degree of safety for operating members.

6.2.4 Plan tactics in proper sequence. For example, don’t be carrying bulky equipment down an emergency exit while the exit is being used for evacuation.

6.2.5 Establish sectors, groups and task forces as necessary to maximize efficiency and control. (Figure 15)

![Figure 15](http://example.com/figure15.png)

Example of how a large scale operation can be organized into geographical and functional units.
6.2.6 Designate locations for Decontamination, Staging Areas, Casualty Collection, etc.

6.2.7 Begin intermediate and long range planning.

- Request USAR Team response. Among its many capabilities, a USAR team provides surgeons who can perform on scene amputations, if necessary.
- Family Assistance: A mass casualty incident may bring many family members to the scene. To manage this situation, utilize NYPD, Red Cross, and the media for information and instructions. If a Family Assistance Area is designated, it must be at a secure location, remote from operations.

6.3 Logistics

A massive search and rescue operation in an under river tube will present significant logistical requirements, which will take time to assemble and put in position. If supplies and equipment are needed at track level, consider loading them onto a rescue train at the nearest station for efficient transport to point of operations (Section 7.2.2 C).

6.3.1 Respiratory/face protection

- Provide 45 minute and 1 hour SCBA cylinders to both sides of the incident. Special call MSU and/or a High Rise Unit, if necessary.
- Ensure availability of APR adaptors and canisters. Even if continuous SCBA use is not necessary, we can expect large quantities of dust, including steel dust, to be airborne. This dust may affect members’ eyes and respiratory systems.

6.3.2 Communications

- Sound Powered Phone equipment

6.3.3 Lighting

- Hand lights, glow sticks, portable lighting
- Lighting methods should cause as little noise and heat buildup as possible
- Monitor for CO buildup when using generators to operate portable lighting

6.3.4 Patient care supplies and equipment

- Oxygen
- Splints and bandages
- SKEDs
EMS Logistical Support Units (LSUs) contain a large quantity of medical supplies and equipment and should be requested by EMS onsite.

6.3.5 Transportation

- Rescue train in the affected tube or in the adjoining tube at the emergency exit crossover
- Rail carts
- Personnel needed to transport supplies and equipment to secure location close to the operation

6.3.6 RAC

There may be a need for RAC supplies at track level. These supplies will have to be transported to track level by full duty personnel.
7. VICTIM REMOVAL

7.1 Triage
Triage duties within under river tubes will probably be performed by Rescue Paramedics and/or CFR trained firefighters. The triage process needs to be modified due to the imminently hazardous environment and the cramped work areas. The guiding principle should be to remove the largest number of victims as quickly as possible.

Victims should be removed in the following order:

7.1.1 Ambulatory Victims
Evacuate passengers who have walked from the incident to the emergency exit.

7.1.2 Non-Ambulatory Victims
• Red Tag (Immediate Transport)
• Yellow Tag (Delayed Transport)

7.1.3 Victims Requiring Disentanglement/Extrication
• Red Tag (Immediate Transport)
• Yellow Tag (Delayed Transport)

7.1.4 Black Tag (deceased victims)

7.2 Removal of Ambulatory Victims from Tube
Ambulatory victims should be evacuated before beginning the difficult, labor-intensive work of removing non-ambulatory victims.

7.2.1 Personnel Deployment
• Control the number of members assigned to assist evacuation; use only as many as are necessary to guide victims.
• Spread out and establish HT relay, as well as a mode of backup communications; provide lighting and directions.
• Assign one or more Battalion Chiefs to the base of the emergency exit stairway and the tube to coordinate the evacuation. Consider establishment of ICS sectors, groups, etc. (Figure 15)

7.2.2 Movement of ambulatory victims out of the tube. Once victims have reached the area at the base of the emergency exit stairs, there are several possible removal options:

A. Direct passengers to walk along the track to the nearest station
The decision to move passengers along the track to nearest station will be based on travel distance, patient condition, and the status of 3rd rail power.
B. **Emergency Exit Stairways**

Evacuating passengers via emergency exit stairs may be a viable choice in some instances, depending on depth of the shaft, stairway configuration, and smoke condition. However, emergency exit stairs may be difficult to climb. If a person stops climbing the stairs due to injury or fatigue, the evacuation may be delayed or brought to a standstill. FD members attempting to descend a stairway must first allow civilians to evacuate. When two staircases are present, designate an Evacuation Stairway and an Attack Stairway.

In some cases, there is another set of emergency exits between the tube and the nearest station. These exits should be evaluated as an alternate or supplemental means of egress.

C. **Rescue Train**

A Rescue Train would take some time to put in operation. It would be useful to remove victims who are non-ambulatory, or too weak to evacuate on foot. CFR units and/or EMS personnel should initiate treatment on-board the rescue train, conditions permitting. Consider loading medical equipment onto rescue train at the nearest station. There are two possible scenarios for use of rescue trains:

- A rescue train may be used on the track in the adjacent tube, accessed via the emergency exit crossover. Power would remain off on the track where the incident took place. Passengers would have to walk or be carried from the incident scene to crossover at the emergency exit.
- Rescue train on same track as incident. Although unlikely, this may be possible if passengers are not on the tracks and they can be sheltered in place on the affected train, allowing 3rd rail power to remain on. Passengers would only have to be moved a short distance along the benchwall from train to train.

**Note:** Potential rescue trains should be swept for secondary devices by law enforcement personnel prior to deployment.

7.3 **Removal of Non-Ambulatory Victims from Tube**

Removal of non-ambulatory victims will be labor-intensive and will require increased personnel and logistical support.

- **7.3.1 Victim Removal Relay Teams** may be used to remove non-ambulatory victims. Teams would spread out from victim location to emergency exit. Victims would be passed from team to team in a relay fashion. This action would prevent carrying teams from having to pass each other in a narrow space. The relay concept has been tested in FDNY exercises and found to be a more efficient method of moving large numbers of patients over significant distances.

- **7.3.2 SKED stretchers** have proven to be useful to move patients long distances over difficult terrain.
7.3.3 Rail carts, which ride on the tracks, are the primary method for moving patients and equipment. The carts are:
- Safer
- Decrease fatigue of the personnel requested to transport patients and/or equipment
- More efficient than any other method

7.3.4 Rescue trains (See Section 7.2.2 C)

7.4 Disentanglement/Extrication
In the next phase of operations, victims requiring extrication will be removed. Extrication will be extremely challenging for several reasons:
- Difficulty gaining access to damaged areas of the train.
- Adverse environmental conditions: heat, darkness, smoke, dust, water, and mud.
- Contamination of atmosphere with the use of gasoline-powered generators and tools.
- Difficulty with movement of tools to point of operations.

Specific extrication plans will be developed on-site under the direction of the Rescue Battalion.

7.5 Recovery
A serious incident in an under river tube would likely cause fatalities. After all live victims are removed; crime scene investigation and removal of remains will be the primary concerns. All of the problems listed above will still be encountered. As time passes, the environment will get progressively more difficult to work in due to decaying body parts, vermin, etc.

8. UNIT OPERATIONS
In addition to SCBA and spare cylinders, all units ordered to operate inside under river tubes shall be equipped with APR adaptors and canisters to protect eyes and respiratory tracts from steel dust and other contaminants.

8.1 Engine Company Operations
8.1.1 Assignments will vary based on the needs of the operation. Units may perform several tasks, including:
- Firefighting
- CFR Duties
- Communications: augment HT relay, operate sound powered phones.

8.1.2 Tools and Equipment
- Full PPE
- Rolled lengths of 2½” hose
- Standpipe kit (including FT-2 nozzle, chocks and pressure gauge)
- CFR equipment, including SKEDs, backboards, triage tags
8.1.3 Fire Operations
- Confirm power removal, but operate as if power is on.
- Use FT-2 nozzle.
- It is most likely that handlines will be operated from standpipe outlets. If the incident is very close to an emergency exit, it may be feasible to stretch a handline via the exit. However, we cannot operate from an emergency exit in a manner that hinders passenger evacuation.
- When stretching a hoseline through a train, it may be necessary to chock numerous car doors to reach the fire. Many chocks would be required.
- Several units may need to work together to stretch and operate a handline.
- Consider the use of dry chemical extinguishers, which are located at the blue lights in the tube.

8.1.4 CFR Duties
Triage, treatment and transport. Assist EMS or perform these tasks if EMS is unable to operate in the hazardous environment.

8.2 Ladder Company Operations
The tasks listed below may be too numerous for the first alarm ladder companies. The IC must monitor progress and special call additional units as necessary.

8.2.1 Size-Up/Assist victims who are self evacuating.
- Verify location and nature of the incident.
- Determine how many trains and cars are affected and number of passengers that require assistance.

8.2.2 Establish Communications
- Ensure HT Relay is set up and later arriving units should augment as necessary.
- Utilize agency-specific radios (NYCT portable radios and Subway Repeater System).
- Deploy sound powered phones.

8.2.3 Ventilation
Communicate with the Incident Commander about the status of ventilation:
- Are ventilation fans operating?
- What effect are they having?

8.2.4 Entry, Search and Rescue
- Determine the best access to the incident. Depending on fire/emergency location, units approaching from opposite end of tube may have better access.
- Entry to hazardous locations only after proper hazard assessment and approval of IC.
- Be aware of your surroundings and possible landmarks that can pinpoint your location, including blue light/power removal boxes, standpipe outlets, and signal and column numbers.
8.2.5 Deliver and Operate Tools

• Standard firefighting tools, for use in initial stages of the operation, including:
  o Wooden hooks
  o Forcible entry tools
  o Bolt cutters (to gain access to Emergency Evacuation Devices)

• Specialized Tools. The following tools may prove useful and should be considered:
  o Cordless Sawzalls™
  o Glow sticks (provide light without extra noise or heat)
  o Suitcase/scissor ladders and A frame ladders. (Useful to move from track level to benchwalls, train cars and emergency exit platforms)
  o Cutters Edge saw blades, Hurst™ tools (Hurst™ tools may be difficult to transport to the point of operations)
  o Dry chemical extinguishers
  o Search ropes
  o Thermal imaging cameras
  o Torches and gas saws (may cause unacceptable contamination of the atmosphere)

Note: Do not carry down unnecessary tools; this will waste effort and possibly crowd an already congested work area.

8.3 SOC Unit Operations

When making assignments, the IC must attempt to keep sufficient SOC units available for specialized tasks, particularly if the use of Rebreather Masks is under consideration. Utilize resources appropriately. The following assignments would require SOC units and/or SOC Support Ladder Companies:

8.3.1 Atmospheric Monitoring

One of the most important initial duties of SOC units will be atmospheric monitoring. Hazardous Materials Company 1, Hazardous Materials Technician Units and SOC Support Ladder companies should be special called to assist.

8.3.2 Rebreather Operations. Follow procedures as explained in TB Masks, Addendum 4.

Note: In the event multiple incidents have transpired simultaneously, this response may be greatly compromised.
  • For extended operations into a tunnel with a distance of up to 300 feet from the point of entry, consider using SOC units with their supplied air cart and hose.

8.3.3 Structural Assessment of the tube and the train, due to damage from explosions, fire or high speed derailment.
8.3.4 Shoring
- Vertical-ceiling
- Lateral-walls
- Shoring of derailed cars

8.3.5 Use of Special Tools and Equipment
Officers of SOC units shall inform the Incident Commander of any special tools carried that would be useful in addition to the tools listed in Section 8.2.5:
- Extrication equipment that would minimize the generation of fumes, heat and noise.
- High Angle equipment and a haul system may be needed where emergency exits have exceptionally steep stairs, for removal of incapacitated patients.

9. SAFETY

9.1 Some of the many potential hazards are listed below:

9.1.1 Electrical Power
Third rails in the affected tube and in adjacent tubes may be live. In addition, 1,000 volt lines may run throughout the tubes at ceiling level. (Figure 16)
These lines are not deactivated by routine requests for power removal. An explosion or derailment may cause these high voltage lines to come in contact with the metal skin of the car. Electrical fires may generate thick, irritating smoke.

9.1.2 Secondary Devices
If a terrorist event is suspected, the possibility of secondary devices must be considered. Communication with law enforcement personnel is necessary to properly evaluate and manage this risk.

9.1.3 Moving Trains
Members may encounter moving trains. Increased noise levels and powerful air movement are indications of train movement. A distant light reflecting on the running rails, or vibration in the tracks, are also indications of an approaching train. Always be aware that trains may be traveling in any direction at any time. Also, be aware that train movement may move smoke in unexpected directions.
9.1.4 Respiratory Contamination
Smoke, toxins, radiological contamination are all possible. A thorough hazard assessment must be completed prior to committing members. If chemical contamination is suspected, is the substance lighter or heavier than air? This may influence whether to evacuate passengers via the roadbed or the benchwall.

9.1.5 Dust
An explosion, collision or derailment would generate large amounts of airborne dust. In addition to being a respiratory hazard, the dust would severely affect unprotected eyes. Members must have SCBA facepieces equipped with APR adaptors and canisters.

9.1.6 Limited Access/Egress
Once committed to the tubes, members must realize that the route they approached from may be their only means of egress. Conditions at the scene may not allow members to pass to the other side of the incident.

9.1.7 Poor Visibility
Dust, smoke, and darkness will severely reduce visibility.

9.1.8 Structural Failure
• A severe explosion or a high speed derailment may cause structural damage to the tube itself. Catastrophic tube failure could result in extensive flooding.
• A serious fire could cause spalling of the concrete tube ceiling.
• The cars of a derailed train may hang precariously and collapse suddenly if not properly shored.

9.1.9 Water
A waterflow could be caused by either a failure of the tube wall or by a ruptured standpipe.

9.1.10 High Heat Conditions

9.1.11 Biological Contamination
Numerous severe injuries will result in body parts and bodily fluids at the incident scene. As time passes, high heat conditions in such an enclosed area will result in tissue decomposition.

9.1.12 Noise

9.2 Actions

9.2.1 The IC must designate a Safety Coordinator. If a separate branch exists on each side of the incident, designate a Safety Coordinator for each branch.

9.2.2 Assign EMS, a FAST Unit and a CFR-D Engine to each branch.

9.2.3 Use the Under River Tube Safety Checklist found in AUC 337.
9.2.4 Direct Safety Coordinator to develop a safety plan including the following elements:
- Hazard Assessment
- Risk/Benefit Analysis
- Minimum commitment of personnel with maximum supervision. Monitor work time and SCBA use. Relieve or rotate members as needed.
- Appropriate PPE. Due to the remote location and adverse conditions of the incident, if the correct PPE is not brought to the scene, it could prove to be disastrous.

9.2.5 Treat as Confined Space Operation. Take precautions accordingly.

9.2.6 Continuously monitor the atmosphere in the tube. If there is smoke or other atmospheric contamination:
- Can ventilation be controlled to provide safe scene access to FDNY personnel?
- If SCBA use is necessary, can a Forward Staging Area be established in clean air in the vicinity of the incident, where SCBA cylinders can be stockpiled and changed safely?

10. CONCLUSION

Preparation is the best way to overcome the hazards and operational difficulties inherent in under river operations. All members are responsible for appropriate operating and safety procedures.

On a unit level:
- Are you familiar with the emergency exits and under river tubes in your response area (not just the ones your company inspects)?
- Are new firefighters and officers trained?
- Do you have sound powered phone equipment on your apparatus? Do you know how to use it?
- Do you have glow sticks? Why and how may they be used?
- Are your APR adaptors and canisters accessible and in good condition?

Divisions and Battalions should visit critical subway stations and emergency exits, and pre-plan possible locations for staging, casualty collection, mass decontamination, etc. They should work with the Public Transportation Safety Unit and EMS commanders to develop inter-borough drills, designed so that units can test specific equipment and procedures. Communication and patient care (triage, treatment and transport) should be emphasized.

The FDNY must constantly look for ways to improve equipment, knowledge and operational effectiveness in one of our most difficult work environments.