Buildings and Infrastructure Protection Series

Integrated Rapid Visual Screening of Mass Transit Stations

BIPS 02/March 2011

Homeland Security

Science and Technology

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Foreword and Acknowledgments

Since the events of September 11, 2001, government officials, law enforcement, the design community, transportation specialists, and first responders have understood that the risk environment has changed and that the Nation's critical assets must be protected. The Department of Homeland Security (DHS) has identified transportation infrastructure as a Critical Infrastructure and Key Resource (CIKR) Sector. Mass transit, which includes heavy rail, light rail, commuter rail, trolleys, and buses, is part of the transportation infrastructure. Mass transit stations function as hubs to allow passengers to board and disembark from mass transit vehicles and to transfer between modes of transport.

"Integrated" in IRVS indicates that the methodology includes the risk of both terrorist acts and natural hazards and an assessment of both risk and resiliency.

DHS has sponsored the development of a methodology for assessing the risk and resilience of mass transit stations to terrorist attacks and selected natural hazards. The methodology, referred to as the integrated rapid visual screening (IRVS) for mass transit stations, was developed by the DHS Science and Technology Directorate (DHS S&T), Infrastructure Protection and Disaster Management Division, in partnership with public and private-sector stakeholders involved in the design, operation, and management of critical infrastructure.The result of an IRVS of mass transit stations is a quantifiable assessment of the risk of a given mass transit station to a terrorist attack or natural disaster that leads to catastrophic losses

(fatalities, injuries, damage, or business interruption) and a quantifiable assessment of the resiliency of the station (ability to recovery from such an event).

Need and Purpose

The number of mass transit stations and number of people who use mass transit make mass transit a target for terrorists. In the United States, there are more than 1,025 mass transit stations, and in 2008, passengers took 10.5 billion trips on mass transit and rode transit vehicles for 55.1 billion miles. The largest transit agency, the Metropolitan Transit Authority New York City Transit, carried passengers on 3.3 billion trips for 11.9 billion miles (American Public Transit Association, 2010).

In the United States, there are more than 1,025 mass transit stations.

Terrorist attacks on subway stations and in tunnels have wreaked significant damage and caused societal disruption. Aggressors have successfully orchestrated mass transit attacks in well-guarded major cities. For example, in 2004, train bombs in Madrid killed 191; in 2005, suicide bombers in London's subway killed 52; in 2006, train bombs in Mumbai killed 209; and, in 2010, a terrorist attack in Moscow's subway killed at least 40.

Furthermore, mass transit can often be subjected to the collateral damage of attacks on other targets because of its location. For example, collateral damage from the attacks of September 11, 2001, rendered the Port Authority Trans-Hudson (PATH) commuter rail line and station unusable for 2 years. The PATH station and tunnel were connected to the World Trade Center towers via an underground concourse and shopping center. The collapse of the towers destroyed the station and led to flooding in the tunnels. The rail line carried 67,000 passengers to Lower Manhattan every weekday (FHWA, 2003).

In 2008, passengers took 10.5 billion trips on mass transit and rode transit vehicles for 55.1 billion miles.

The goals of terrorists are to attract attention, disrupt the economy, create fear, and disrupt the social fabric. Selected targets may not have a pattern. Terrorists may use methods that have been used before or they may use new methods. The possibility that new methods may be used complicates mitigation.

To better quantify, qualify, and mitigate the risks to mass transit systems, DHS S&T has dedicated resources to developing risk assessment and mitigation tools to protect mass transit stations and tunnels. The assessment of mass transit stations is described in this document, and the assessment

of tunnels is described in the *Integrated Rapid Visual Screening of Tunnels* (DHS, 2011b).

The primary purpose of the IRVS of mass transit stations is to rank the risk in a group of mass transit stations in a community.

The primary purpose of the IRVS of mass transit stations is to rank the risk in a group of mass transit stations in a community. The results of an IRVS can also be used in infrastructure-specific risk assessments and higher level assessments of threats, consequences, and vulnerabilities.

This document is the manual for conducting an IRVS of mass transit stations, including subway stations, and as such, provides guidance in rating a mass transit station's potential risk of and resiliency to terrorist attacks and selected natural disasters (fire and flooding).

Relationship of the IRVS of Mass Transit Stations to the Risk Management Series

The technical concepts and field application of the methodology are based on the Risk Management Series (RMS), a widely accepted series of publications that provide risk evaluation methods and design guidance for mitigating multihazard events. The design concepts from the RMS are represented in the IRVS methodology in the evaluation of favorable and unfavorable characteristics of a mass transit station that influence the risk of the structure to specific threats.

Furthermore, the field application of the IRVS reflects the procedures for risk assessment outlined in several RMS publications. The series was developed by DHS's Federal Emergency Management Agency (FEMA) after the events of September 11, 2001. The IRVS methodology is drawn largely from the following three RMS publications:

- FEMA 426, *Reference Manual for the Protection of Buildings Against a Terrorist Attack* (DHS, 2011c)
- FEMA 452, *Risk Assessment, A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings* (FEMA, 2005)
- FEMA 455, *Handbook for Rapid Visual Screening of Buildings to Evaluate Terrorism Risk* (FEMA, 2009)

The differences between the rapid visual screening (RVS) described in FEMA 455 and the IRVS of mass transit stations described in this manual are:

- RVS is used to screen buildings, and IRVS is used to screen mass transit stations
- RVS focuses on the risk of terrorists acts, and IRVS focuses on both terrorist acts and selected natural hazards (fire and flooding)
- RVS focuses on risk, and IRVS focuses on both risk and resiliency

"Integrated" in IRVS indicates that the methodology includes the risk of both terrorist acts and natural hazards and an assessment of both risk and resiliency.

Relationship of the IRVS of Mass Transit Stations to the National Infrastructure Protection Plan

The IRVS methodology closely follows the general risk management framework and definitions identified in DHS's National Infrastructure Protection Plan (NIPP) (DHS, 2009b), including the Critical Infrastructure and Key Resources (CIKR) Sectors. The risk management framework in the NIPP involves scenario-based consequence and vulnerability estimates and an assessment of the likelihood that a postulated threat will occur. The IRVS is based in part on the NIPP's core criteria for risk assessments, as follows:

- **Documented** – This manual includes the types of information that are collected during the IRVS and how the information is synthesized to generate a risk and resiliency assessment. All assumptions, weighting factors, and subjective judgments are explained.
- **Reproducible** – The methodology has been tested to ensure that the results are reproducible.
- **Defensible** – The components of the methodology are integrated logically, and disciplines that are relevant to the methodology are incorporated appropriately (e.g., engineering, architecture, construction, emergency management, security). The methodology has been tested to ensure that the results are reproducible, and the results produced by the methodology have been validated.
- **Complete** – The methodology includes an assessment of consequences, threats, and vulnerabilities for every defined scenario and an assessment of the resiliency to postulated threats.

The NIPP includes the 18 CIKR Sectors that are identified in Homeland Security Presidential Directive 7. CIKR Sectors are the assets, systems, and networks that provide similar functions to the economy, government, or society. The IRVS incorporates the 18 CIKR Sectors in the target density

evaluation and includes all sectors in determining the threat of collateral damage from attacks on other targets.

Partnership

DHS S&T worked in partnership with several public and private sector organizations to develop the IRVS methodology. The partners reviewed the factors involved in risk and resiliency scoring and conducted pilot and field studies of a variety of mass transit stations throughout the Nation. Equally important was the cooperation provided by the Metro Boston Transportation Agency and the Port Authority of New York and New Jersey. All agencies provided DHS with invaluable information, including how the methodology could realistically be expected to be used, which helped determine the scope of the methodology.

Intended Audience

This manual is intended for both technical and stakeholder audiences. Technical audiences include potential screeners and personnel who are knowledgeable about mass transit stations but who may not have a high level of expertise. Stakeholders include owners, operators, and decision-makers involved in the planning and maintenance of transit stations.

The intended audience includes:

- Transportation authorities
- City, county, and State officials
- Emergency managers
- Law enforcement personnel
- Facility managers
- Security consultants
- Engineers, architects, and other design professionals

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Overview

In this chapter:

The methodology, referred to as integrated rapid visual screening (IRVS), can be used by transit agencies to assess a transit system that includes buildings, tunnels, and mass transit stations.

In response to the need to improve the protection of the Nation's critical assets, the Department of Homeland Security's Science and Technology Directorate (DHS S&T) has initiated the development of a methodology for assessing the risk and resilience of buildings, tunnels, and mass transit stations to terrorist attacks and natural disasters that result in catastrophic losses (fatalities, injuries, damage, or business interruption). Resilience is the ability of a facility to recover from a terrorist attack or natural hazard (see Section 1.3.2 for more information on resilience).

The methodology, referred to as integrated rapid visual screening (IRVS), can be used by transit agencies to assess a transit system that includes buildings, tunnels, and mass transit stations.

1.1 IRVS Family

The IRVS of MTS (described in this manual) is just one infrastructure type in the IRVS Family developed by DHS S&T. Infrastructure specific IRVS assessment types have been created for buildings and tunnels as well. IRVS family is described in the following documents published by DHS S&T:

- BIPS 02, *Integrated Rapid Visual Screening of Mass Transit Stations* (DHS, 2011)
- BIPS 03, *Integrated Rapid Visual Screening of Tunnels* (DHS, 2011b)
- BIPS 04, *Integrated Rapid Visual Screening of Buildings* (DHS, 2011a)

Each IRVS assessment is tailored to evaluate the unique characteristics of the infrastructure type that influence the risk and resiliency. The IRVS family can be used in conjunction to evaluate a system that may include mass transit stations, tunnels, and buildings.

1.2 Validation

DHS S&T validated the IRVS through alpha and beta testing in partnership with the Transportation Security Administration (TSA) and in cooperation with Massachusetts Bay Transportation Authority (MBTA) and Port Authority of New York and New Jersey (PANYNJ). One objective of the alpha and beta testing was to evaluate or determine the following:

- User-friendliness of the documentation and software
- Clarity of the description of the methodology
- Duration of a typical evaluation by newly trained assessors
- Sensitivity of the scoring system (attribute weights) to various station attributes
- Variation among scores for different station types
- Consistency of results

A second objective of the testing was to collect data on a wide array of mast transit stations with unique characteristics throughout the Nation.

The results of the alpha and beta testing were used as a basis for:

- Adding, deleting, and modifying characteristics
- Modifying the weighting factors for attribute options

- Calibrating the tool to obtain accurate, consistent, and reasonable risk scores for each IRVS for different types of stations. Calibration of scoring includes the overall risk score and the scores for each threat scenario and the consequences rating, threat rating, and vulnerability rating.

The IRVS of MTS was validated in four of the largest mass transit systems in the United States: New York City, Washington D.C., Boston, Cleveland, and St. Louis. In addition, this manual was reviewed by TSA, MBTA, and PANYNJ.

DHS S&T is developing a design program that promotes high performance in resistance to hazard events, resilience, security, sustainability, and energy efficiency.

1.3 Risk and Resilience

The two objectives of the IRVS of MTS are to assess a mass transit station's risk of a terrorist attack or selected natural hazards (fire and flooding) and resilience to such an event.

1.3.1 Risk

Risk is the likelihood of the occurrence of an unfavorable event that leads to catastrophic losses (fatalities, injuries, damage, or business interruption). The three components of risk are consequences, threat, and vulnerability. Consequence is the level, duration, and nature of loss from an unfavorable event; threat is the likelihood of a manmade or natural unfavorable event with the potential to harm life, information, operations, the environment, and/or property; and vulnerability is defined as a physical feature or operational attribute that renders an entity open to exploitation or susceptible to a given hazard. See Section 2.5.2 for more information on consequences, threat, and vulnerability.

Risk is the likelihood of the occurrence of an unfavorable event that leads to catastrophic losses (fatalities, injuries, damage, or business interruption).

The three components of risk are consequences, threat, and vulnerability.

1.3.2 Resilience

Resilience is defined as "the ability to resist, absorb, recover from, or successfully adapt to adversity or a change in conditions" (DHS, 2009b). Figure 1-1 shows an example of an asset's resilience after an event.

Resilience is defined as the effectiveness of protective measures to reduce the impact of a catastrophic event and the capacity to absorb, adapt, and rapidly recover from the event.

Resilience depends on robustness, resourcefulness, and recovery.

- Robustness is defined as "the ability to maintain critical operations and functions in the face of crisis" (DHS, 2009a). Robustness measures include barriers, cameras, alarms, access control, redundancy of critical infrastructure systems and components. Robustness measures also include mitigating construction techniques that are designed to prevent a structure from collapsing after an explosion; structural retrofits; and debris mitigation techniques such as window films.
- Resourcefulness is defined as "the ability to skillfully prepare for, respond to and manage a crisis or disruption as it unfolds" (DHS, 2009a). Resourcefulness factors include training and preparedness, exercises, information sharing, security awareness programs, and ongoing assessment of risk.
- Recovery is defined as "the ability to return to and/or reconstitute normal operations as quickly and efficiently as possible after a disruption" (DHS, 2009a).

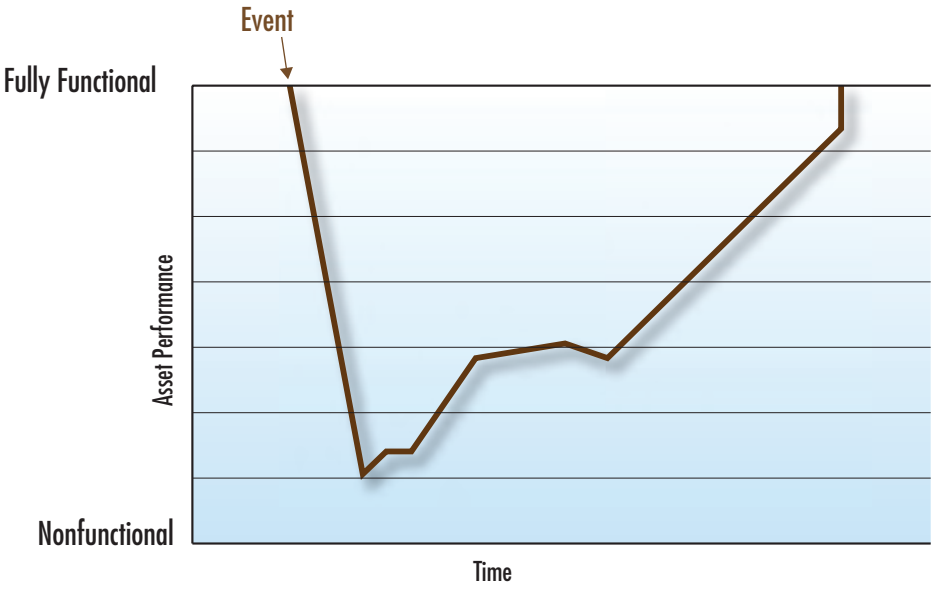


Figure 1-1:
Example of resilience

1.4 Organization of the Manual

The information in this manual is organized as follows:

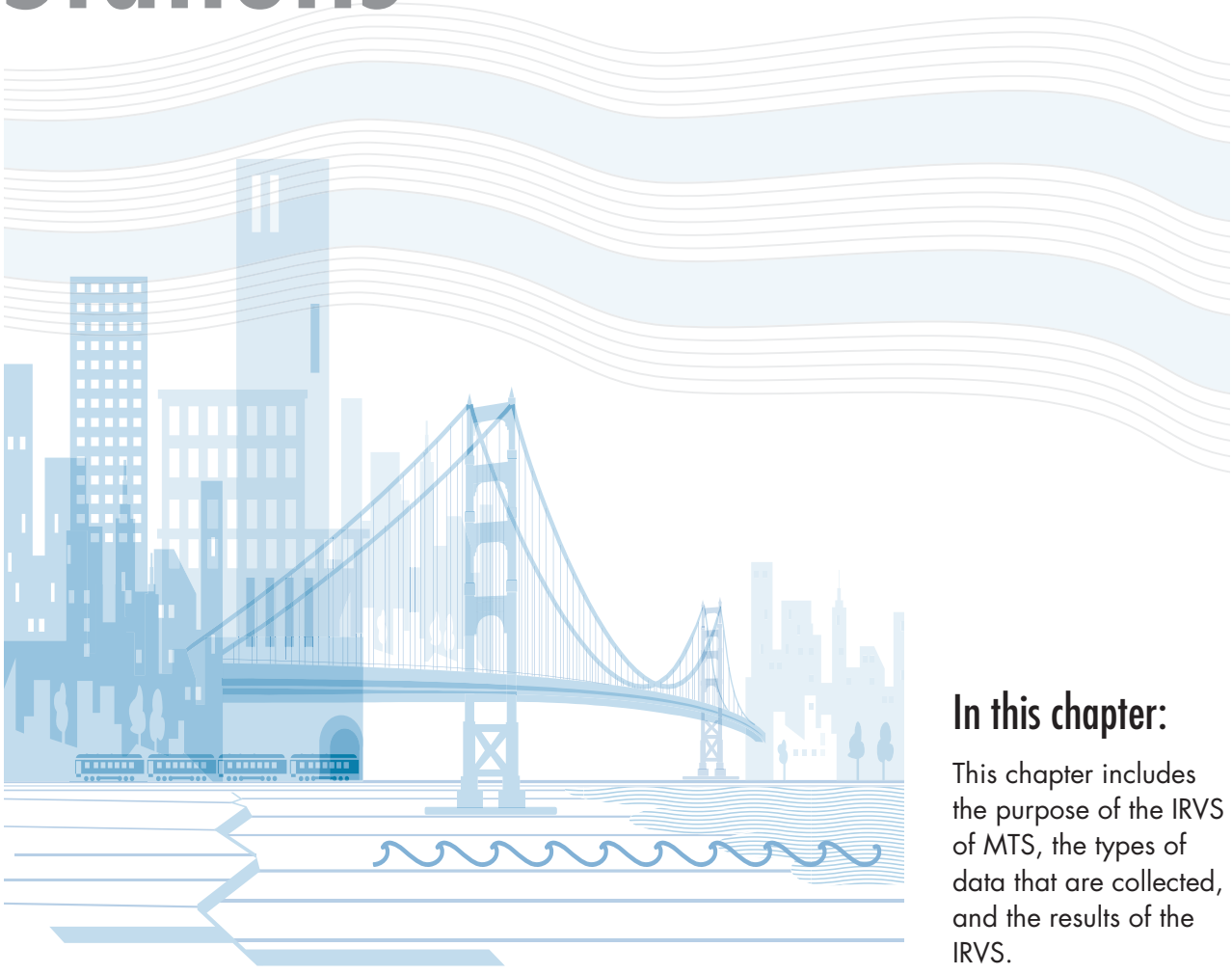
- Introduction to the IRVS of Mass Transit Stations (Chapter 2)
- Conducting an IRVS of Mass Transit Stations (Chapter 3)
- Completing the Data Collection Form (Chapter 4)
- References (Chapter 5)

Supplemental information is provided in the following appendices:

- Appendix A: Acronyms and Abbreviations
- Appendix B: Glossary
- Appendix C: IRVS Database User Guide
- Appendix D: Data Collection Form: Paper Version
- Appendix E: DHS Infrastructure Taxonomy

2

Introduction to IRVS of Mass Transit Stations



In this chapter:

This chapter includes the purpose of the IRVS of MTS, the types of data that are collected, and the results of the IRVS.

This chapter includes the purpose of the IRVS of MTS, the types of data that are collected, and the results of the IRVS. Chapters 3 and 4 explain how to conduct the IRVS and input data into the IRVS Database, respectively.

2.1 Purpose of the IRVS of Mass Transit Stations

Mass transit refers to public transportation or transportation systems, usually publicly owned and operated, that are designed to move large numbers of people in various types of vehicles. Mass transit includes heavy rail, light rail, commuter rail, trolleys, and buses (Figures 2-1 and 2-2). A mass transit station is a structure that serves as a terminal for a mass transit system. Stations function as hubs to allow passengers to board and disembark from mass transit vehicles and to transfer between modes of transport (e.g., from a train to a bus). Stations also serve as payment checkpoints. Stations that are underground and serve railways are typically referred to as subways or metro stations (Encyclopædia Britannica, 2011).

The purpose of the IRVS of MTS is to assess a station's risk of a terrorist attack or selected natural disaster (fire or flooding) and the resiliency of the station (the ability to recover from such an event). The results of the assessment can be used to avoid or minimize catastrophic losses—fatalities, injuries, station destruction or damage, and business interruption— from a terrorist attack or natural disaster.

Figure 2-1:
Interior of a subway car

Figure 2-2:
Platform area of a mass transit station

The IRVS provides an assessment of the risk of a station by evaluating the consequences of, threat of, and vulnerability to a terrorist attack or natural disaster. The IRVS also provides an assessment of the resilience of a station by evaluating a station's robustness, resourcefulness, and potential for recovery.

The IRVS generates separate scores for risk and resilience. The information that is collected and the scores can be used to help:

- Identify, collect, and store vulnerability data that allow re-examination of risks during consideration of protective measures or after protective measures have been implemented
- Collect and store reported assessment information for mass transit station management
- Rank vulnerabilities and consequences in a mass transit system indicating which stations may be more at risk and require higher protection
- Determine and rank risks within a particular transit station in order to allocate potential resources to reduce major vulnerabilities cost effectively

def-ə

The **risk score** is a numeric value that describes the risk of catastrophic loss from a terrorist attack or natural disaster at a mass transit station.

The **resilience score** is a numeric value that describes the ability of a mass transit station to resist, absorb, and recover from a potentially disruptive event at a mass transit station.

- Understand potential cascading effects to the transit system by assessing a group of mass transit stations
- Understand resilience, potential down time, and economic and social implications if a mass transit station is affected by a catastrophic event

Anticipate the increased risks during special events that affect the peak flows of the station in order to plan properly and implement protective measure

- Identify which security measures should be implemented immediately during high alerts
- Anticipate the increased risks during special events that affect the peak flows of the station in order to plan properly and implement protective measures; special events (e.g., sporting events, concerts, festivals) cause an abnormally high volume of ridership.

2.2 Stakeholders

The stakeholder is the group or entity that decides to conduct an IRVS, owns the results of the IRVS, and makes many of the decisions regarding the IRVS. In most cases, the stakeholder is the owner or operating authority of the mass transit station or group of stations but can also be a law enforcement agency or a Federal, State, or local government agency.

The stakeholder or stakeholder's personnel may conduct the IRVS. For example, a transit authority may create a task group consisting of its security personnel and engineers to conduct an IRVS of the transit system. The transit system may opt to hire a consulting group to conduct the IRVS.

2.3 Screeners

The IRVS was developed so that screeners can be local operators, law enforcement officers, or others outside the design community without a high level of expertise. Screeners can conduct an IRVS with a reasonable level of certainty after brief training, thus reserving technical experts such as engineers and architects for more in-depth assessments. See Section 3.1.2 for more information about screeners and the IRVS Team.

2.4 Time Required for the IRVS

One of the strengths of the IRVS of MTS is how quickly it can be completed. An assessment can typically be conducted in approximately 2 days by one or two screeners, facility management, and key staff. The field assessment is designed to be completed by two screeners in a few hours, depending on the complexity of the station and the availability of information prior to the assessment.

2.5 Characteristics, Attributes, and Data

This section describes the types of data that are collected during the IRVS and how the data are recorded and stored.

The various characteristics of mass transit stations are evaluated in the IRVS. A characteristic is a physical component, function, or operation that relates to consequences, threat, and vulnerability. Examples of characteristics are number of tracks, number of entrances, natural protective barriers, the presence of hazardous materials, construction material, and station elevation.

An attribute is a subcategory of a characteristic. For example, for station elevation (characteristic), the attribute may be at grade, at street level, above grade, below grade (above water table), below street level, above water, or below grade (below water table). Screeners select one attribute from a set of attribute options for each characteristic. Some characteristics have multiple sets of attributes, which reflect the need to normalize regional and other types of disparities.

An attribute is a subcategory of a characteristic. Attributes are weighted depending on their degree of risk.

Attributes are weighted depending on their degree of risk. For example, a below-grade elevation has the most risk compared to other elevations and is therefore given the heaviest weight of the attribute options for station elevation.

Characteristics are grouped into the risk components of consequences, threat, and vulnerability, depending on which component the characteristic would affect. See Section 2.5.2 for information on the components of risk. Some characteristics affect more than one component.

The attributes of characteristics that are more important than others are weighted more heavily than the attributes of less important

characteristics. Characteristics with heavily weighted attributes require careful evaluation because of their influence on the risk score. A small difference in the assessment of these characteristics can change the risk and resilience scores significantly.

"**Characteristic**" refers to the physical components, function, and operation of a mass transit station. "**Attribute**" is a subcategory of a characteristic.

The following list contains the characteristics that are weighted more heavily than other characteristics. The numbers in parentheses refer to the section of the IRVS catalog that the characteristics appear in. The IRVS catalog is provided in Chapter 4.

- Peak number of riders/transfers per day (1.4)
- Station locality (1.5)
- High-value/CIKR targets (1.7 and 2.4)
  - Zone 1 (within 300 feet of the station)
  - Zone 2 (between 300 and 1,000 feet of the station)
- Impact of physical loss/criticality (1.8)
- Replacement value (1.10)
- Operational redundancy (1.11)
- Terrorist threats: station (2.3.1)
- Function criticality within system/region (2.7)
- Flooding history (2.11)
- Station elevation (3.5)
- Integrated/adjacent parking (4.3)
- Overall structural condition (5.8)
- Protection of ventilation shafts (6.1)
- Ventilation hardware exposure (6.4)
- Backup power system (7.2)
- Overall security effectiveness
- Effectiveness of emergency plans (12.3)
- Effectiveness of mass evacuation plans (12.7)

2.5.1 Consequences, Threat, and Vulnerability

As noted in Section 2.5.1, characteristics are grouped into the components of risk—consequences, threat, and vulnerability.

Consequence is the effect of an event, incident, or occurrence and reflects the level, duration, and nature of the loss resulting from the incident.

- As defined in the NIPP (DHS, 2009), consequence is the effect of an event, incident, or occurrence and reflects the level, duration, and nature of the loss resulting from the incident. Consequences are divided into four categories: public health and safety, economic, psychological, and governance/mission impacts.
  - The category of **public health and safety** reflects the effect on human life and physical well-being (e.g., fatalities, injuries/illness). **Economic loss** includes direct loss (e.g., cost to rebuild an asset, cost to respond to and recover from the event) and indirect loss (e.g., costs resulting from the disruption of a product or service, long-term costs from environmental damage). The **psychological effect** refers to the effect on public morale, which includes the possible changes in the public's sense of safety and well-being after a significant event and possible subsequent aberrant behavior. The **governance/mission effect** is the effect on government's or industry's ability to maintain order, deliver minimum essential public services, ensure public health and safety, and carry out national security-related missions.

Consequences are divided into four categories: public health and safety, economic, psychological, and governance/mission impacts.

  - The consequences that are considered in the IRVS are based on the criteria set forth in Homeland Security Presidential Directive 7 (HSPD-7), Critical Infrastructure Identification, Prioritization, and Protection. HSPD-7 establishes a framework to identify, prioritize, and protect CIKR from terrorist attacks and natural hazards, with an emphasis on protecting against catastrophic health effects and mass casualties.
- **Threat** is defined as a natural or manmade occurrence that harms or indicates the potential to harm life, information, operations, the environment, and/or property.
- **Vulnerability** is defined as a physical feature or operational attribute that renders a station open to exploitation or susceptible to a given hazard. Vulnerabilities may be associated with physical, cyber, or human factors. The assessment of vulnerabilities involves evaluation of specific threats to the asset to identify areas of weakness that could result in consequences of concern.

2.5.2 Subjective Judgments

Screeners may use subjective judgment when selecting attributes. The information in the catalog is intended in part to minimize the number of times the screener must use subjective judgment.

2.5.3 IRVS Catalog

The IRVS catalog contains the characteristics and associated attributes that are evaluated during the IRVS as well as information about the characteristics and attributes to help the screener. Characteristics are divided into consequences, threat, and vulnerability.

The catalog is essential in an IRVS assessment. The catalog is provided in Chapter 4 of this manual and also digitally in the IRVS database. See Section 2.5.5 for information about the IRVS database.

2.5.4 Electronic Data Collection Form

To prepare an IRVS assessment, the screener records the evaluation using the electronicData Collection Form (DCF) in the IRVS Database(see Section 2.5.5). The screener may opt to use a paper version of the DCF (not recommended). If this is the case, information has to be transferred to the electronic version. The screener can input data into the electronic DCF using a laptop or tablet computer. The paper version is provided in Appendix D.

The first page of the DCF contains general station information and target density information (i.e., the number of high-value targets near the station). The subsequent pages of the DCF contain characteristics and attribute options for consequences, threat, and vulnerability. The attribute options are listed in order of least degree of risk to highest degree of risk.

See Chapter 4 for information on completing the DCF.

2.5.5 IRVS Database

The IRVS database is a user-friendly data collection and management tool that includes the IRVS catalog and the DCF. The database is a standalone application that runs on computers with MS Access. Reports are generated as text files or files that can be imported into MS Word or MS Excel for editing and formatting.

2.5.5.1 Database Synchronization

The database can be accessed by multiple computers simultaneously. For example, screeners use the DCF in the database to record data in

the field, and a computer at an organization's headquarters analyzes the data and prints reports. The database is kept up-to-date using the import/export feature (see Appendix C) and by synchronizing the database through the authority's secure network.

2.5.5.2 Use of the Database by Mass Transit Managers

The IRVS database can be used to facilitate the management of mass transit stations. Station managers can use vulnerability and risk data when considering the implementation of protective measures. During periods of high alert, the database can be used to identify which security measures should be put in place immediately.

2.5.6 Links

Some characteristics affect more than one risk component. For example, the number of riders affects both consequences and threat. As the number of riders increases, the consequences and threat ratings are both expected to increase. The number of riders is therefore linked to two risk components and has a similar effect on both components.

Some linked characteristics have different effects on risk components. For example, station elevation below the water table would increase flooding vulnerability while reducing collision vulnerability.

2.6 IRVS Risk and Resilience Scores

The IRVS generates scores for risk and resilience.

2.6.1 Risk Score

The risk score is based on the consequences, threat, and vulnerability ratings for each of the 12 threat scenarios. Consequences, threat, and vulnerability ratings are explained in Section 2.6.1.1, and threat scenarios are explained in Section 2.6.1.2.

2.6.1.1 Consequences, Threat, and Vulnerability Ratings

The IRVS generates ratings for consequences, threat, and vulnerability.

- **A consequences rating** represents the degree of debilitation that would result from the incapacitation or destruction of an asset after a catastrophic event that causes injuries or fatalities, social and economic losses, and/or business interruption. Consequences are rated from the perspective of a mass transit station's stakeholders, not terrorists.

- The **threat rating** represents the likelihood that a transit station will be affected by a terrorist attack or natural disaster (fire or flooding) and that the losses will be catastrophic (fatalities, injuries, damage, or business interruption).
- The **vulnerability rating** is defined as the likelihood of damage and loss at a transit station as result of a terrorist attack or natural hazard (fire, flood). The vulnerability rating is a measure of the expected outcome in terms of casualties and business interruption after a terrorist attack or natural hazard event.

  The vulnerability rating is the most important and in-depth part of the IRVS. Unlike consequences and threats, vulnerabilities can be controlled or mitigated by the stakeholder. The vulnerability rating is crucial for determining protective measures and corrective actions that can be designed or implemented to reduce the identified vulnerabilities.

2.6.1.2 Threat Types and Scenarios

In the IRVS, risk is assessed with respect to a threat scenario or set of scenarios. The IRVS includes an assessment of the risk of both terrorist attacks and selected natural hazards. Risks are divided into four categories: (1) blast, (2) chemical, biological, or radiological (CBR) attack, (3) fire, and (4) other. Each category is subdivided into three threat scenarios (see Table 2-1). The scenarios represent the location of the source of harm. All components of risk (i.e., consequences, threat, and vulnerability) are evaluated for each scenario.

Table 2-1: Threat Types and Threat Scenarios

Threat Type	Threat Scenario
Blast	Internal External (direct) External (collateral)
CBR	Internal (platforms/plaza/etc.) Internal (tunnel) External
Fire	Internal External Tunnel/Track/Smoke
Other	Flood Collision (grade/tunnel/elevated) Cyber

CBR = chemical, biological, or radiological

The threat types and threat scenarios are as follows:

- **Blast**
  - **Internal –** Intrusion into the transit station by a person or persons with the intent to attack the transit station with an explosive device.
  - **External (direct) –** The use of an explosive device to attack the transit station from the exterior. The transit station is the primary target.
  - **External (collateral) –** An attack with an explosive device on a target within 1000 feet of the transit station. For example, in a bomb explosion in a plaza adjacent to a transit station, the transit station is not the primary target but is susceptible to collateral effects (see Figure 2-3). The severity depends on the proximity to the target and the magnitude of the attack.
- **Chemical, biological, or radiological (CBR) attack**
  - **Internal (e.g., platform) –** Ground release of an airborne CBR agent inside the transit station (see Figure 2-4).
  - **Internal (tunnel) –** Release of a CBR agent inside the tunnel of a transit system that serves the station.
  - **External –** Ground release of an airborne CBR agent from outside the transit station.

Figure 2-3:
Collateral effects of an attack on a nearby plaza could threaten the operations of the transit station

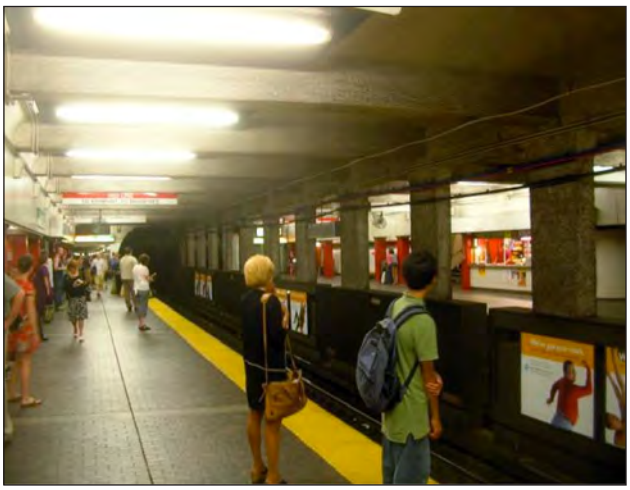


Figure 2-4:
An explosive or CBR attack on the platform of a transit station is a threat scenario

- **Fire**
  - **Internal –** Fire inside the transit station that threatens the users and operations of the transit station.
  - **External –** Fire outside the transit station that threatens the operations of the transit station. An example is a transit station that is next to or under a building that is on fire, and the fire threatens the operations and structure of the transit station.
  - **Tunnel/Track/Smoke –** Fire or smoke in the tunnel that contains tracks and is connected to the transit station. The smoke threatens life safety, operations, and structure of the transit station.
- **Other**
  - **Flood/Flooding –** Event that causes the transit station to collect water and/or be submerged in water, threatening the users and operations of the station.
  - **Collision –** Vehicular impact to the transit station that damages the structure and threatens operations.
  - **Cyber –** Cyber attack on networks or control systems that affects any combination of facilities, equipment, procedures, and communications.

2.6.1.3 Calculation of the Risk Score

The risk scoring procedure used in the IRVS is based on the risk assessment equation in P-426, *Reference Manual to Mitigate Potential Terrorist Attack Against Buildings* (DHS, 2011c) and the NIPP framework assessing risks (DHS, 2009b).

The procedure is as follows:

1. The consequences, threat, and vulnerability ratings are generated for each threat scenario.
2. The consequences, threat, and vulnerability ratings for each scenario are combined using the following equation to produce a risk score for the scenario (de-aggregated risk score).

$$Risk = C \times T \times V \qquad (1)$$

where

***C* = Consequences Rating –** degree of debilitation that would be caused by the incapacity or destruction of an asset. The consequences rating includes both monetary value and the value to a system or community.

***T* = Threat Rating** – any indication, circumstance, or event with the potential to cause loss of, or damage to, an asset.

***V* = Vulnerability Rating** – any weakness that can be exploited by an aggressor to make an asset susceptible to damage.

The de-aggregated risk score for each scenario ranges from 0.1 to 10. De-aggregated risk scores are color-coded as low (green), moderate (yellow), and high risk (red) in the IRVS database.

The de-aggregated risk score for each threat scenario provides more information about a station's risk to a specific threat than the overall risk (aggregated) score.

3. The 12 de-aggregated risk scores are combined using the statistical algorithm shown below to produce a single overall risk score (aggregated risk score) for the station.

$$R = \propto \sqrt[n1]{\sum_{i=1}^{n2} R_i^{n1}} \qquad (2)$$

Equation

and

$$R_i = \sqrt[3]{C_i \times T_i \times V_i} \qquad (3)$$

Equation

where

$\propto$ = scaling factor of 1/12

R = aggregated (overall) risk

$n2$ = 12 (total number of threat scenarios)

$n1$ = 10 (power value)

R_i = risk score of the i^{th} threat scenario

C_i = consequences rating of the ith threat scenario

T_i = threat rating of the i^{th} threat scenario

V_i = vulnerability rating of the ith threat scenario

C_i, T_i, and V_i are all scaled to be in the range of 0.1 to 10. As such, the resulting risk score for the i^{th} threat scenario is also in the range of 0.1 to 10. The overall risk score (aggregated) is displayed as a percentage to indicate the level of risk associated with the station.

The risk score are color-coded as low (green), moderate (yellow), and high risk (red) in the IRVS database. Table 2-2 indicates the different levels of risk.

Table 2-2: Risk Levels

Risk Level	Risk Score
High	>66%
Moderate	33% to 66%
Low	<33%

2.6.2 Resilience Score

The characteristics in the IRVS cover most of the important issues that affect the resilience of a mass transit station. Each characteristic can affect the quality of performance (robustness), resourcefulness, and/or time and speed of recovery. Each attribute option for the characteristics that pertain to resilience is assigned a weight ranging from 0 to 10. The weight represents the importance of the attribute in the resiliency of the station. At the end of the assessment, all of the adjusted weights of the attributes that control quality of performance, Q_i, are summed. The quality of performance describes the ability of the station to maintain critical operations and function. Similarly, all of the adjusted weights of the characteristics that control recovery and resourcefulness, also known as the time measure, T_i, are summed. The time measure describes preparedness efforts (such as training, plans, and policies) and the ability to re-institute operations after a hazard event. The sum of Q_i and T_i are inserted into the following equations:

Equation

$$Q_{TOTAL} = 10\left(\frac{\sum_{i=1}^{N} Q_i}{\sum_{i=1}^{N} Q_i|_{MAX}}\right) \quad (4)$$

and

Equation

$$T_{TOTAL} = 10\left(\frac{\sum_{i=1}^{N} T_i}{\sum_{i=1}^{N} T_i|_{MAX}}\right) \quad (5)$$

where

Q_{TOTAL} = scaled quality of performance

T_{TOTAL} = scaled time measure

Q_i = quality of performance (robustness)

N = upper boundary (number of characteristics with a weight being summed)

T_i = time measure (recovery and resourcefulness)

$Q_{i|MAX}$ = maximum quality of performance

$T_{i|MAX}$ = maximum time measure

$Q_{i|MAX}$ and $T_{i|MAX}$ represent the maximum weighted values of the quality of performance and the recovery/robustness values, respectively. Now the values of Q_{TOTAL} and T_{TOTAL} represent a scaled, accurate measure of quality of performance and time measure that control resiliency (the two axes in Figure 1-1). The scale for both variables ranges from 0.01 to 10. The objective value of the station resilience is

$$\boldsymbol{RES = 100 - (Q_{TOTAL}\, T_{TOTAL})} \qquad \textbf{(6)}$$

Equation

where

RES = *resilience*

Thus, a *RES* of 0% indicates there is no resilience in the station when affected by the postulated hazard. A *RES* of 100% indicates a perfect resilience in the station when affected by the postulated hazard.

Resilience scores can be used in decision-making and planning for hazardous events for the asset (station). These scores can also be used in planning for community (network) resiliency. Table 2-3 indicates the levels of resilience and how to interpret these levels.

Table 2-3: Resilience Levels

Resilience Level	Resilience Score	Description
High	>66%	The transit station has taken reasonable steps to maintain continuity of operations and/or has taken reasonable action to ensure that key functions will not be significantly affected by an event.
Medium	≥33%, ≤66%	The transit station has taken moderate steps to maintain continuity of operations and/or has taken moderate action to ensure that key functions will not be significantly affected by an event.
Low	<33%	The transit station has taken few or no steps to maintain continuity of operations and/or has taken little or no action to ensure that key functions will not be significantly affected by an event.

2.7 Other Considerations

2.7.1 Evaluating Risk for a Transit Station Connected to a Building

The IRVS methodology is designed for transit station structures only. Some stations may be connected to a building that is not part of the station (see Figure 2-5). When a transit station is connected to a building, each structure should be considered a separate structure. To evaluate the non-station building, the screener should use the IRVS of buildings (DHS, 2011a). Considerations of interconnections may be addressed through characteristics that focus on collateral effects associated with an attack.

Figure 2-5:
Example of a transit station connected to a building

2.7.2 Evaluating Risk for Multiple Mass Transit Stations

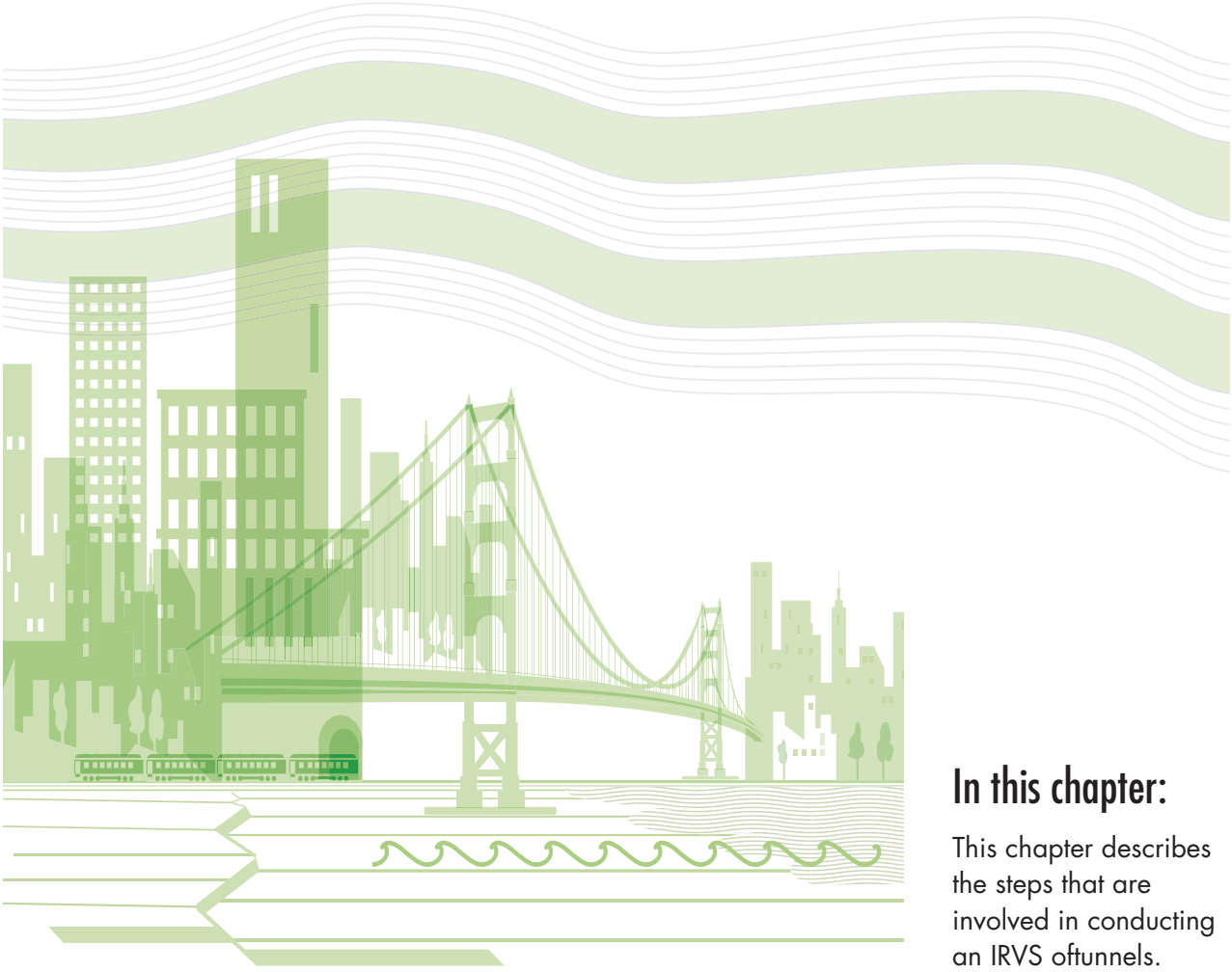
When two or more mass transit stations are adjacent to each other, a separate IRVS process should be performed for each station individually. Note that such proximity is reflected in several characteristics. For multiple stations in a mass transit system that are not adjacent to each other, a separate IRVS process is needed for each station.

2.7.3 Evaluating Risk for Interconnected Mass Transit Stations and Other Infrastructure

When other types of infrastructure are connected to the mass transit station being evaluated, such proximity is accounted for in several of the parameters within the IRVS process. As a rule, the larger the number of interconnecting infrastructures, the higher the risk score of the station.

3

Conducting an IRVS of Mass Transit Stations



In this chapter:

This chapter describes the steps that are involved in conducting an IRVS oftunnels.

This chapter describes the steps that are involved in conducting an IRVS of mass transit stations (see Table 3-1). The IRVS process can be adjusted as needed.

Chapter 4 describes how to complete the Data Collection Form (DCF).

Table 3-1: Steps in the IRVS of Mass Transit Stations

Pre-Field Activities	• Select the mass transit stations to be assessed • Identify the IRVS team • Train the IRVS team • Identify key objectives of the IRVS • Complete as much of the DCF as possible by reviewing publicly available information and available materials from transit authorities, including operations and security procedures, policies, and construction drawings • Identify the conditions for the field assessment • Set up a meeting with key staff and schedule the station tour • Assemble the equipment that is needed for the field assessment
Field Assessment	• Interview and meet with key staff and stakeholders • Tour the exterior and publicly accessible areas of transit station • Tour the critical areas of the interior of the station • Record data on the DCF
Post-Field Activities	• Transfer data from the paper version of the DCF to the electronic DCF if necessary • Use the scores in a variety of ways including identifying the transit stations that require a more detailed assessment • Summarize the results in a written report

3.1 Pre-Field Activities

The accuracy of the IRVS will be improved if the screeners obtain and review relevant information about the transit station prior to the field assessment and also review the IRVS methodology. A review of the IRVS methodology by the team of screeners for a group of stations (e.g., stations in one community) prior to the assessments will help ensure consistency among assessments, a high quality of collected data, and uniformity of decisions among screeners.

3.1.1 Selecting Mass Transit Stations To Be Assessed

The IRVS can be used to assess a single station or a group of stations within a transit system or region. The stakeholder typically selects the mass transit stations that will be assessed (see Section 2.2 for more information on the stakeholder). Budget is often a factor in the selection of stations for the IRVS.

3.1.2 Identifying the IRVS Team

The stakeholder or designee appoints the IRVS team leader who is responsible for identifying the IRVS team. The team leader should be familiar with risk assessment and transit systems. The IRVS team should include members who are knowledgeable about transit systems and security concepts and should include at least one individual familiar with structural engineering or construction and operations of a mass transit station.

The IRVS was developed so that screeners inside or outside the design community could conduct an IRVS with a reasonable level of certainty after brief training, thus reserving technical experts such as engineers and architects for more in-depth assessments. The more knowledgeable the screeners, the more accurate the assessment and, potentially, the more accurate the results. Training is recommended to ensure that the IRVS team understands the IRVS concepts. At a minimum, the IRVS team should review this manual.

3.1.3 Training the IRVS Team

Training should be required to ensure accuracy and uniformity of decisions among screeners. Training includes reviewing the IRVS methodology. The review should include:

- Station systems (e.g., site design; architectural, mechanical, electrical, plumbing, fire protection, security, and cyber systems)
- How to complete the DCF (see Chapter 4)
- How to use IRVS database (see Section 1.9 and Appendix C)
- What screeners should bring to the field assessment (see Section 3.9.1)
- What screeners should look for when performing the field assessment (See Section 3.2.2)
- How to account for uncertainty (see Section 4.2)

The training should also include a desktop exercise, which is a simulated IRVS conducted in a classroom using photographs of stations. The desktop exercise can be created by gathering photographs of and information about an actual station.

3.1.4 Identifying the IRVS Objectives

The stakeholders and IRVS team should determine the objectives of the assessment early in the pre-field activities. Examples of objectives are:

- Assessing a group of stations to determine which stations require more detailed analysis
- Plan protective measures for a special event that will increase ridership at the station and the attractiveness of the station as a target
- Evaluate the risk for a station during a period of high threat alert and to implement protective measures
- Prioritize a group of stations for mitigation
- Prepare a risk report of stations in a system in order to apply for grant funding

Objectives define outcomes and conditions of the assessment. For instance, if the objective is to evaluate the risk of a station during a period of high threat alert, the condition for the assessment will be worst case and the outcome will be to establish immediate protective measures to lower the risk score. Objectives can help determine the resources, time, and effort that are needed and how the risk and resiliency results will be used. If the objective includes assessing a group of stations, more time and effort will be needed than when only a single station is assessed. Objectives may vary across and within transit systems.

The goal of the IRVS is to enhance protection and resiliency through the implementation of focused risk-reduction strategies.

3.1.5 Evaluating Target Zones and Density

Two considerations when selecting a transit station for IRVS are the proximity of the station to other critical facilities and the presence of other high-profile targets near the station. Proximity of targets creates two possible scenarios of concern. In the first scenario, the station itself is the target, and collateral damage to nearby critical facilities will increase

damage and the severity of the attack. In the other scenario, the station is not the target, but there are high-profile targets near the station, and the station is subjected to collateral damage that varies in severity depending on the hardiness of the structure, proximity to the target, and magnitude of the threat. In the IRVS, the concept of target density is part of the consequences, threat, and vulnerability ratings. The IRVS of mass transit stations is designed to address both target and non-target stations.

The IRVS of mass transit stations is designed to address both target and non-target stations.

In the IRVS, the following target zones are considered (see Figure 3-1):

- Zone 1 refers to an attack occurring less than 300 feet from the subject station.
- Zone 2 refers to an attack occurring at least 300 feet but not more than 1,000 feet from the transit station.

Information regarding the target density is collected on the first page of the DCF (see Section 4.2). The target density can be calculated using open source information such as Google maps or Bing maps. In addition, the IRVS database includes an application for plotting the target density rings in Google Earth (requires installation on a computer) using the coordinates of the station. The target density is calculated using the 18 CIKR Sectors that are identified in HSPD-7.

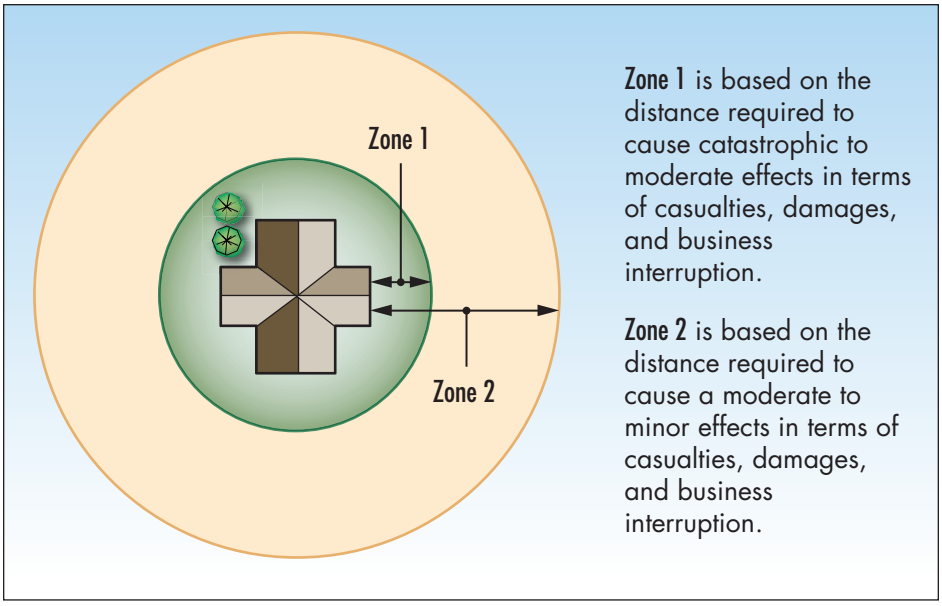


Figure 3-1:
Target Zones 1 and 2

3.1.6 Gathering Pre-Field Data

The IRVS team should complete as much of the DCF as possible before the field assessment by reviewing publicly available information and information that is provided by the transit agency (e.g., operations and security procedures, policies, construction drawings). Electronic documents can be stored in the IRVS database as MS Word files or PDFs. Documents that are not available electronically can be scanned and imported into the database.

Examples of documents that can be useful are:

- Drawings for original design and any implemented modifications
- Prior vulnerability assessment data
- Emergency response and disaster recovery plans
- Security master plan
- Hazardous materials plans
- Site plans of utility and communications system
- Historical reports regarding the station
- Facility systems operational capability
- Reports of incident in the station (e.g., misconduct)

The IRVS team should also review emergency plans, policies, and procedures. These documents are useful in evaluating characteristics related to resilience. Examples of such documents are:

- Emergency notification procedures
- Emergency evacuation procedures
- First responder access and routing
- Shelter-in-place procedures
- Exercise of plans

The screener can also obtain information by conducting phone interviews of transit system authorities, stakeholders, and key station staff.

3.1.7 Identifying Conditions for the Field Assessment

IRVS results can be affected by the timing of the field assessment. For example, a station may have low ridership during the work week but high ridership during a special weekend event at a nearby venue (e.g.,

sporting event, concert, festival). Ridership is relevant to all three risk components (consequences, threat, and vulnerability). In addition, increased security for special events may reduce vulnerability and therefore the risk, but special events can also make normally non-high-profile stations attractive targets, thus increasing the threat.

To avoid variations that can distort the scores, the IRVS team and stakeholders should determine before the field assessment which conditions will be considered.

To avoid variations that can distort the scores, the IRVS team and stakeholders should determine before the field assessment which conditions will be considered. The two conditions are:

- Current "as-seen" conditions: The station is assessed for the situation and conditions present at the time of the screening.
- Worst-case or special event conditions: The combination of conditions that would make the most harmful results.

Physical conditions should be considered at their most disadvantageous state. Reasonable worst-case conditions are recommended when assessing the risk of a terrorist attack because intelligent adversaries can choose circumstances in which targets are vulnerable and consequences maximized (NIPP, 2009). The concept of worst case should be moderated by reason, however; scenarios should not include numerous unlikely conditions unless the focus of the contingency and other types of planning is on rare or special events. On the other hand, scenarios should not be based simply on average conditions. Every station has different characteristics that need to be assessed to describe reasonable worst-case conditions accurately (i.e., the worst-case scenario is different for every station). The IRVS team and stakeholders should establish the conditions that will be considered.

3.1.8 Scheduling a Meeting with Key Staff and Stakeholders and Scheduling the Station Tour

The IRVS team should try to arrange a meeting or interview with key staff and stakeholders before or during the field assessment to review the information that was obtained before the field assessment. The IRVS team leader decides which key staff and stakeholders should be interviewed based on the composition of the team and the familiarity of the transit station or system. The team should prepare a list of questions before the meeting. Key personnel include:

- Chief of engineering
- Chief of security

- Chief of Information Technology
- Emergency manager
- Station transportation official/manager (station specific)

The station's transportation official/manager, who opens and closes the station, can provide a wealth of information. The manager knows all of the entrances, exits, mezzanines, and corridors throughout the station and should be able to answer questions about the vent systems, electrical systems, pump rooms, fire emergency panels, and security.

The IRVS team also needs to schedule the station tour. The IRVS team should plan which areas of the station (see Section 3.2.2) need to be viewed and obtain the proper permissions to survey the station.

3.1.9 Assembling the Equipment for the Field Assessment

The screener should take the following to the field assessment:

- A laptop or tablet loaded with the IRVS database, which contains the DCF and catalog. The database user guide is included in this manual as Appendix C.
- The paper version of the DCF if a laptop or tablet is not available. The paper version is included in this manual as Appendix D.
- A digital camera for photographing the station.

3.2 Field Assessment

The field assessment is an onsite visit to the mass transit station to record and/or verify information that has already been recorded on the DCF. The visit includes interviewing key personnel and stakeholders and touring the station.

3.2.1 Interviewing Key Staff and Stakeholders

Interviews with key staff and stakeholders can be conducted in person during the field assessment. The screener can record the information electronically or on a notepad. Key station staff or stakeholders may be part of the IRVS team or participate in the field assessment.

3.2.2 Touring the Station

The IRVS team should tour the exterior of the station, publicly accessible areas, and internal, secure areas of the station. The locations the assessor should tour, if applicable, are:

- Perimeter of station or site
- Main lobby or entryway
- Emergency exits
- Station lighting
- Vent systems
- Electrical/power systems
- Pump rooms
- Fare collection area
- Mezzanine levels
- Concourses
- Retail areas
- Platforms
- Entrance security and security rooms
- Parking

3.3 Post-Field Activities

The following activities are typically conducted after completing the DCF and the field assessment.

3.3.1 Transferring Data to the IRVS Database

If the paper version of the DCF is used, the information must be transferred to the IRVS database in order to generate the risk and resiliency scores. Any photographs taken during the field assessment should be imported into the database.

3.3.2 Using the IRVS Scores

The IRVS of MTS is a quick and simple tool for obtaining a preliminary risk and resilience assessment. IRVS results can be used to:

- Identify the stations that require a more detailed assessment

- Prioritize stations for further evaluation
- Develop emergency preparedness plans for high-threat alerts
- Plan post-event evacuation, rescue, recovery, and safety evaluation efforts
- Prioritize mitigation needs
- Conduct a "what if" exercise by selecting different attributes to see how the scores are affected
- Compare the scores of various threat scenarios to identify the relative exposure of the station to different threats. Risk scores for different scenarios can be compared
- Develop transit station-specific vulnerability information

3.3.3 Identifying Mass Transit Stations That Require Further Analysis

Depending on the objectives of the IRVS assessment, the IRVS team and stakeholders may identify stations that require further analysis (a more detailed assessment). The risk and resiliency scores from the IRVS assessment can be used to determine the need for a more detailed assessment. The IRVS team and stakeholders must decide the levels of risk and resilience that are unacceptable for a particular transit system based on the conditions of the system (e.g., size, locality, number of riders, performance objectives). Unacceptable levels trigger a more detailed assessment.

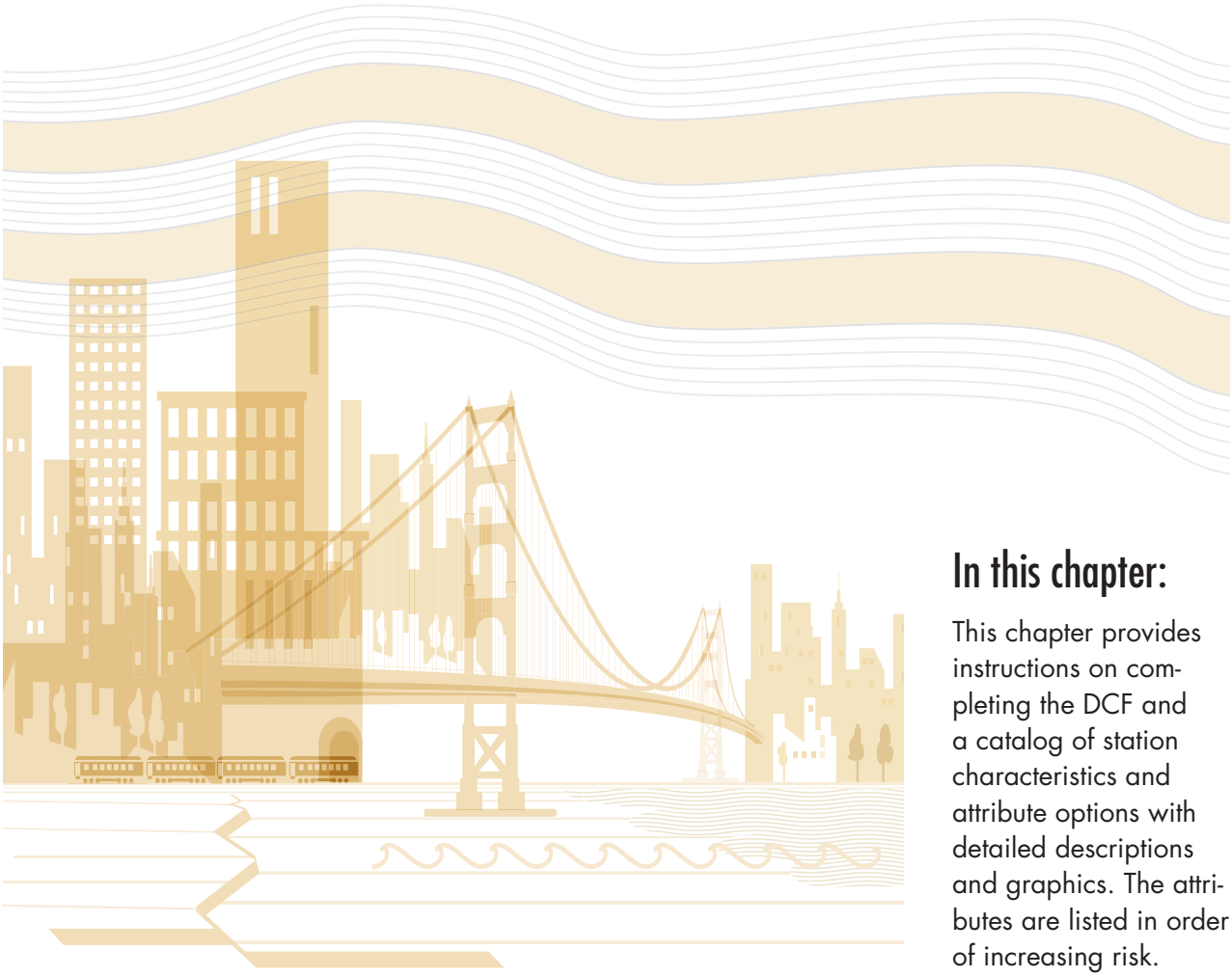
Generally, risk and resilience can be interpreted as unacceptable when the risk score is above 70% and the resilience score is below 30%.

3.3.4 Preparing a Written Report

The IRVS database can be used to generate a generic report for one station or a group of stations. The report includes the information that was input into the database and the risk and resiliency scores. The report is generated as an MS Word document and can be edited by the IRVS team.

4

Completing the Data Collection Form



In this chapter:

This chapter provides instructions on completing the DCF and a catalog of station characteristics and attribute options with detailed descriptions and graphics. The attributes are listed in order of increasing risk.

Information that is collected during the IRVS is recorded electronically on the Data Collection Form (DCF) or on paper using the paper version of the DCF. The screener can input data into the DCF using a laptop or tablet computer. If the paper version is used, the information has to be transferred to the electronic version, so using the electronic version is more efficient. The paper version is provided in Appendix D.

This chapter provides instructions on completing the DCF and a catalog of station characteristics and attribute options with detailed descriptions and graphics. The attributes are listed in order of increasing risk.

The DCF is typically completed during the field assessment, but it can also be completed before or after the field assessment.

- **Before the field assessment –** The DCF is completed collectively by the IRVS team and key personnel during a desktop workshop, and the information is verified during the field assessment. Completing the DCF before the field assessment is typically done by screeners who are familiar with the station or when the available information makes it possible.
- **During the field assessment –** The DCF is completed during the field assessment either electronically or using the paper version.
- **After the field assessment –** The IRVS team records observations, conducts interviews, and takes pictures during the field assessment. After returning from the field assessment, the IRVS team collectively completes the DCF.

The DCF should be completed according to the station conditions that have been selected (see Section 3.1.6). Screeners should document the assessment as completely as possible to optimize the accuracy of the risk and resiliency scores.

4.1 Accounting for Uncertainty

The accuracy of the risk and resiliency scores rely on an accurate and thorough completion of the DCF. All characteristics must be evaluated before risk and resiliency scores can be calculated. If a screener is unsure which attribute is correct for a particular characteristic, the screener should document observations using the comments tab and should do one of the following:

The accuracy of the risk and resiliency scores rely on an accurate and thorough completion of the DCF.

- Select “Not Applicable” when available

- Make an educated guess based on professional or engineering judgment
- Select the attribute that is most common in other similar stations in the system

Where two or more attributes for one characteristic could be selected, the screener should select the dominant attribute . When one attribute is not clearly dominant and an educated guess is not possible because not enough information is available, the screener should select the attribute with the highest risk. The number of times a screener is uncertain about which attribute to select should be minimal.

4.2 Page One of the DCF

The first page of the DCF includes station identification, historical information about the station, and target density. Station identification is especially important when a group of stations are assessed. The electronic version of page 1 is shown in Figure 4-1, and the paper version is shown in Figure 4 2.

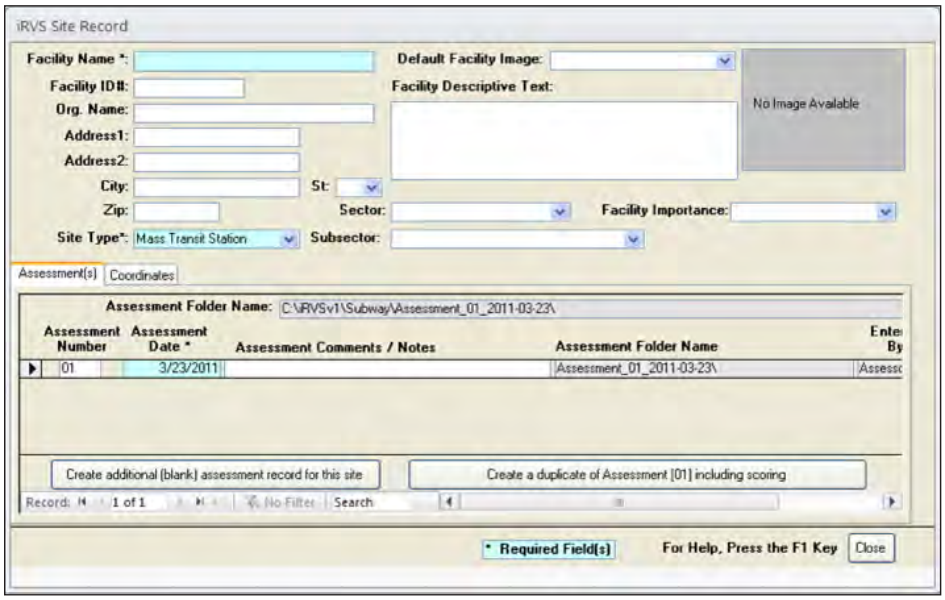


Figure 4-1:
Data Collection Form, page 1

Pre-Field Information

Complete the information on this page before the field assessment, using additional sheets as needed. The numbers in parentheses refer to the ID number in the catalog. Refer to the catalog for explanations of the information that is requested on this page and the potential sources of the information.

Station name/identification _____

Address/intersection _____

Transit agency _____

Year built _____ Footprint (in square feet) _____

Overview of the station from the transit agency _____

_____

_____

_____

Number of tracks (1.1) _____ Number of levels (1.2) _____

Station elevation (1.3) _____ Replacement value (1.10) _____

Peak daily ridership/transfers (1.4) _____

Terrorist threats against the station (2.3) _____

_____

Terrorist threats against the transit system (2.4) _____

_____

History of flooding affecting the station since opening(2.11) _____

_____

Geology: Soil conditions (3.9) _____

Year(s) of major retrofits (5.3) _____

Retrofit description _____

Operating hours (12.8) _____

Target Density. Number of potential high-value/CIKR targets/buildings within 300 feet and between 300 and 1000 feet of any point of the perimeter of the station (1.7).

CIKR Sector	Within 300 feet	From 300 to 1000 feet
Agriculture and Food		
Banking and Finance		
Chemical		
Commercial Facilities		
Communications		
Critical Manufacturing		
Dams		
Defense Industrial Base		
Emergency Services		
Energy		
Government Facilities		
Healthcare and Public Health		
Information Technology		
National Monuments/Icons		
Nuclear Reactors, Materials, and Waste		
Postal and Shipping		
Transportation Systems		
Water		
TOTAL		

Figure 4-2: Data Collection Form (paper version), page 1

4.3 Step One: Consequences Rating

4.3.1 Consequence Ratings Characteristics

Consequences are related primarily to the use, occupancy (the function of the building or infrastructure), and importance of the transit station from the owner's perspective. Rating consequences involves assessing the following station characteristics:

- Number of tracks
- Number of station levels
- Station elevation
- Peak number of riders/transfers per day
- Station locality

- Adjacent/nearby transportation systems or public assembly venues
- High-value targets/CIKR
  - Zone 1 (within 300 feet of the station)
  - Zone 2 (between 300 and 1,000 feet of the station)
- Impact of physical loss/criticality
  - Station
  - Tracks
- Social impact
- Replacement value (fair market value)
- Operational redundancy
- Estimate downtime after a major disaster

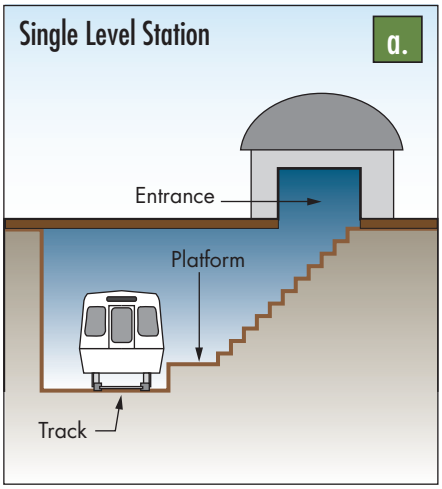
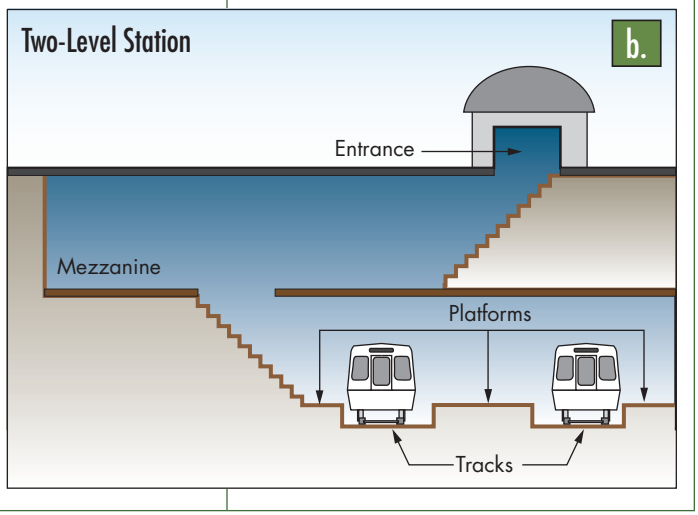
Information used to determine the consequence rating typically comes from the owner/operator, government sources, municipalities, and publicly accessible sources. This information should be gathered before the field assessment or during interviews with key personnel (see Section 3.2.1).

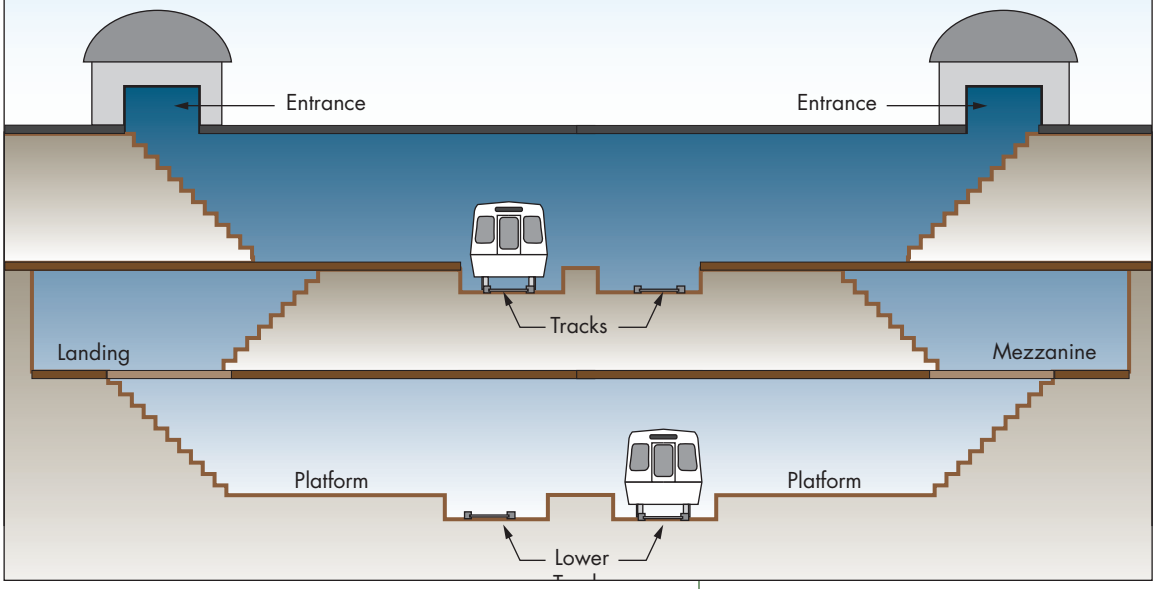
4.3.2 Catalog of Station Characteristics and Attribute Options for the Consequences Rating

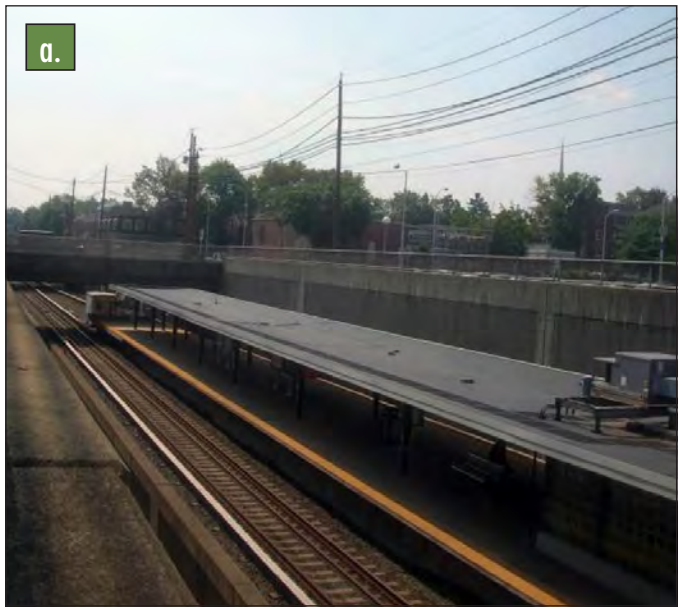
The catalog of consequence characteristics and attribute options is provided in Table 4-1. The catalog is also part of the IRVS database. The ID number in the catalog corresponds to the number of the characteristic in the DCF. The screener should use the catalog as a reference, as needed, when evaluating the characteristics.

Information used to determine the consequence rating typically comes from the owner/operator, government sources, municipalities, and publicly accessible sources.

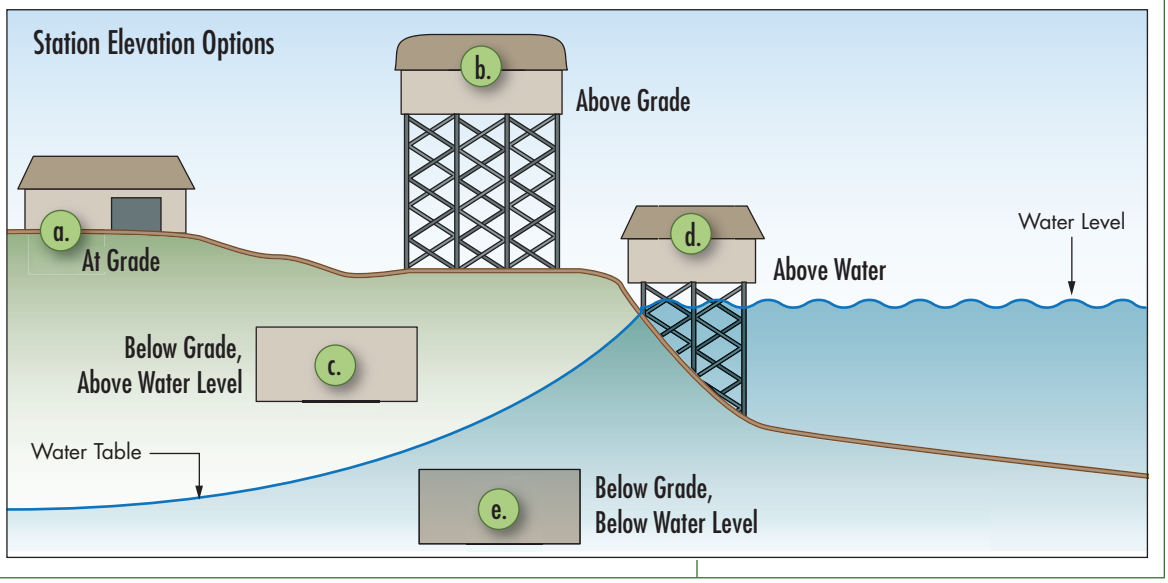
Table 4-1: Catalog of Station Characteristics and Attribute Options for the Consequences Rating

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
1.1	**Number of Tracks** Number of operating rail tracks or bus lanes, including express tracks that do not stop at a given station and layover tracks used for train storage. Five or more tracks are typical in large railroad stations, terminals, and maintenance yards. Abandoned tracks or tracks not used for regular service/ storage should not be counted.  *c. A three-track line, with the center track facilitating peak-direction rush hour express service.*	a. 1 b. 2 c. 3 to 4 d. 5 to 8 e. More than 8
1.2	**Number of Station Levels** Number of levels open to the public, including platforms, lobbies, concourses/mezzanines, fare control areas, transfer passageways, service, and other areas in the station. For below-grade stations, the street level should not be considered unless the station has features that make it an attractive target at this level.   	a. 1 b. 2 c. 3 d. More than 3

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
	Number of Station Levels (continued)	
	Three-Level Station c. 	
1.3	**Station Elevation** Elevation in relation to the prevailing street level or surrounding area.	**Least Risky** a. **At grade.** At street level. Typically located outside central cities. b. **Above grade.** Above the prevailing grade or street level. Typically built on steel platforms, concrete viaducts, or masonry structures. c. **Below grade, above water table.** Below street level or prevailing natural features. Typically subway or open-air stations below the street level. d. **Above water.** Typically on bridges or viaducts. e. **Below grade, below water table** **Most Risky**

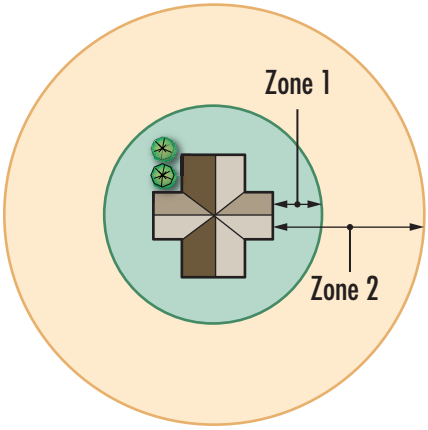


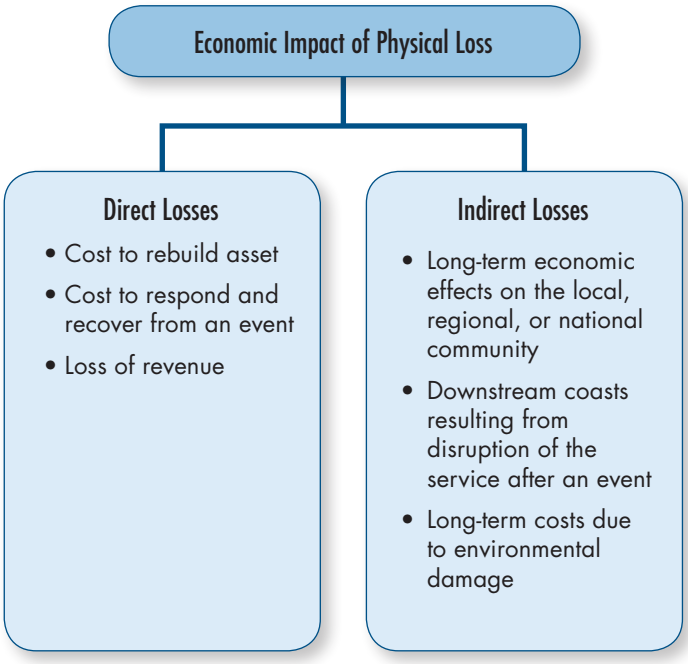
a. An at-grade station

1. Consequence Rating		
ID	Station Characteristics	Attribute Options
1.3		
	b. Elevated station on a steel structure over an active roadway.	
		
	c. Entrance to a below-grade subway station.	*d. Station above water.*
		

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
1.4	**Peak Number of Riders/Transfers per Day** Number of people who embark and disembark at a transit station on a peak day. Most transit authorities provide ridership reports to the public via the Internet. The screener should research this characteristic during the pre-field assessment. When ridership information is not available, the screener will have to estimate the number of riders per day. The screener should take into account the number of people transferring from one line to another (i.e., riders who switch from one line to another and do not exit the station) when this information is available. However, because ridership data are normally calculated by counting the number of people entering and exiting the station, accounting for the number of transfers is difficult.	**Low ridership (in riders per day):** a. Less than 1,000 b. 1,000 to 2,000 c. 2,000 to 5,000 d. 5,000 to 10,000 e. 10,000 to 20,000 **High ridership (in riders per day):** f. 20,000 to 50,000 g. 50,000 to 100,000 h. 100,000 to 150,000 i. 150,000 to 200,000 j. More than 200,000
1.5	**Station Locality** General population density and land use in the area surrounding the station. The screener should consider the time of day the locality is at its peak activity. For instance, the peak activity in a business district may occur during the morning rush hour; this location should be described as urban or dense urban.  *a. Rail station on park land*	a. **Remote.** Sparsely populated area, such as park land. b. **Rural.** Low ratio of inhabitants to open land or farm land, or an outlying part of a city or town. c. **Urban.** Urban neighborhood or metropolitan area in a city or large town. d. **Dense urban.** Densely populated area in a city or major metropolitan area with clusters of commercial, retail, and residential buildings and congested streets. An explosive attack in a dense urban location has a significant potential resulting in collateral consequences to people on the street, in vehicles, and in surrounding structures.

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
	 *c. A transit station in an urban neighborhood outside a city center*	 *d. Transit station in a dense entertainment, commercial, retail, and office district where high rises and other large buildings are predominant*
1.6	**Adjacent/Nearby Transportation Systems or Public Assembly Venues** Any transportation system (stations, structures, or modes) or public assembly venue that is above, below, or within 300 feet of the station. Bus stops are not included. Public assembly venues include: • Amphitheater • Arena • Convention center • Museum • Performing arts center/auditorium • Shopping mall • Stadium	a. **None.** No other transportation systems or public assembly venues are within 300 feet of any part of the station. b. **Close.** Another transportation system or public assembly venue is within 300 feet of the station but is not connected. c. **Tightly integrated.** The station is connected to either another transportation system or a large public assembly facility through tunnels, passageways, the structure, or other connections

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
1.7	**High-Value/CIKR Targets** A high-value/CIKR target is any structure or asset the incapacitation or destruction of which would have a debilitating impact on the security, economy, public health or safety, and/or environment across any Federal, State, regional, territorial, or local jurisdiction. The 18 Critical Infrastructure and Key Resources (CIKR) sectors defined by DHS for evaluating target density are listed below and are available in the DCF and also in DHS (2009). Subsectors should also be reviewed for this characteristic. **CIKR Sectors** • Agriculture and Food • Banking and Finance • Chemical • Commercial Facilities • Communications • Critical Manufacturing • Dams • Defense Industrial Base • Emergency Services • Energy • Government Facilities • Healthcare and Public Health • Information Technology • National Monuments and Icons • Nuclear Reactors, Materials and Waste • Postal and Shipping • Transportations Systems • Water  *A subway station adjacent to an interstate highway, a CIKR*	High-value/CIKR targets are divided into two zones for this characteristic according to the distance of the target from any point of the perimeter of the station. Zone 1 is within 300 feet of any point of the perimeter of the station, and Zone 2 is between 300 feet and 1,000 feet of any point of the perimeter of station. In most cities, 300 feet is equal to approximately 1 block, and 1,000 feet is equal to approximately 3 blocks. **Zone 1.** Number of targets within 300 feet of any point of the perimeter of the station. a. None b. 1 to 6 c. 7 to 12 d. 13 to 19 e. 20 or more **Zone 2.** Number of targets between 300 feet and 1,000 feet of any point of the perimeter of station. a. None b. 1 to 6 c. 7 to 12 d. 13 to 19 e. 20 or more  **Zone 1**– Within 300 feet of the perimeter of the structure **Zone 2** – Within 1,000 feet of the perimeter of the structure

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
1.8	**Impact of Physical Loss/Criticality** Extent to which loss of or serious damage to the station would affect the livelihood and resources of individuals and businesses in the local, regional, and national community. Criticality refers to the importance of the station to the system or region. Partial or complete physical loss of a station from a terrorist attack or natural disaster would have economic consequences (direct loss such as the cost to rebuild an asset and cost to respond to and recover from the event and indirect loss such as the costs resulting from the disruption of a product or service and long-term costs from environmental damage). The impact of physical loss includes consequences from the loss of a facility above or connected to the transit station. For this characteristic, the economic impact of physical loss should be evaluated for two scenarios: • Loss of the station • Loss of the tracks The impact of the physical loss of the actual station and loss of the tracks are different because of the direct and indirect losses associated with the loss of the station. The loss of the station would be direct. The loss of the tracks could be indirect if the tracks are shared by other authorities, and a major corridor for multiple systems is interrupted. The attribute options define the geographic limits of the economic impact of the loss of a station.  	<table><tr><td>Station</td><td>Local</td><td>Regional</td><td>National</td></tr><tr><td>Tracks</td><td>Local</td><td>Regional</td><td>National</td></tr></table> a. **Local.** The station has little, if any, importance to maintaining the transit system's service levels, mobility with respect to the regional transportation system, and the local and regional economy. The regional transit system would be minimally affected, and regional authorities would be able to route passengers around distressed areas easily. b. **Regional.** Loss of the station would substantially affect the transit system and force passengers to find alternative transportation, which would result in increased congestion-related environmental and employment costs locally and in the region. c. **National.** Loss of the station would severely strain the regional transit system, and movement around the region via other modes would be disrupted significantly, resulting in extreme social and economic costs nationally

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
1.9	**Social Impact** Psychological effect on public morale and confidence in the transit system. Social impacts of loss include the decrease in the public's mobility, lack of confidence in the transit system, and environmental impacts. Included are changes in the public's sense of safety and well-being after a significant event and possible subsequent aberrant behavior.	a. **Low.** There will be little or no effect on daily life in the region served by the transit system. b. **Moderate.** A substantial number of people will stop using the transit system. c. **High.** Transit use in the affected region will be severely disrupted.
1.10	**Replacement Value (Fair Market Value)** Current market cost to construct a station. Replacement value depends on the construction costs in the region. Replacement value information is obtained before the field assessment and is on page 1 of the Data Collection Forms. This information should be obtained from a knowledgeable site representative. If this is not possible, the value must be estimated using qualitative guidance for construction costs. **Least Expensive** • Simple at-grade and open-air station consisting of a simple concrete platform and few structural elements • Typical above-ground station with lobbies, elevators, and other major structural elements • Simple below-grade station without elevators; escalators; or heating, ventilation, and air conditioning (HVAC) systems; and no lobby or small lobby • Below-grade station with elevators, escalators, large lobbies, HVAC systems, and other structural elements • Large station with multiple lines and platforms, elevators, escalators, HVAC systems, and a large lobby • Station with complex site-specific conditions, such as soil conditions or other complex surrounding infrastructure • Largest and most complex station, such as Times Square, with four or more connecting trunk lines, numerous entrances and exits, elevators, escalators, and interior retail locations **Most Expensive**	a. Less than $1 million (m) b. $1 m to $5 m c. $5 m to $20 m d. $20 m to $50 m e. $50 m to $100 m f. $100 m to $200 m g. $200 m to $350 m h. $350 m to $600 m i. $600 m to $900 m j. More than $900 m

1. Consequence Rating		
ID	**Station Characteristics**	**Attribute Options**
1.11	**Operational Redundancy** The degree to which a transit system is able to maintain a reasonable service level by routing passengers around a distressed station, either by sharing tracks with other lines, bussing, or some other means of transportation.	a. **Very high.** Few, if any, disruptions would result from a problem at the station, and the local transit provider would be able to reroute transit services. b. **High.** Some passengers would be affected, but most transit operations would be able to continue, with service routed around the troubled station without any disruptions. c. **Moderate.** Many passengers would be affected, but the transportation system would be functional with few delays for the majority of customers. d. **Low.** Few, if any, alternative service routes to the station exist; failure of the station would cause system delays, nearly crippling mass transit operations. e. **Very low.** Failure of the station would cripple mass transit in the region and cause rail transit operations to halt.
1.12	**Estimated Downtime after a Major Disaster** The resiliency of the station to a major disaster is estimated by the amount of time needed for the transit station to recover fully and be operational after a disaster.	a. **Very short.** Less than a day b. **Short.** Less than a week c. **Moderate.** Less than a month d. **Long.** Less than a year e. **Very long.** More than a year

4.4 Step Two: Threat Rating

This section contains (1) a description of the station characteristics that are assessed to determine the threat rating and (2) the catalog of threat characteristics and attribute options.

4.4.1 Threat Rating Characteristics

The threat rating is a function of the following transit station characteristics:

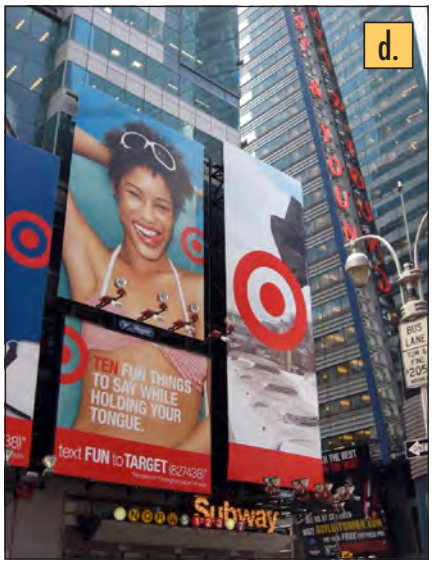
- Station locality
- Peak number of riders/transfers per day
- History of planned, thwarted, or successful terrorist attacks
  - Station
  - Transit system
- High value targets/CIKR
  - Zone 1 (within 300 feet of the station)
  - Zone 2 (between 300 and 1,000 feet of the station)
- Significance of station
- Function criticality within the system/region
- Number of entrances/exits
- Plaza/public areas
- Protective deterrence measures
- Accessibility of off-duty vehicles/equipment
- Flooding history

The transit station characteristics that are the same for the consequence and threat ratings are station locality, peak number of riders/transfers, and high-value targets/CIKR. In the IRVS database, these characteristics are automatically selected after they are input in the consequence section of the DCF.

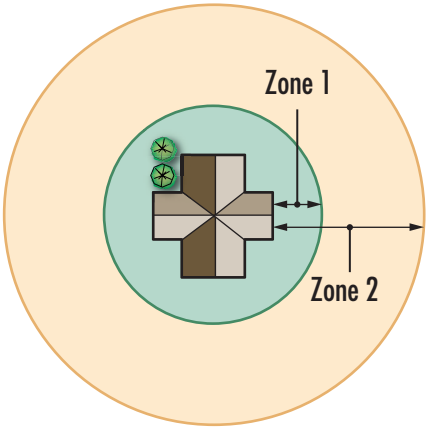
4.4.2 Catalog of Station Characteristics and Attribute Options for the Threat Rating

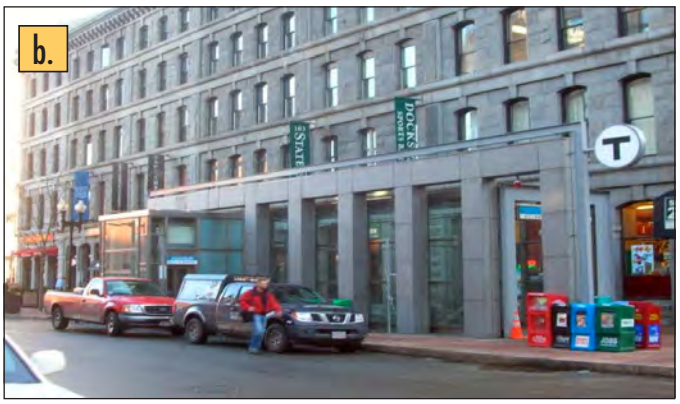
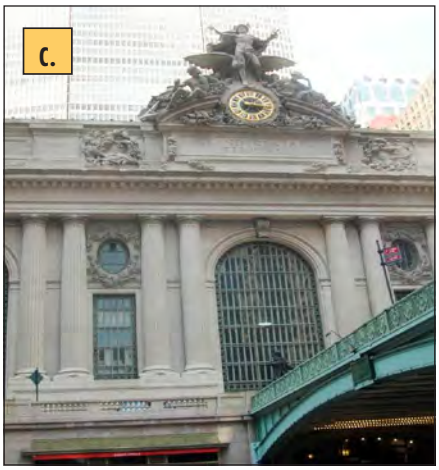
The catalog of threat characteristics and attribute options is provided in Table 4 2. The catalog is also provided electronically the IRVS database. The ID number in the catalog corresponds to the number of the characteristic in the DCF. The screener should use the catalog as a reference, as needed, when evaluating the characteristics on the DCF.

Table 4-2: Catalog of Station Characteristics and Attribute Options for the Threat Rating

2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.1	**Station Locality** General population density and land use in the area surrounding the station. The screener should consider the time of day the locality is at its peak activity. For instance, the peak activity in a business district may occur during the morning rush hour; this location should be described as urban or dense urban.  *a. Rail station on park land.*  *c. Transit station in an urban neighborhood outside a city center.*	a. **Remote.** Sparsely populated area, such as park land. b. **Rural.** Low ratio of inhabitants to open land or farm land, or an outlying part of a city or town. c. **Urban.** Urban neighborhood or metropolitan area in a city or large town. d. **Dense urban.** Densely populated area in a city or major metropolitan area with clusters of commercial, retail, and residential buildings and congested streets. An explosive attack in a dense urban location has a significant potential to result in collateral consequences to people on the street, in vehicles, and in surrounding structures.  *d. Transit station in a dense entertainment, commercial, retail, and office district where highrises and other large buildings are predominant.*

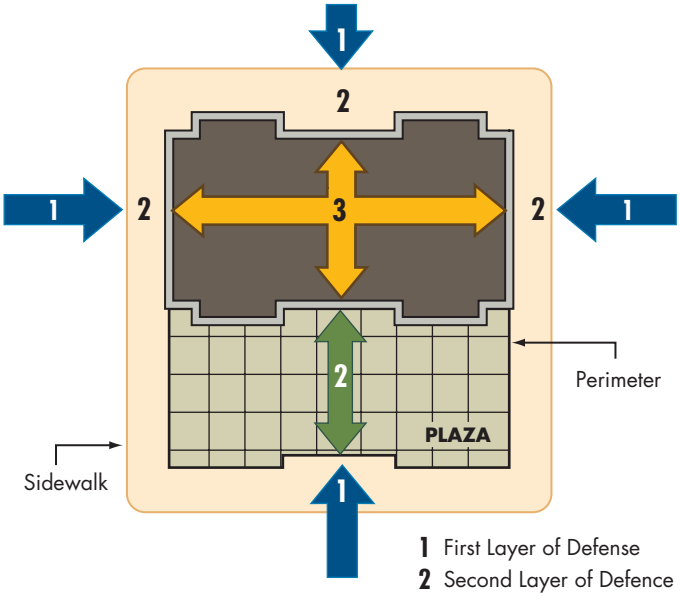
2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.2	**Peak Number of Riders/Transfers per Day** Number of people who embark and disembark at a transit station on a peak day. Most transit authorities provide ridership reports to the public via the Internet. The screener should research this characteristic during the pre-field assessment. When ridership information is not available, the screener will have to estimate the number of riders per day. To determine whether a threat is credible, the screener should talk to a senior security representative for the station or transit authority to obtain the most accurate information. Information may also be available from law enforcement officials in the area, newspapers, and Internet searches. The screener may have to use judgment based on the best available information at the time of the screening.	**Low ridership (in riders per day):** a. Less than 1,000 b. 1,000 to 2,000 c. 2,000 to 5,000 d. 5,000 to 10,000 e. 10,000 to 20,000 **High ridership (in riders per day):** f. 20,000 to 50,000 g. 50,000 to 100,000 h. 100,000 to 150,000 i. 150,000 to 200,000 j. More than 200,000
2.3	**Terrorist Threats (Credible)** A terrorist threat refers to any planned, thwarted, or successful attack against the station or transit system in the past or present. This characteristic addresses the likelihood of a terrorist attack occurring at the station under consideration. Unsubstantiated threats, such as called-in bomb threats, should not be considered. To determine whether a threat is credible, the screener should talk to a senior security representative for the station or transit authority to obtain the most accurate information. Information may also be available from law enforcement officials in the area, newspapers, and Internet searches. The screener may have to use judgment based on the best available information at the time of the screening.	
2.3.1	**Terrorist Threats: Station** Any credible threat, past or present, to the station.	a. No b. Previous c. Current
2.3.2	**Terrorist Threats: Transit System** Any credible threat to the transit system operating the station. If a credible threat has been made to a transit system (e.g., Washington Metro), but no particular station has been identified, the threat should be counted.	a. No b. Previous c. Current

2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.4	**High-Value/CIKR Targets** A high-value/CIKR target is any structure or asset the incapacitation or destruction of which would have a debilitating impact on the security, economy, public health or safety, and/or environment across any Federal, State, regional, territorial, or local jurisdiction. The 18 Critical Infrastructure and Key Resources (CIKR) sectors defined by DHS for evaluating target density are listed below and are available in the DCF and also in DHS (2009). Subsectors should also be reviewed for this characteristic (see Appendix E). **CIKR Sectors** • Agriculture and Food • Banking and Finance • Chemical • Commercial Facilities • Communications • Critical Manufacturing • Dams • Defense Industrial Base • Emergency Services • Energy • Government Facilities • Healthcare and Public Health • Information Technology • National Monuments and Icons • Nuclear Reactors, Materials and Waste • Postal and Shipping • Transportations Systems • Water  *A subway station adjacent to an interstate highway, a CIKR*	High-value/CIKR targets are divided into two zones for this characteristic according to the distance of the target from any point of the perimeter of the station. Zone 1 is within 300 feet of any point of the perimeter of the station, and Zone 2 is between 300 feet and 1,000 feet of any point of the perimeter of station. In most cities, 300 feet is equal to approximately 1 block, and 1,000 feet is equal to approximately 3 blocks. **Zone 1.** Number of targets within 300 feet of any point of the perimeter of the station. a. None b. 1 to 6 c. 7 to 12 d. 13 to 19 e. 20 or more **Zone 2.** Number of targets between 300 feet and 1,000 feet of any point of the perimeter of station. a. None b. 1 to 6 c. 7 to 12 d. 13 to 19 e. 20 or more  **Zone 1**– Within 300 feet of the perimeter of the structure **Zone 2** – Within 1,000 feet of the perimeter of the structure

2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.5	**Significance of Station** Symbolic nature or landmark status of the station. If the station is on a national, State, local, or non-governmental historic registry, the screener should select Option C, National. The screener can determine whether the station is on an historic registry by: • Consulting with the transit authority or building management • Reviewing the National Register of Historic Places at www.nationalregisterofhistoricplaces.com • Checking with States, local jurisdictions, and non-governmental organizations for listings of historically significant buildings within a locality • Checking the outside of the station or building in which the station is housed for a plaque indicating its status as an historic property.  *a. Local station*  *b. Station with regional significance*	a. **Local.** The transit station is recognizable only to locals and can be confused with other similar stations. The station has no media value or symbolism to the general public. b. **Regional.** The transit station is recognizable only to people around the State and region. The station is prominent in the local community and is a local landmark. The station has some media value on a regional level. c. **National.** The transit station is easily recognizable and is featured in the mass media on a national level. The station is considered a landmark and is located in an architecturally significant structure. d. **International.** The station is easily recognizable and is featured in the mass media internationally.  *c. Station with national significance*

2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.6	**Function Criticality within System/Region** Function criticality describes the importance of a station to the regional transportation system. When a station is heavily used but has redundancy with other transit lines, it should be rated lower.	a. **Very low.** The regional transit system would barely be affected by loss of the station, and regional authorities would easily be able to route passengers around distressed areas. b. **Low.** Loss of the station would result in delays in the regional transit system, and passengers would have longer commutes, but regional transit mobility would not be severely affected. c. **Moderate.** Loss of the station would cause significant delays in the regional transit system, but movement around the region would continue. d. **High.** Loss of the station would severely strain the regional transit system, and movement around the region via other modes would be disrupted significantly. e. **Very high.** The regional transit system has no redundancy to compensate for the loss of the station; transit operations around the region would nearly cease (for example, when station is a regional or multi-modal transportation hub).
2.7	**Number of Entrances/Exits** An entrance is defined as a single point of entry from the street or any other means of access into a transit station. Emergency exits are not counted as regularly used entrances and exits, and transfer points between lines are not considered separate entrances. An entrance may be stairs, escalators, elevators, or people movers.  *Two station entrances, an elevator (right) and a stairwell (left)*	a. 1 to 2 b. 3 to 4 c. 5 to 8 d. 9 to 12 e. More than 12 or unlimited (open-air stations)

2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.8	**Plaza/Public Area** A plaza is an open public space outside the controlled access to the station. The plaza may be at grade or below grade and may have public seating areas. If not properly designed, plazas may make the station susceptible to a vehicular collision or car bombing. An acceptable standoff distance can be created by incorporating a plaza in the site. Barriers and landscape features should be designed to make the plaza impenetrable by a vehicle. The size and vulnerability of the plaza should be reviewed using the descriptions of the attribute options.	a. **Not applicable** b. **None**. No plaza or area where public can congregate just outside the control area into the station. c. **Well-controlled.** Numerous barriers that are well-positioned to obstruct vehicular entry. d. **Moderate control.** Some vehicular barriers but several notable security flaws (e.g., temporary or ornamental barriers that can easily be defeated by vehicles). e. **Not controlled.** No vehicular barriers.



d. Public plaza with some protection

c. Below-grade public plaza leading to a transit entrance with numerous obstacles between traffic and the transit entrance

e. Public area adjacent to a subway station without limited access management controls

2. Threat Rating		
ID	**Station Characteristics**	**Attribute Options**
2.9	**Protective Deterrence Measures** Visibility and/or prominence of protective security measures that discourage an aggressor from attacking the transit station. Security creates a psychological deterrent for an aggressor who is considering attacking the station. Visibility inhibits criminal behavior because of the fear of being caught. A potential aggressor who perceives a risk of being caught may be deterred from attacking the station. For deterrence to be effective, security measures should be prominent and visible throughout the station (i.e., perimeter, site, and station interior). Combined security measures, such as those listed below, may be used in all areas of the station: • Security guards (armed and unarmed) • Law enforcement patrols • Monitoring and surveillance equipment • Dedicated search and screening • Random search and screening • Mobile screening (e.g., canine unit) • Access controls • Public awareness and notification of protective measures	a. **High.** Security measures are prominent and visible in all areas of the station, from the point a person enters the site to the platform of the station. b. **Medium.** Security measures are prominent and visible only in one or two areas of the station. For instances, security measures may be prominent at the platform of the station but not at the perimeter of the site or vice versa. c. **Low.** Security measures are minimal or not visible enough to discourage an attacker in any area of the station. An attacker would not be discouraged by the security measures from attacking the station.
2.10	**Accessibility of Off-Duty Vehicles/Equipment** Accessibility of off-duty vehicles (e.g., subway cars, trolleys), transit maintenance equipment or parts, and other transit related supplies that are stored by the station. Equipment that is stored in a transit station, even if abandoned or unrelated to transit operations, should be counted.  *Transit equipment stored adjacent to a large transit transfer station*	a. Not applicable b. No accessibility c. Low d. Moderate e. High

2. Threat Rating		
ID	Station Characteristics	Attribute Options
2.11	**Flooding History** Flooding refers to an incident in which the station was unable to clear water in a timely manner during a water surge. Service on rail systems can be disrupted by flooding from both major and minor rainstorms. Flood waters can disrupt signals underground and can require the electrified third rail be shut off. The screener should research historical data of flooding at the station through newspaper and Internet searches prior to the field assessment.	a. **Not applicable.** Not subjected to flooding. b. **None.** No record of flooding. c. **Limited.** Some flooding has occurred, but service was either not disrupted or quickly restored. d. **Moderate.** Flooding has occurred often, causing disruptions. e. **Severe.** Flooding has impaired operations for significant periods.

4.5 Step Three: Vulnerability Rating

4.5.1 Vulnerability Rating Characteristics

The vulnerability rating is a function of station characteristics that may be adversely affected by a terrorist attack, natural hazard, or accidental event.

The vulnerability rating characteristics are:

- Site
- Architecture
- Structure
- Ventilation (including HVAC)
- Fire protection
- Operations (e.g., power supply, lighting)
- Nonstructural components
- Physical security
- Cyber infrastructure
- Operational security

4.5.1.1 Site

Site vulnerability refers to the condition of the area surrounding and above the transit station, including exposure of the station, elevation, and water drainage.

4.5.1.2 Architecture

Architectural considerations involve station layout and space design. Space design relates to separating public areas of the station from the more secured areas of the facility. Features such as the number of entrances, number of levels, service entrances, lobby/lobbies, retail space, and integrated/adjacent parking garages are key characteristics of architectural vulnerabilities.

4.5.1.3 Structure

Structural vulnerability is defined as a weakness in a structure's ability to supports its own weight and the weight of its contents and to resist loads from wind and earthquake. Structural vulnerabilities can be exploited by an aggressor. Evaluating structural vulnerabilities is limited by the extent to which the structure is covered with finishes. The structural framing in public areas is typically covered for aesthetic purposes, making it difficult to determine the materials underneath the finishing.

To identify the structural characteristics as accurately as possible, the following steps should be taken before the field assessment:

- Review the structural as-built drawings, including renovations/retrofits. Drawings provide the most detailed structural information.
- Make arrangements to talk to the transit station engineer during the field assessment.
- Request permission to tour areas without interior finishes or areas not accessible by the public.

Reviewing the drawings and questioning the transit station engineer may be the most efficient way to assess the structural vulnerability. Site observation can be more time-consuming but is necessary when the drawings are not available.

The structural characteristics that are evaluated have a strong influence on a transit station's performance in a terrorist attack or natural disaster. Structural vulnerability to an explosive event is dependent on the magnitude of the air blast shock wave as it loads walls, columns, and floor/framing.

4.5.1.4 Ventilation

Ventilation refers to any system that permits air intake or exhaust to control temperature or remove moisture, odors, smoke, heat, dust, and airborne bacteria. Ventilation systems are also referred to as heating, ventilating, and air conditioning (HVAC) systems. Ventilation systems are required in transit stations because of heat from the railway tunnels, fire

hazards, exhaust from vehicles, and the potential for CBR threats. All building structures that are served by the ventilation systems in the station are included in the IRVS.

Vulnerability is dependent on the exposure, protection, and redundancy of HVAC systems. The likelihood of a CBR contaminant being introduced in the transit station is greatly influenced by the accessibility of the air vents to the public.

Ventilation system characteristics are given significant weight in the vulnerability rating for CBR threat scenarios.

4.5.1.5 Fire Protection

A fire protection system in the transit station serves the functions of preventing, suppressing, and protecting against the hazards of a fire. Fire protection systems include fire and smoke-detection and alarm as well as fire suppression. Life safety in the transit station is supported by the fire protection system which initiates evacuation, allows for safe evacuation, and suppresses the fire prior to the arrival of fire fighters.

There are eight subsystems that need to operate in order to have a functional fire safety system in a transit station:

- Detection
- Alarm
- Verification
- Incident location
- Communications
- Response plan
- Personnel evacuation
- Smoke control (ventilation)

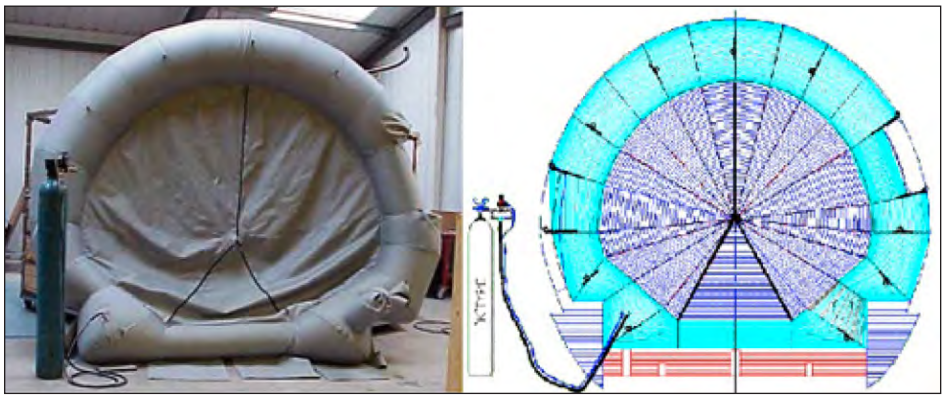


Figure 4-3:
The "Tunnel Plug" is an example of an innovative fire suppression system under development for tunnels. Funded by DHS S&T, the plug is designed to drop from the ceiling and inflate inside the tunnel, essentially sealing off the passageway and preventing smoke or fire from spreading.

4.5.1.6 Operations

Operations refer to the critical utility and control functions required for the transit station to operate safely and efficiently (e.g., power supply, lighting, monitoring, surveillance).

4.5.1.7 Nonstructural

Nonstructural vulnerabilities are vulnerabilities in non-load-bearing features (e.g., wall and ceiling finishes, fixture attachments, police booths, barriers).

4.5.1.8 Physical Securityy

Physical security refers to any method or system whose purpose is to detect, prevent, and protect against any threat or hazard. The availability and effectiveness of security-related detection systems are the key concerns in physical security vulnerabilities.

The evaluation of the physical security vulnerability consists of two sections in the data collection form.

1. **Security System Checklist.** The vulnerability assessment of physical security begins by reviewing the available security systems in the station. The screener evaluates the available security systems by completing the checklist of general security systems that can be used to detect and/or interdict against a threats to the station.
2. **Security System Evaluation.** The second portion of the physical security evaluates the security measures in relation to the specific threats. For each threat scenario, the screener evaluates the number of systems (from the security system checklist) and the effectiveness of the collective systems to protect against the specific threat scenario. The purpose is to assess the ability of a given security system to prevent a threat from being carried out.

4.5.1.9 Cyber Infrastructurey

Cyber infrastructure includes electronic information, control systems, and/or communication systems needed for daily operations. Cyber infrastructure is critical to the functions and services of a transit station. Because cyber infrastructure is interconnected, attacks using cyber tools can spread quickly and have debilitating effects. Cyber vulnerabilities are addressed through the evaluation of communication and control systems of the transit station.

Security and information technology personnel should be interviewed during the field assessment. Review cyber-security system documentation is also recommended.

4.5.1.10 Operational Security

Operational security refers to the transit agency's emergency preparedness and planning for the transit station. Operational security vulnerabilities are assessed by evaluating emergency and security response plans, mass evacuation plans, and training of emergency response personnel.

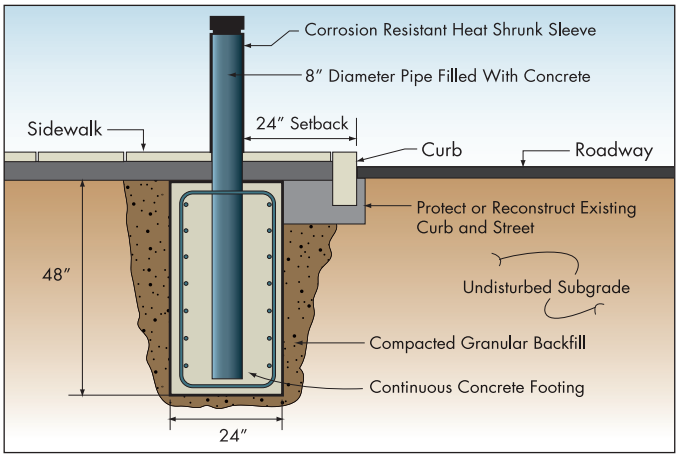
4.5.2 Catalog of Station Characteristics and Attribute Options for the Vulnerability Rating

The catalog of vulnerability characteristics and attribute options is provided in Tables 4-3a through 4-3j. The catalog is also provided electronically in the IRVS database. The ID number in the catalog corresponds to the number of the characteristic in the DCF. The screener should use the catalog as a reference, as needed, when completing the DCF.

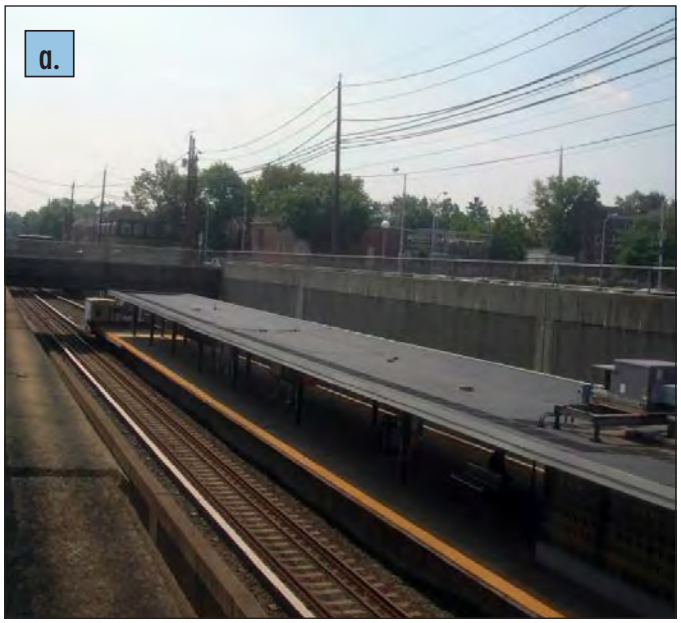
Table 4-3a: Catalog of Station Characteristics and Attribute Options for Site Vulnerabilities

3. Vulnerability Rating: Site Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
3.1	**Presence of Stand Pipes/Fire Hydrants (Water Supply)** A standpipe is a type of rigid water piping that is built into the station in a vertical position. Fire hoses can be connected to the piping, allowing manual application of water to the fire. Stations that are open environment or open air and at grade may only have fire hydrants. The presence of standpipes and/or fire hydrants in the station should be used to evaluate the adequacy of water supply to the station. The availability and sufficiency of water provided to the station is critical for general operations such as fire  	a. Yes b. No

3. Vulnerability Rating: Site Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
3.2	**Water Drainage** Adequate water drainage allows the station to clear water in a timely manner during a water surge. Service on a rail or transit system may be disrupted by flooding of only a few inches. Rainwater can disrupt underground signals and require the electrified third rail to be shut off. Water drainage should be evaluated by inspection of the drainage structures, pump room (when present), and research of historical data of flooding in the station. 	a. **Excellent.** The station controls water inflow well and flooding does not impede transit operations. b. **Moderate.** Some flooding has occurred, but service was either not disrupted or quickly restored. c. **Limited.** Flooding has impaired operations for limited periods. d. **Deficient.** Flooding has impaired operations for significant periods 
3.3	**Natural Protective Barriers** Natural protective barriers are terrain elements such as grassy knolls, hills, ditches, boulders, shrubs, trees, or water bodies that make traversing a site difficult or may at least delay an aggressor. Assess the degree to which natural barriers shield the transit station from vehicles that can intentionally or accidently damage the station.	a. **Not applicable** b. **High.** Transit station is surrounded by natural features that would make a close approach by a vehicle nearly impossible. Station has incorporated Crime Protection Through Environmental Design principles. c. **Medium.** Station has natural features that create obstacles to approaching vehicles. Approaching the station by vehicle is difficult but not impossible. d. **Low.** Station has little or no protection from vehicular impact, either accidental or intentional.
3.4	**Manmade Barriers** Manmade barriers such as bollards, fencing, walls, floors, roofs, bars, and roadblocks are used to restrict, channel, or impede access and provide standoff distance between the station and vehicles. These barriers are designed to deter threats and delay the undeterred aggressor. Assess the degree to which manmade barriers shield the transit station from vehicles that can intentionally or accidently damage the station. The screener evaluates this characteristic by assessing the presence and effectiveness of bollards/barriers and fencing at the site.	

3. Vulnerability Rating: Site Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
3.4.1	**Barriers/Bollards** Physical wall or bollard that provides an interface to prevent vehicles from passing, but allowing entrance of pedestrians and bicycles  *Diagram of typical bollard installation (FEMA 430)*	a. **Not applicable** b. **High.** Permanent barrier resistance up to a 15,000-pound vehicle traveling at 50 mph with penetration of less than 3 feet. Vehicle entry to the station must be hardened to the same standard. c. **Medium.** Permanent barrier resistance up to a 15,000 pound vehicle traveling at 40 mph with penetration of less than 20 feet. d. **Low.** Fixed or movable barrier designed to limit or redirect vehicular access.
3.4.2	**Fencing** A common means of establishing a physical protective barrier to protect a controlled area. **High Attribute Characteristics** • Double buried fence line – two staggered fences • Height of 10 feet • Anti-climb/anti-cut fencing – vertical bars with horizontal supports designed to make climbing difficult • Top guard – an overhang of barbed wire or tape along the top of the fence, facing outward and upward at approximately a 45-degree angle • Hardened posts • Counter-sunk into concrete **Medium Attribute Characteristics** • Single buried fence line • Height of 10 feet • Hardened posts • Counter-sunk into concrete **Low Attribute Characteristics** • 7-foot chain-link fence	a. **Not applicable** b. **High.** Designed to provide optimal restriction or delay to pedestrian-based attacks. Vehicle and pedestrian gates are designed to continue the structural integrity of the fence line. c. **Medium.** Designed to restrict or delay pedestrian-based attacks. Vehicle and pedestrian gates are designed to continue the structural integrity of the fence line. d. **Low.** Fence provides minimal delay to a pedestrian-based assault.

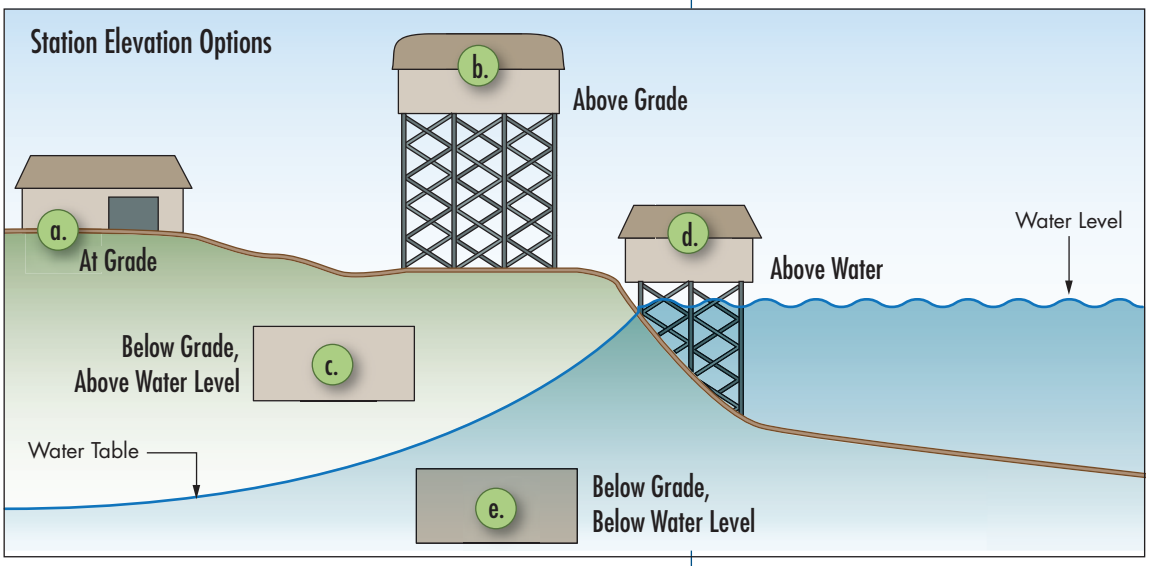
3. Vulnerability Rating: Site Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
3.5	**Station Elevation** Elevation in relation to the prevailing street level or surrounding area.	**Least Risky** a. **At grade.** At street level. Typically located outside central cities. b. **Above grade.** Above the prevailing grade or street level. Typically built on steel platforms, concrete viaducts, or masonry structures. c. **Below grade, above water table.** Below street level or prevailing natural features. Typically subway or open-air stations below the street level. d. **Above water.** Typically on bridges or viaducts. e. **Below grade, below water table** **Most Risky**



a. An at-grade subway station

b. An elevated subway station built on a steel structure over an active roadway

c. Entrance to a below-grade subway station

3. Vulnerability Rating: Site Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
		
3.6	**Depth of Cut and Cover above Station** The distance the station was constructed below grade, where it is at or below grade.	a. **Not applicable.** At or above grade. b. **Deep.** Multi-level station below grade or single-level station more than 30 feet below grade. c. **Shallow.** Single-level station 10 to 30 feet below grade. d. **Exposed.** Station 0 to 10 feet below grade with an open cut.
3.7	**Concourse** Location where numerous hallways, passageways, stairways, and elevators converge. It is an open space that accommodates large crowds and allows for efficient distribution of people between locations, typical in inter-modal terminals.  *Crowded concourse at rush hour*	a. No b. Yes

3. Vulnerability Rating: Site Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
3.8	**Adjacent Buildings** Applicable to any inhabited commercial, residential, institutional, or industrial structure within 300 feet of a transit station. Buildings that are used to support transit operations, such as maintenance facilities and or transit parking garages, are not counted.	a. **None.** No adjacent buildings. Typical of this category are suburban locations with large commuter parking facilities and rural locations. b. **Some.** Some adjacent buildings. Typical of this category are urban and suburban neighborhoods with one- and two-story structures nearby. c. **Numerous.** Numerous adjacent buildings. Typical of this category are stations in dense urban neighborhoods, such as central cities or dense urban settings.

a. No adjacent buildings.

b. Some adjacent buildings

c. Numerous adjacent buildings

<table>
<tr><th colspan="3">3. Vulnerability Rating: Site Vulnerabilities</th></tr>
<tr><th>ID</th><th>Station Characteristics</th><th>Attribute Options</th></tr>
<tr><td>3.9</td><td>Geology (Soil Condition)

Geology, or soil condition, describes the type of soil/Geology, or soil condition, describes the type of soil/rock that a transit station is built on or under. The geology surrounding the station is critical to the framing and structure because it provides a substantial percentage of the load carrying capacity for underground structures. If the type of soil is not easy to identify, the screener should ask the transit authority.

<table><tr><th>Soil Type</th><th>Suitability</th></tr><tr><td>Hard Rock</td><td>Best</td></tr><tr><td>Sand and Gravel</td><td>Medium</td></tr><tr><td>Medium and Hard Clays</td><td>Medium</td></tr><tr><td>Silts and Soft Clays</td><td>Poor</td></tr><tr><td>Organic Silt and Clays</td><td>Poor</td></tr><tr><td>Peat</td><td>Poor</td></tr></table></td><td>a. Hard rock
b. Medium
c. Poor

Note the following danger flags in the DCF by checking the red flag and adding comments.
• High water table
• Presence of soft soils
• Cut and fill
• Evidence of slides or subsidence</td></tr>
<tr><td>3.10</td><td>Accessibility of Off-Duty Vehicles/Equipment

Accessibility of off-duty vehicles (e.g., subway cars, trolleys), transit maintenance equipment or parts, and other transit related supplies that are stored by the station. Equipment that is stored in a transit station, even if abandoned or unrelated to transit operations, should be counted.</td><td>a. Not applicable
b. No accessibility
c. Low accessibility
d. Moderate accessibility
e. High accessibility</td></tr>
<tr><td>3.11</td><td>Hazardous Materials Storage

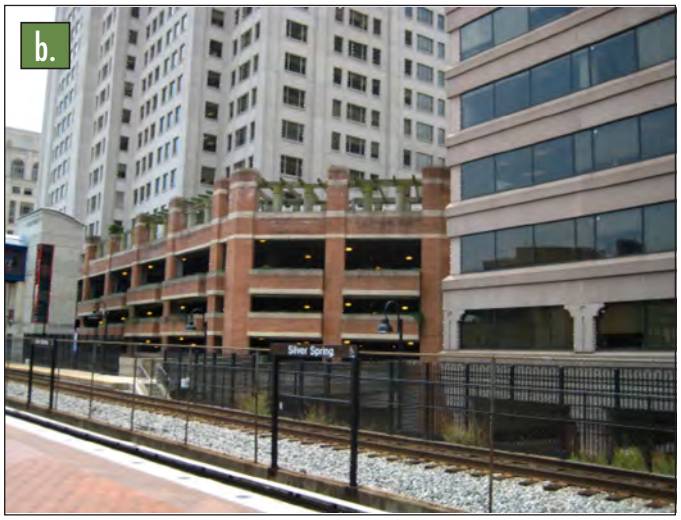
Storage of hazardous materials in the station or in surrounding area pose a high risk to staff and riders because of the potential for combustion or release of lethal materials.

Abundant open-source information on hazardous materials storage is available on Web sites such as the EPA, state office of emergency management, and local fire department.</td><td>a. No
b. Yes</td></tr>
</table>

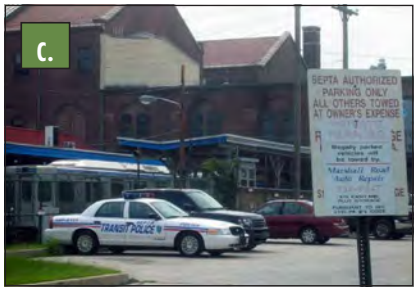
Table 4-3b: Catalog of Station Characteristics and Attribute Options for Architectural Vulnerabilities

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
4.1	**Number of Entrances/Exits** An entrance is defined as a single point of entry from the street or any other means of access into a transit station. Emergency exits are not counted as regularly used entrances and exits, and transfer points between lines are not considered separate entrances. An entrance may be stairs, escalators, elevators, or people movers.  *Two distinct station entrances, an elevator (left) and a stairwell (right)*	a. 1 b. 2 to 4 c. 5 or More
4.2	**Retail Spaces** Retail space creates areas in the station that are open and inviting, but the presence of retail may introduce risks to the station and its occupants. Retail spaces are considered high-risk areas where an explosive (or CBR) device could be placed undetected. The location of retail spaces in relation to occupied/critical areas or primary structural framing affects the vulnerability of the building to an explosive attack. 	a. **None.** No retail spaces in the transit station. b. **Low.** A few small retail spaces such as kiosks and venders. c. **Medium.** More than one retail store in the transit station. d. **High.** Significant number of retail spaces but they do not attract non-transit riders. e. **Very High.** Significant amount of retail space in the station that attract both riders and non-riders.

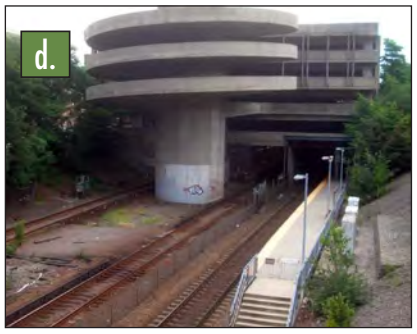
4. Vulnerability Rating: Architectural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
4.3	**Integrated/Adjacent Parking** Parking spaces near the transit station increase the risks to the station. A parking garage is a particularly high-risk area where a vehicle, unscreened or screened, could deliver a weapon. The screener should question a site representative or walk around the exterior of the station to ascertain the location of parking lots or garages and select the attribute option that most closely represents the parking location relative to the station building and proximity to occupied/critical areas. Many stations, particularly in dense urban environments, are adjacent to garages in other structures and may connect through above or underground walkways. Some transit stations have "kiss-and-ride" or passenger drop off/pick up waiting areas near the station. These areas are not considered parking in the IRVS. Vulnerability from vehicles using these areas should be assessed in ID 3.4, Manmade Barriers.	a. **None.** No parking adjacent to the station. b. **Adjacent parking (not transit agency controlled).** Parking areas (public or restricted) not controlled by the transit agency and within 300 feet of the transit station. c. **Staff-only parking.** Adjacent parking area(s) restricted to transit staff for general parking or maintenance vehicles. d. **Public parking (transit agency controlled).** Public parking areas controlled by the transit agency.



b. Parking garage at a commercial facility adjacent to a transit station

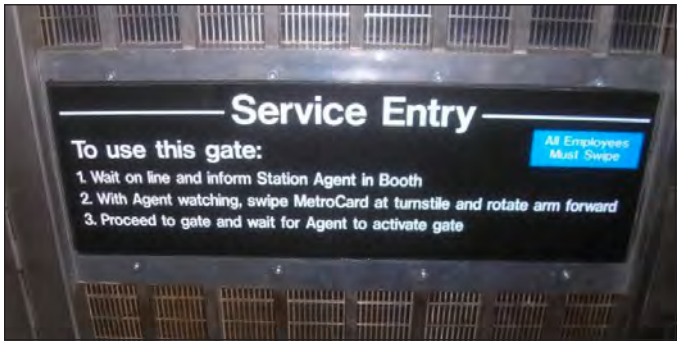


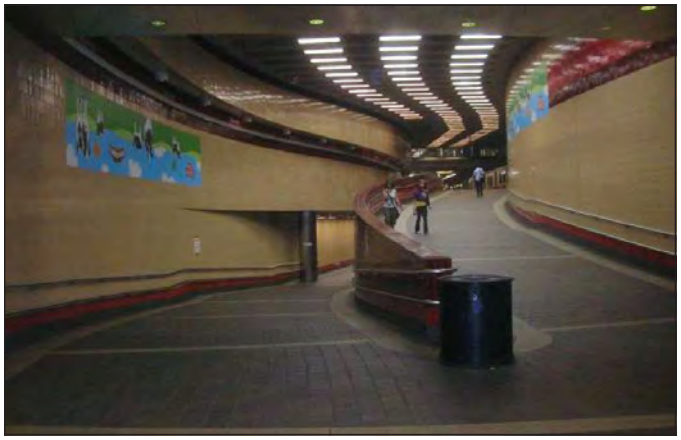
c. A staff parking lock adjacent to a transit station



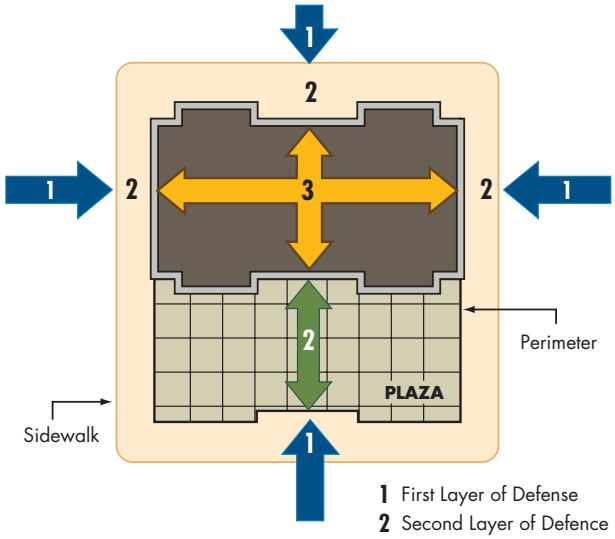
d. Public parking garage above a transit station.

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
4.4	**Lobbies (Number & Size)** Transit station lobbies are typically areas where station attendants and ticket machines are located and fare collection occurs. Some lobbies have newspaper and/or food vendors.  *Small transit station lobby with fare controls (right) and attendant booth (left).*	a. None b. 1 small c. 1 medium d. 1 large e. 2 small a. 2 medium b. 2 large c. 3+ small d. 3+ medium e. 3+ large  *Large subway station lobby*
4.5	**Number of Observable or Concealed/Not Observable Occupied Spaces** The station may have occupied spaces that are concealed or not observable and are considered high-risk areas where an explosive or CBR device could be placed undetected. The number of these spaces in relation to critical areas or primary structural framing affects the vulnerability of the station to explosive attack. These spaces are typically not considered lobbies where the public is expected and may be observed to pass through. However, when a station has a lobby or lobbies that are not observable, these spaces should be counted.	a. **None.** No observable or concealed/not observable occupied spaces. b. **No (1 to 2).** 1 to 2 occupied spaces (or lobbies) that are observable. c. **No (3+).** More than 3 occupied spaces (or lobbies) that are observable. d. **Yes (1 to 2).** 1 to 2 occupied spaces (or lobbies) that are concealed/not observable. e. **Yes (3+).** More than 3 occupied spaces (or lobbies) that are concealed/not observable.

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
4.6	**Services Entrance** Any entrance used by the transit organization's personnel that is not open to the general public and not used for emergency evacuation.  	a. **Not applicable** b. **No.** No service entrance c. **Yes.** One or more service entrance(s)
4.7	**Crowding/Congestion** Refers to any potential for pedestrian tie-ups within the station during peak hours. Review the number of exits and type of exits available to people in the station.  *Congested stairwell.*	a. Multiple exit types b. Escalators only c. Stairs only d. Elevators only

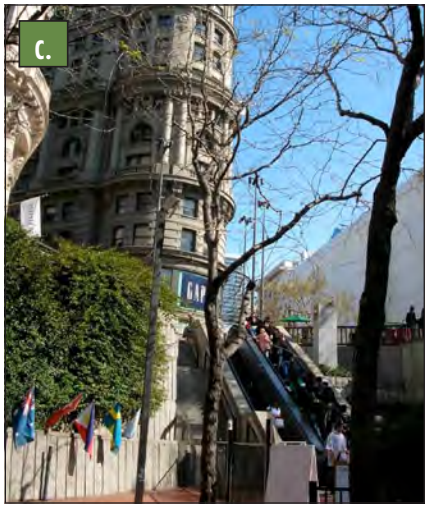
4. Vulnerability Rating: Architectural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
4.8	**Emergency Exits** Emergency exits are egresses that facilitate the evacuation of riders and emergency personnel operations during an incident. Emergency exits should be clearly designated with the proper signage. The screener should count the number of independent (separate from public exits) emergency exits in the station.  	a. More than 4 b. 3 to 4 c. 2 d. 1 e. None
4.9	**Number of Station Levels** Number of levels open to the public, including platforms, lobbies, concourses/mezzanines, fare control areas, transfer passageways, service, and other areas in the station. For below-grade stations, the street level should not be considered unless the station has features that make it an attractive target at this level.  *Ramps leading to two levels in a multi-level subway station*	a. 1 b. 2 to 3 c. More than 3

4. Vulnerability Rating: Architectural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
4.10	**Ease of Egress from Vehicle/Trains to Station**	a. Difficult b. Moderate c. Easy
4.11	**Plaza/Public Areas** A plaza describes an open public space outside the controlled access to the station. The plaza may be at grade or below grade and may have a public seating area. If not properly designed, plazas may leave the station susceptible to a vehicular collision or car bombing. An acceptable standoff distance can be created by incorporating a plaza in the site. Barriers and landscape features should be designed to make the plaza impenetrable by a vehicle. The screener should review the size and vulnerability of the plaza using the descriptions of the attribute options.	a. **Not applicable** b. **None.** No plaza or area where public may congregate just outside the control area into the station c. **Well controlled.** Public plaza has numerous barriers that are well-positioned to obstruct vehicular entry d. **Moderate control.** The plaza has some vehicular barriers, but has several notable security flaws (i.e., temporary or ornamental barriers that can easily be defeated by vehicles) e. **Not controlled.** Public plaza has no vehicular barriers



1 First Layer of Defense
2 Second Layer of Defence
3 Third Layer of Defence

d. Public plaza with some protection.



c. Below-grade public plaza leading to a transit entrance with numerous obstacles between traffic and the transit entrance

e. Public area adjacent to a subway station without limited-access management controls

Table 4-3c: Catalog of Station Characteristics and Attribute Options for Structural Vulnerabilities

<table>
<tr><th colspan="3">5. Vulnerability Rating: Structural Vulnerabilities</th></tr>
<tr><th>ID</th><th>Station Characteristics</th><th>Attribute Options</th></tr>
<tr><td>5.1</td><td>Liner Relative Thickness

The liner (or roof/wall) relative thickness refers to the thickness of the structural roof, wall, or envelope outlining the transit station. A transit station that has a thin liner that spans a long distance tends to be more vulnerable than one with a thicker liner and shorter span. In general, the relative liner thickness can be found in structural drawings of the transit station. Such information is difficult to ascertain visually, especially by the nonprofessional screener. For an approximate evaluation of this characteristic, the construction material of the liner can provide some clues to the relative liner thickness. The table below provides general guidelines for the relationships between construction materials and relative liner thickness.

<table>
<tr><th>Construction Material/Visible Structural Details</th><th>Relative Liner Thickness</th></tr>
<tr><td>Non-Reinforced Masonry</td><td>Thick</td></tr>
<tr><td>Reinforced Masonry</td><td>Thick</td></tr>
<tr><td>Other types of brick, stone, or rock based materials</td><td>Thick</td></tr>
<tr><td>Non-Reinforced Concrete</td><td>Thick</td></tr>
<tr><td>Reinforced Concrete</td><td>Medium</td></tr>
<tr><td>Iron (usually non-ductile older construction)</td><td>Thin

Note: Watch for stiffeners (ribs); if not closely spaced or not visible, categorize as ‘medium’</td></tr>
<tr><td>Steel</td><td>Thin (older construction)

Very thin (newer construction)</td></tr>
<tr><td>Pre-stressed/post-tensioned concrete</td><td>Thin</td></tr>
<tr><td>High strength concrete</td><td>Thin</td></tr>
<tr><td>High strength steel</td><td>Very thin</td></tr>
</table>
</td><td>a. Not applicable. Station is above grade

b. Thick

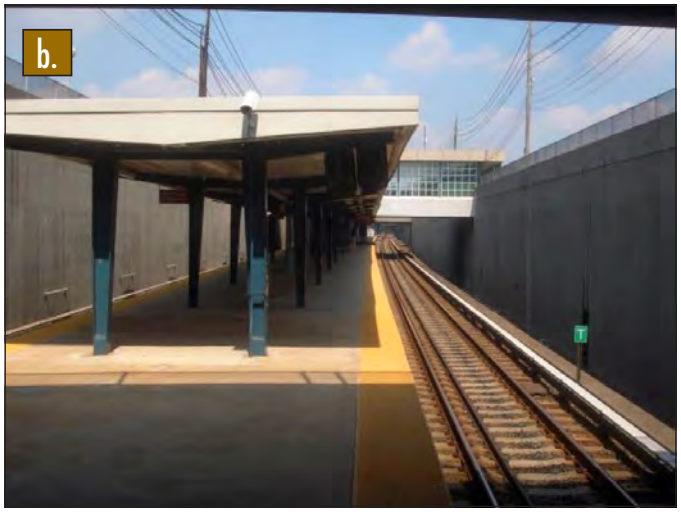
c. Medium

d. Thin

e. Very thin</td></tr>
</table>

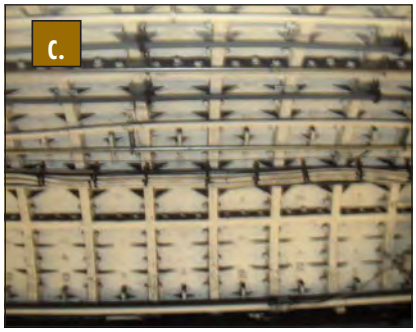
5. Vulnerability Rating: Structural Vulnerabilities		
ID	Station Characteristics	Attribute Options
5.2	**Construction Material** Primary material used to construct the transit station's structural framework and envelope.	a. High-strength concrete/steel b. Steel, concrete and/or pre-stressed concrete c. Wrought iron d. Non-reinforced concrete e. Masonry or brick

b. Elevated subway station built primarily with steel



b. Station primarily built with concrete

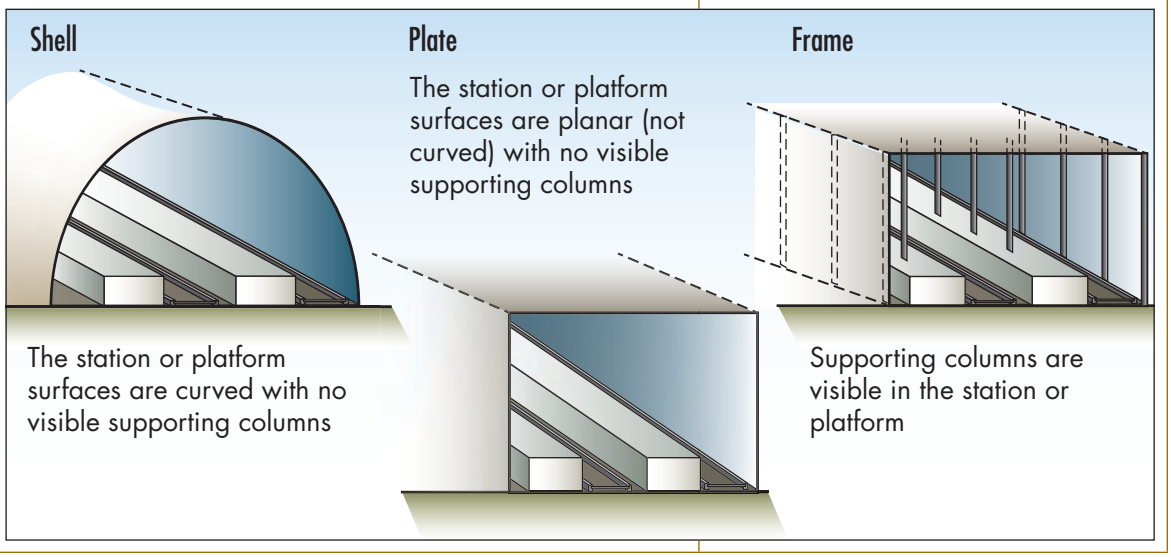
a. High-strength concrete and steel



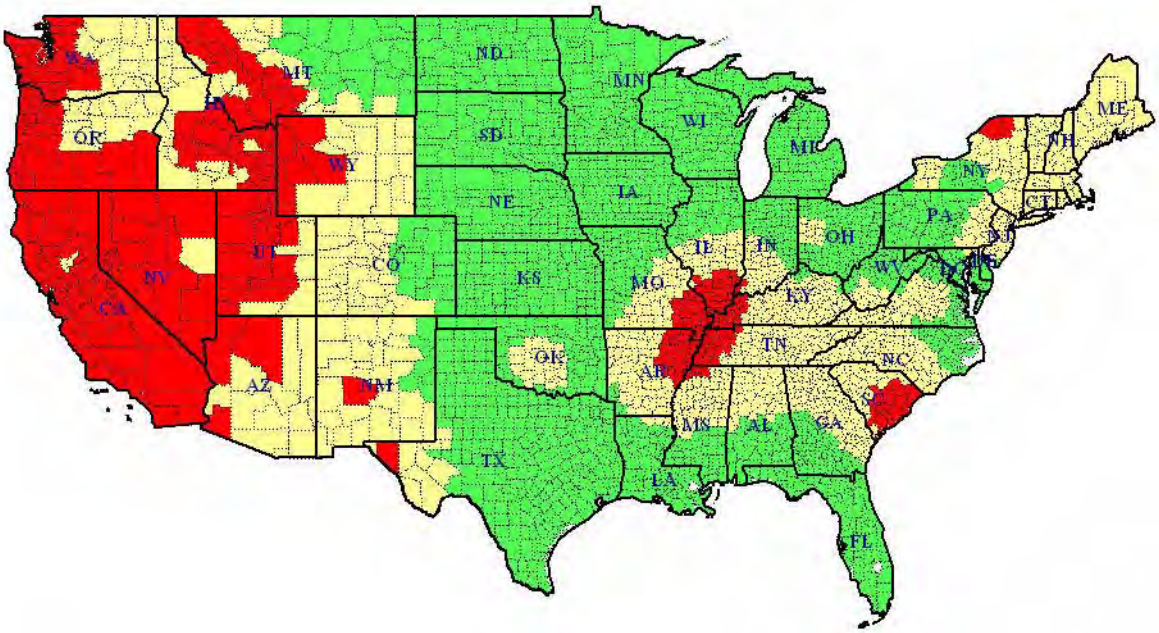
c. Example of wrought iron

e. Example of brick used in the station's structure
(a) High-strength concrete/steel

5. Vulnerability Rating: Structural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
5.3	**Known Retrofits** Recent structural upgrades to the station, including any addition of new technology or features to the existing system to increase the strength, durability, and/or service life of the structure. The screener should not give credit for simple "patch and repair" work to improve the aesthetics of the station.	a. Yes b. No
5.4	**Longest Span** Greatest distance between columns or other supporting structures.	a. Not applicable b. Less than 25 feet c. 25 to 40 feet d. 40 to 50 feet e. 50 feet or more
5.5	**Controlling Height** Average distance from floor to roof/ceiling.	a. Not applicable b. Less than 25 feet c. 25 to 40 feet d. 40 to 50 feet e. 50 feet or more
5.6	**Type of Framing** Type of structural frame or "skeleton" to which the interior and exterior envelopes of the station are attached.	a. Shell b. Plate c. Frame



5. Vulnerability Rating: Structural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
5.7	**Seismic Design** Stations in active fault/earthquake zones that were built with or retrofitted with seismic design to be resistant to earthquakes.	a. **Not applicable.** Not in a high seismic zone and does not require seismic design b. **Yes.** In an seismic zone and incorporates seismic design c. **No.** In an seismic zone and does not incorporate seismic design elements



Note:
(1) Based on NEHRP B-C soil type.
(2) The seismicity at any site is calculated based on the highest seismicity at any point in a county. More accurate information on any site can be obtained from the USGS site.

5. Vulnerability Rating: Structural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
5.8	**Overall Structural Condition** State of station maintenance, basic upkeep, and relative deterioration of important structural elements. Indicators of poor structural condition include aging members, discoloration, cracks, deflection, excessive vibrations, spalled or delaminated concrete, and corrosion. New materials, retrofitting, and lack of visual flaws may be taken as a sign of healthy structural condition	a. **Excellent.** Recently built or retrofitted. b. **Good.** Well maintained with few structural flaws. c. **Average.** A few major structural flaws, but none will impede safe transit operations or pedestrian movement. d. **Below average.** Major flaws in critical structural components that have the potential, without proper maintenance/repair, of impeding transit operations or pedestrian movement. e. **Poor.** Nearly unusable from lack of maintenance or other problems that have caused structural deterioration.

a. Recently retrofitted subway station

b. Station is well-maintained with few structural flaws

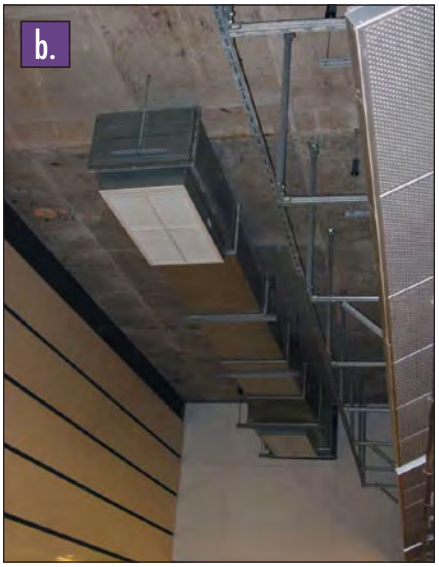
c. Discoloration and rust of station wall portray a few structural flaws, but the structural conditions will not hinder operations

d. Severe corrosion of this steel beam and bearing in the station demonstrates a major flaw that could cause problems

e. Conditions have lessened the structural capacity of the column so that it requires bracing and can no longer carry the designed load

Table 4-3d: Catalog of Station Characteristics and Attribute Options for Ventilation Vulnerabilities

6. Vulnerability Rating: Ventilation Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
6.1	**Protection of Ventilation Shafts** Degree of protection and security features of the station's ventilation shafts. Ventilation shafts are typically small openings in the ground that permit air intake or exhaust and rarely have significant above-ground structural components (for larger structures, see ID 6.2, Protection of Ventilation Structures).  *c. A vent shaft is raised above the street level with bars that provide extra protection, but vent still has some exposure*	a. **Not applicable** b. **Well-protected.** Vent is well shielded or is not visible to passers-by c. **Somewhat protected.** Vent has limited protection but is still vulnerable. d. **Not protected.** Vent is completely exposed; no attempt has been made to shield the vent from any hazard  *d. Vent is exposed on a pedestrian sidewalk*

6. Vulnerability Rating: Ventilation Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
6.2	**Protection of Ventilation Structures** The degree to which major vent structures are shielded from a planned terrorist attack, car accident, or the effects of a natural disaster.  *d. A ventilation building exposed to a potential vehicular accident, explosion, or CBR attack, with little standoff distance from the nearby street*	a. **Not applicable** b. **Well-protected.** Protected from failure in the event of an attack, accident, or natural disaster c. **Somewhat protected**. Has features, either manmade or natural, so that it is shielded but not completely protected from an attack, accident, or natural disaster d. **Not protected.** No standoff distance from vehicles or exposed to natural hazards or another structural feature could cause ventilation functions to be compromised
6.3	**Redundancy of Ventilation Systems** Reliability of the ventilation system if one or more components of the station's system fail. Redundant ventilation systems provide an alternative or fail-safe by allowing connection to a backup system.	a) Not applicable b. Yes c. No
6.4	**Ventilation Hardware Exposure** Reflects the degree to which ventilation systems are visible and accessible to the general public. .  *b. Hardened enclosure*	a. **Not applicable** b. **Hardened enclosure.** HVAC system is behind secured doors and vents where it is neither visible nor accessible to the general public. c. **Covered, not hardened.** HVAC system is not visible to the general public but is accessible through unsecured doors, vents, or other access points. d. **Visible.** HVAC system is exposed and unprotected.

6. Vulnerability Rating: Ventilation Vulnerabilities		
ID	Station Characteristics	Attribute Options
6.4	Ventilation Hardware Exposure (continued)  *c. Covered, not hardened*	 *d. Visible*

Table 4-3e: Catalog of Station Characteristics and Attribute Options for Fire Protection System Vulnerabilities

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	Station Characteristics	Attribute Options
7.1	**Code Inspection** Inspection by code enforcement officials within the last 12 months.	a. Yes b. No
7.2	**Backup Power System** Whether the station has a backup power system. A backup power system creates redundancy in the system, providing power to essential areas of the station in a power outage or interruption in the primary power supply.	a. Yes b. No
7.3	**Emergency Lighting System** Whether the station has an emergency lighting system. An emergency lighting system illuminates the station in a fire or other emergency or if the normal lighting system ceases to function. An emergency lighting system includes having a clearly lit evacuation path and emergency exit signage. 	a. Yes b. No

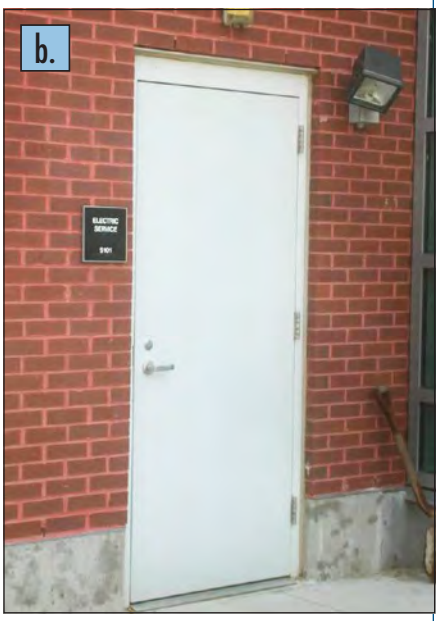
7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
7.4	**Fire Control Systems**	
7.4.1	**Automatic Detection System** Whether the station has a fire automatic detection system. An automatic fire detection system is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion. Automatic fire alarm systems can be used to notify people to evacuate in a fire or other emergency, to summon emergency services, and to prepare the station to control the spread of fire and smoke.	a. Yes b. No
7.4.2	**Fire Control Panel** Whether the fire control panel is in a publicly accessible location. The fire control panel is an electric panel that controls the fire protectionsystems. It receives information from the detection system and automatically controls equipment to respond to a fire. The panel should be accessible in an easily identified location, typically near the main lobby on in a clearly marked fire control room.	a. Yes b. No
7.4.3	**Automatic Detection System Reporting** Who the automatic detection system reports to. When the automatic detection system senses a fire based on certain changes in the environment of the station, it alerts people to the danger through fire alarms. The detection system may also transmit this information to emergency services outside the station.	a. Not applicable b. Fire department c. Offsite control center d. Station control panel e. No one – local alarm only
7.4.4	**Activation System** When the automatic detection system is activated, certain other systems in the station may be triggered to facilitate safe evacuation. Security control devices such as ticket control barriers and emergency exit doors may be released, and elevators may be recalled to a designated floor. When the elevator is recalled, it proceeds to the recall floor and stops with its doors open. The elevator will not respond to calls or move in any direction. A fire service key switch is located on the fire recall floors. The fire service key switch has the ability to turn fire service off, turn fire service on, or bypass fire service. Only designated personnel should be able to control these emergency service switches.	a. Not applicable b. Release security control devices and recall elevators c. None

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
7.5	**Smoke Dampers in Ventilation System** Whether the ventilation system has smoke dampers. Smoke dampers are passive fire protection devices used in air conditioning and ventilation ductwork to prevent the spread of smoke inside the ductwork where the ductwork penetrates fire-resistance rated walls and floors. Smoke dampers are installed inside the ducting by sheet metal contractors.	a. Yes b. No
7.6	**Sprinkler Systems**	
7.6.1	**Automatic Sprinkler System** Whether the station has an automatic sprinkler system. An automatic fire sprinkler is an active fire protection measure, consisting of a water supply system, and provides adequate pressure and flow rate to a water distribution piping system onto which fire sprinklers are connected. Fire sprinkler systems should be installed in all transit stations. 	a. Yes b. No
7.6.2	**Coverage of Automatic Sprinkler System** The presence of sprinklers in all areas of the station. A typical sprinkler system operates when heat at the site of a fire causes a glass component in the sprinkler head to fail, thereby releasing the water from the sprinkler head. Sprinkler systems help to reduce the growth of a fire, thereby increasing life safety and limiting damage.	a. Not applicable b. Entire station c. Partial coverage

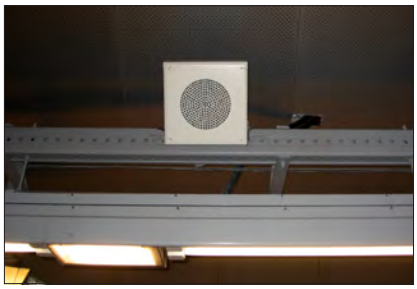
7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
7.6.3	**Alternate Automatic Extinguishing System** There are several alternatives to standard water sprinkler systems. These systems are common in places that cannot afford significant down time or loss of property as the result of a fire. The chemicals used in some alternate systems may be harmful to building occupants when released.	a. **Combination**. Consists of sprinkler heads and standpipe hose outlets attached to a common riser. Combination systems are either "wet" or "dry." b. **Clean agent/water mist.** A water mist system forces water and pressurized gas together to deliver a spray of small droplets. In a clean agent system, chemical agents are used to extinguish a fire. They are applied in either a total flooding or local application method. In total flooding, a three-dimensional area is filled with the agent in a concentration sufficient to stop fire. In local application the agent is applied only at the site of the fire. c. **Dry chemical**. In a dry chemical system, a powder-based agent extinguishes the fire by preventing the reaction causing the fire. d. **None**
7.7	**Station Knox Box** Whether the station has a knox box. A knox box is a small, wall-mounted safe that holds all station keys for firefighters and Emergency Medical Technicians to retrieve in emergencies. Knox boxes simplify entry for fire departments and minimize property losses because firefighters do not need to break doors to gain entry. The location of the knox box is typically coordinated with the fire department.	a. Yes b. No

7. Vulnerability Rating: Fire Systems Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
7.8	**Fare Collection System** Method through which riders pay for each ride. The three system types are open access, automated, and restricted turnstiles . The fare collection system plays an important role in the ease with which a station can be evacuated.  	a. **Open access.** No turnstiles or gates through which passengers must pass to enter the transit car. Stations with this fare collection system are easily evacuated in the event of an emergency. b. **Automated.** Riders swipe or touch their fare cards, which opens a gate to allow them into or out of the station. Gates are opened in the event of an emergency to allow riders to exit freely without swiping a card. Examples of this fare collection method are in the Metro system in Washington, D.C., and Boston subway systems. c. **Restricted turnstile.** Riders swipe their cards and push through a turnstile to enter and exit the station. This fare collection method results in a much slower evacuation of the station. Turnstiles cannot be held open, so each rider must exit individually through the turnstile or through exit doors, neither of which is able to handle large volumes of people.

Table 4-3f: Catalog of Station Characteristics and Attribute Options for Operations Vulnerabilities

8. Vulnerability Rating: Operations Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
8.1	**Power Supply and Distribution: Enclosures** Enclosures of power supplies include any covering of electrical equipment, generators, and other supporting infrastructure necessary for facility operations.  *a. Secure entrance to a power supply area with a hardened door and electronic key pad entry*  *c. Power supply system, with only a chain link fence for protection, exposed to the public and subject to tampering*	a. **Well protected.** Power supplies are behind hardened enclosures with secure access points. b. **Marginally protected.** Power supply systems are concealed but not sufficiently hardened to withstand intentional tampering or a natural disaster. c. **Not protected.** Power supplies are exposed and easily accessible to the general public.  *b. Power supply system behind a non-hardened door with a traditional lock and key entry system*

8. Vulnerability Rating: Operations Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
8.2	**Surveillance and Control**	
8.2.1	**Coverage of Control Systems** The number of surveillance, intrusion detection, and access management/control systems in operation describes the total number of security systems in place that are designed to allow facility personnel to monitor public behavior. Security systems can be simple or as complex as a comprehensive integrated intrusion detection system that includes a closed circuit television (CCTV) network. Two security systems, a CCTV camera and a mirror, are each different types of surveillance systems with differing qualities and deterrence values.  *Two security systems, a CCTV camera and a mirror, are each different types of surveillance systems with differing qualities and deterrence values*	a. **Open access.** No turnstiles or gates through which passengers must pass to enter the transit car. Stations with this fare collection system are easily evacuated in the event of an emergency. b. **Automated.** Riders swipe or touch their fare cards, which opens a gate to allow them into or out of the station. Gates are opened in the event of an emergency to allow riders to exit freely without swiping a card. Examples of this fare collection method are in the Metro system in Washington, D.C., and Boston subway systems. c. **Restricted turnstile.** Riders swipe their cards and push through a turnstile to enter and exit the station. This fare collection method results in a much slower evacuation of the station. Turnstiles cannot be held open, so each rider must exit individually through the turnstile or through exit doors, neither of which is able to handle large volumes of people.
8.2.2	**Quality of Control Systems** The operational quality of surveillance and control systems in operation based on the age of the equipment.	a. High b. Medium c. Low The screener should note the age of the equipment in the Comments column.

8. Vulnerability Rating: Operations Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
8.3	**Public Address and Communication:**	
8.3.1	**Public Notification (Alerts and Signage for Public Awareness)** Efforts by the transit agency to implement focused public awareness campaigns for the transit agency employees and traveling public, placing emphasis on public security and emergency awareness. Public awareness programs consist of security and emergency preparedness information materials prominently displayed throughout the system by signage, notifications, alerts, and public announcements. There are two sets of attribute options corresponding to low and high ridership levels (see ID 1.4, Peak Number of Riders/Transfers per Day) and a total of 10 options for this characteristic. Only one attribute option should be selected. Classification of Public Awareness **Class 1.** Public awareness is a limited effort consisting of: • Signage • Posters • Public telephones. **Class 2.** Public awareness is a heightened effort. In addition to Class 1, Class 2 public awareness consists of: • Panic alarms (one-way communication) • Audible alerts through public address systems **Class 3.** The transit system has a dedicated public awareness campaign. In addition to Class 1 and Class 2, Class 3 public awareness consists of: • Real-time updates • Visual alert system • Emergency call boxes with two-way communication	**(Low ridership (see ID 1.4)** a. Class 3 b. Class 2 c. Class 1 d. Present (non-operational) e. None **High ridership (see ID 1.4)** f. Class 3 g. Class 2 h. Class 1 i. Present (non-operational) j. None 
8.3.2	**Effectiveness of Public Awareness** Ability and success of the public awareness program to accomplish the following (through public notification, alerts, and signage): • Declare a state of an emergency • Urge passengers to report unattended property, suspicious behavior, and security concerns • Display security awareness and emergency preparedness information • Inform passengers of the means to evacuate safely from transit vehicles and/or facilities • Designate restricted areas All signage should be prominently displayed and legible to the public. Public address systems should be audible.	a. High b. Moderate c. Limited

8. Vulnerability Rating: Operations Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
8.3.3	**Asset-Related Communications** Systems available at the station to facilitate rapid information gathering, decision-making, and response (action taking). Classification of Communications Systems: **Class 1.** Basic interdiction-related communications system that alerts the public to potential threats and provides a means for the public and staff personnel to report suspicious activity. Communications consist of: • Hand-held radios • Emergency notification alarm • Cell phones • Telephones **Class 2.** Enhanced interdiction-related communications system that provides appropriate modes of communication capabilities to security, staff personnel, and public. In addition to Class 1, Class 2 communications consists of: • Multi-channeled hand-held radios • GPS • Pagers **Class 3.** Optimal interdiction-related communications system that provides secure, interoperable, and redundant modes of communication capabilities to security, staff personnel, and appropriate communications for the public. In addition to Class 1 and Class 2, Class 3 communications consist of: • Secure communications with multiple channels, frequencies, and additional means should primary means fail • Communications channeled through a dedicated proprietary communications center	**(Low ridership (see ID 1.4)** a. Class 3 b. Class 2 c. Class 1 d. Present (non-operational) e. None **High ridership (see ID 1.4)** f. Class 3 g. Class 2 h. Class 1 i. Present (non-operational) j. None
8.3.4	**Effectiveness of Asset-Related Communications** Ability and success of the asset-related communications to accomplish the following through hand-held radio, emergency alarms, telephones, and emergency callback boxes: • Facilitate rapid information gathering • Facilitate decision-making • Facilitate response and action taking	a. High b. Moderate c. Limited

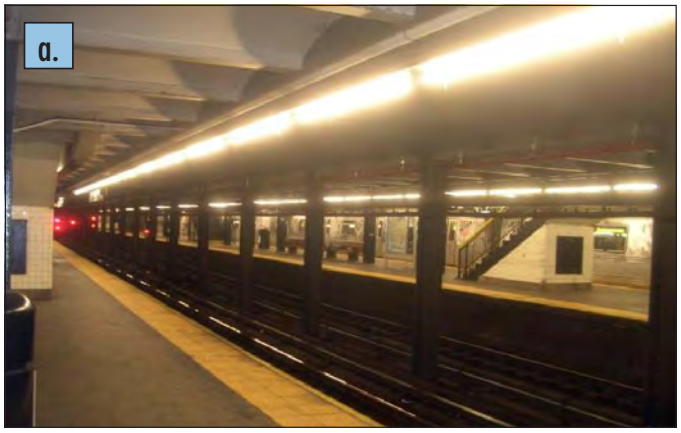
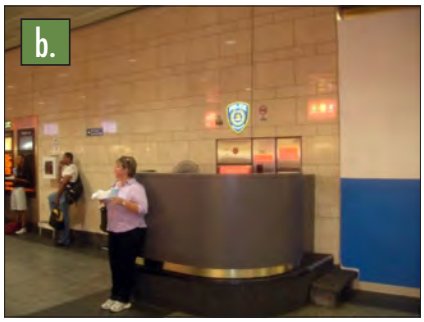
8. Vulnerability Rating: Operations Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
8.4	**Quality of Lighting**	
8.4.1	**Effectiveness of Exterior Lighting** The effectiveness of illumination at the approaches to the station. Security lighting should be provided for the overall site to allow security personnel to maintain visual assessment during hours of darkness. Continuous or periodic observation may provide both a real and psychological deterrent because it facilitates detection of unauthorized personnel and makes the job of an attacker more difficult.	a. **High.** Station approaches are well lit, enhancing lines of sight, and lighting is well maintained. b. **Medium.** Station approaches have areas where lighting should be improved. Visibility and lines of sight are somewhat impaired or lighting is not well maintained. c. **Low.** Station exterior lighting is ineffectual or nonexistent.
8.4.2	**Sufficiency of Interior Lighting** Sufficiency of illumination inside the main functioning areas of the station.  *a. Example of high-quality lighting*  *b. Example of medium-quality lighting (a) High. Lighting for standard operations, such as passenger boarding/disembarkation from transit vehicles, is sufficient*	a. **High.** Lighting for standard operations, such as passenger boarding/disembarkation from transit vehicles, is sufficient. b. **Medium.** Lighting systems either need replacement, basic maintenance, or minor upgrades. c. **Low.** Facility lighting systems are either nonexistent or of such poor quality that the facility interior is barely passable and other sources of light, such as flashlights, are needed to operate in the station.

Table 4-3g: Catalog of Station Characteristics and Attribute Options for Nonstructural Vulnerabilities

9. Vulnerability Rating: Nonstructural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
9.1	**Quality of Security Personnel Booths** Provide information on the existence and rating for any law enforcement installations inside or immediately adjacent to the station that act to directly support public safety in the facility.  *a. Example of high-quality modern security personnel booth facility*  *c. Example of low-quality security personnel booth*	a. **High.** Modern facility with command and control equipment, intrusion detection, access management controls, permanent structural components, and other features that enable public safety officials to monitor the station complex. b. **Medium.** Police booths without significant surveillance capabilities and little or no major structural components. c. **Low.** Temporary or poorly made structure without station surveillance equipment. d. **None**  *b. Example of medium-quality security personnel booth*
9.2	**Fixture Attachments** Lighting, wiring, piping, and other exposed components.	a. **Secured.** Fixture attachments are secure from accidental incidents, vandalism, and other acts that might disrupt operations. b. **Not secured.** Fixture attachments are exposed to accidental events, vandalism, or other acts that might cause a disruption of service.

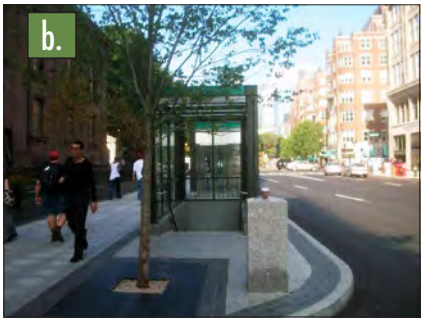
9. Vulnerability Rating: Nonstructural Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
9.2	**Fixture Attachment (continued)**	

a. Example of secure fixture attachments.

b. Example of fixture attachments that are not secure

9.3	**Quality of Barriers/Curbs** Existence and effectiveness of barriers and curbs in preventing vehicles from entering the station.	a. **High.** Existing barriers or curbs are of good quality and sufficient to stop a vehicle from entering the station. b. **Medium.** Existing barriers or curbs are sufficient to stop an accidental impact at the station but would not stop an intentional vehicular attack at the station. c. **Low.** Barriers or curbs would not stop even an accidental vehicular impact at the station. d. **None present**

a. Example of a high-quality barrier



b. Barrier designed to protect the station entrance from an accidental vehicular impact, but an intentional strike is still possible

Table 4-3h: Catalog of Security Systems for Physical Security Vulnerabilities

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.1a	**Access Control** Any combination of equipment and/or guards that can deny entry to unauthorized personnel or vehicles to certain areas of the station. The purpose of the access control is to ensure that only authorized personnel are permitted into or out of a controlled area. Entry can be controlled by locked fence gates, locked doors to a building or rooms within a building, or specially designed portals. The means can be applied manually by guards or automatically by using entry control devices. Examples of access control systems: • Fare collection gates • Electronic keypad • Magnetic-stripe card • Proximity card • Smart card • Biometric devices	a. Yes b. No
10.2a	**Intrusion Detection Systems (IDS)** The combination of components, including sensors, control units, transmission lines, and monitor units, integrated to operate in a specific manner. The purpose is to detect an aggressor crossing the boundary of a protected area. The sensors initiate alarm signals by sensing the stimulus, change, or condition for which it was designed. Examples of exterior intrusion detection sensors: • Fence • Buried line • Microwave • Infrared Examples of interior intrusion detection sensors: • Boundary penetration • Volumetric motion • Video analytics	a. Yes b. No

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.3a	**Video and Surveillance Assessment – Monitored CCTV** An electronic system of cameras, control equipment, recorders, and related apparatus used for surveillance or alarm assessment. The system may include event-activated software. Effectiveness of the system depends on proper monitoring, the resolution, and coverage of the cameras. 	a. Yes b. No
10.4a	**Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Detection Equipment** A variety of technologies and techniques that are in a fixed location to detect the presence or use of CBRNE weapons in real-time. Examples of CBRNE detection equipment: • Trace detection equipment • Vapor sampling • CBR identifiers and classifiers • Integrated system	a. Yes b. No
10.5a	**Personnel/Baggage CBRNE Screening** Search and screening are conducted at a fixed check point. Anomalies are verified with K-9 and other CBRNE detection devices.	a. Yes b. No
10.6a	**Vehicular CBRNE Screening** Vehicles are searched and screened at fixed checkpoints. Anomalies are verified with K-9 and other CBRNE detection devices.	a. Yes b. No
10.7a	**Mobile Personnel/Baggage CBRNE Screening** Random searches are conducted of personnel and baggage, typically by a roving team of personnel with appropriate equipment and an explosive K-9 Unit.	a. Yes b. No

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.8a	**Unarmed Guards/Patrol** Security guards at the station carry no firearms and are responsible for detecting, deterring, observing, and reporting malicious behavior.	a. Yes b. No
10.9a	**Armed Guards/Patrols** Security guards patrolling at the station are armed and meet all appropriate jurisdiction standards. The guard/patrol is responsible for reporting incidents and has a limited interdiction capability.	a. Yes b. No
10.10a	**Law Enforcement Patrols** Sworn law enforcement personnel patrol during specified hours or randomly patrol the station.	a. Yes b. No
10.11a	**Asset Related Communications** Security communication systems that facilitate rapid information gathering, decision-making, and actions (response). Examples: • Pagers • GPS • Multi-channeled hand-held radios • Two-way radio • Direct ring-down intercoms • Standard telephone landlines • Wireless phones • Emergency notification alarm	a. Yes b. No
10.12a	**Special Weapons and Tactics (SWAT) Teams** A special tactical unit trained for multiple special operations that is either full-time to the transit system or provided by the local law enforcement. The SWAT team is trained in counterterrorism and possesses specialized skills in explosive breaching, sharpshooter capability, hostage rescue, etc.	a. Yes b. No
10.13a	**10.13 Explosion Ordinance Disposal (EOD) Teams** A special team either full-time dedicated to the transit system or provided by the local law enforcement who are trained to be used as a bomb squad when needed.	a. Yes b. No

10a. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.14a	**Interdiction-related Communications** Security communication systems that facilitate rapid information gathering, decision-making, and actions (response) to interdict a threat	a. Yes b. No
	Waterside Security Systems Applicable to mass transit stations located above or adjacent to a body of water.	
10.15a	**Waterside Intrusion Detection Systems (IDS)** Appropriate detection technologies capable of detecting smaller water craft, swimmers, divers, or objects at varying distances and depths from the tunnel (DHS, 2002).	a. Yes b. No
10.16a	**Vessel Boarding Teams** Team with the ability to board vessels near the tunnel in security or emergency situations (DHS, 2002).	a. Yes b. No
10.17a	**Dive Teams** Team with the capability to dive into the water surrounding the tunnel for security purposes (DHS, 2002).	a. Yes b. No
10.18a	**Patrol Boats** Vessels used for emergency response at the tunnel.	a. Yes b. No
10.19a	**Unarmed Guards (Waterside)** Security guards at the station waterside carry no firearms and are responsible for detecting, deterring, observing, and reporting malicious behavior.	a. Yes b. No
10.20a	**Unarmed Guards (Waterside)** Security guards at the station waterside carry no firearms and are responsible for detecting, deterring, observing, and reporting malicious behavior.	a. Yes b. No
10.21a	**Armed Guards (Waterside)** Security guards patrolling at the station waterside are armed and meet all appropriate jurisdiction standards. The guard/patrol is responsible for reporting incidents and has a limited interdiction capability.	a. Yes b. No
10.22a	**Law Enforcement Patrols (Waterside)** Sworn law enforcement personnel patrol during specified hours or randomly patrol the station waterside.	a. Yes b. No

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.1b	**Blast Threat: Internal** Intrusion into the transit station by a person or persons with the intent to attack the transit station with an explosive device.	
10.1.1b	**Number of Systems** Number of security systems available to protect against the threat of an explosion inside the subway station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 8 or more b. 4 to 7 c. 1 to 3 d. None
10.1.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect against the threat of an explosion inside the transit station. The number of detection systems available will have little impact if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.2b	**Blast Threat: External (Direct)** Use of an explosive device to attack the transit station from the exterior. In this case, the transit station is the primary target.	
10.2.1b	**Number of Systems** Number of security systems available to protect against an explosion outside the transit station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.2.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect against the threat of an explosion directed at the transit station from the exterior. The number of detection systems available will have little impact if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.3b	**Blast Threat: External (Collateral)** An attack with explosive devices on a target within a 300-foot radius of the transit station e.g., a bomb explosion in a plaza adjacent to a transit station.. The transit station is not the primary target but would be susceptible to collateral effects.	
10.3.1b	**Number of Systems** Number of security systems available to detect the threat of an explosive attack on a target within 300-feet of the transit station. The station is not the primary target but would be susceptible to collateral effects. The detection systems may be separate from security operations of the station. Redundant systems are highly desirable. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.3.2b	**Overall Security Effectiveness** Ability and success of collective security systems to protect the transit station against the collateral effects of an explosive attack on another target within 300 feet. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.4b	**CBR Threat: Internal** The ground release of a CBR agent inside the transit station.	
10.4.1b	**Number of Systems** Number of security systems available to detect the threat of a CBR release inside the station. Detection systems include access control, screening systems, sensors, video surveillance and assessment, security lighting, and security guards. Redundant systems are desirable. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.4.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect against the threat of a CBR release inside the station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.5b	**CBR Threat: Tunnel** The release of a CBR agent inside the tunnel of the transit system serving the station.	
10.5.1b	**Number of Systems** Number of systems available detect the threat of a CBR release inside the tunnel of the station. Detection systems include access control, screening systems, sensors, video surveillance and assessment, security lighting, and security guards. Redundant systems are highly desirable. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.5.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect against the threat of a CBR release inside the tunnel of the station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.6	**CBR Threat: External** The ground release of a CBR agent from the exterior of the transit station	
10.6.1b	**Number of Systems** Number of detection systems available to detect the threat of a CBR release outside the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.6.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect the station against the threat of a CBR release outside the transit station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.7b	**Fire Threat: Internal** A fire threat inside the transit station that threatens the operations and users of the transit station itself.	
10.7.1b	**Number of Systems** Number of detection systems available to protect against the threat of a fire inside the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.7.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect the station against the threat of a fire inside the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing fire.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.8b	**Fire Threat: External** A fire threat outside the transit station that threatens the operations of the transit station itself. An example is a transit station next to or under a building that is on fire, thus threatening the operations and structure of the transit station.	
10.8.1b	**Number of Systems** Number of detection systems available to protect against the threat of a fire outside the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.8.2b	**Overall Security Effectiveness** Ability and success of the systems to protect the station against the threat of a fire outside the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing fire	a. High b. Effective c. Minimal d. Ineffective e. No security

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.9b	**Fire Threat: Tunnel/Track/Smoke** Fire or smoke in the tube of the tunnel connected to the transit station from the tracks of trains that threatens the life safety, operations, and structure of the transit station.	
10.9.1b	**Number of Systems** Number of detection systems available to protect against the threat of fire or smoke in the tunnels connected to the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.9.2b	**Overall Security Effectiveness** Ability and success of the systems to protect the station against the threat of fire or smoke in the tunnel connected to the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing fire.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.10b	**Other Threats: Flood/Flooding** An event causing the transit station to be submerged in water threatening the operations and users of the station.	
10.10.1b	**Number of Systems** Number of detection systems available to protect against the threat flooding in the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.10.2b	**Overall Security Effectiveness** Ability and success of the systems to protect the station against the threat of flooding inside the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing flooding.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.11b	**Other Threats: Collision Grade/Tunnel/Elevated.** Collision describes a vehicular impact to the transit station causing damage to the structure and threatening operations. This includes collisions at grade, in the tunnel, or elevated.	
10.11.1b	**Number of Systems** Number of detection systems available to protect against the threat of a vehicular collision into the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist	a. 5 or more b. 3 to 4 c. 1 to 2 d. None

10b. Vulnerability Rating: Physical Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
10.11.2b	**Overall Security Effectiveness** Ability and success of the systems to protect the station against the threat of a vehicular collision into the station. The number of detection systems available will have little effect if the systems are not effective in warning of or preventing collisions.	a. High b. Effective c. Minimal d. Ineffective e. No security
10.12b	**Other Threats: Cyber** An attack on the transit station through any combination of facilities, equipment, personnel, procedures, and communications integrated through cyber networks or control systems.	
10.12.1b	**Number of Systems** Number of detection systems available to protect against the threat of a cyber attack on the station. This characteristic is automatically summed in the IRVS Database using the general security system checklist.	a. 5 or more b. 3 to 4 c. 1 to 2 d. None
10.12.2b	**Overall Security Effectiveness** Ability and success of the collective security systems to protect the station against the threat of a cyber attack on the station. The number of detection systems available will have little effect if the systems are not effective in thwarting attacks.	a. High b. Effective c. Minimal d. Ineffective e. No security

Table 4-3i: Catalog of Station Characteristics and Attribute Options for Cyber Vulnerabilities

11. Vulnerability Rating: Cyber Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
11.1	**Effectiveness of Cyber Security Plan** How well the security in place protects systems, such as the supervisory control and data acquisition (SCADA) or utility monitoring and control systems (UMCS), which provide monitoring and control of utilities within buildings or the electronic security system. Many station operation systems use the Internet to perform these functions, so cyber security must be a priority because the systems are accessible to all attackers with a computer and access to the Internet. The best protection for these systems is to remove them from the Internet; when that is not feasible, other protective features must be put in place.	a. High b. Medium c. Low d. None
11.2	**Effectiveness of Training Programs** Effectiveness of the programs in place to train transit station employees on the cyber security measures in place.	a. High b. Medium c. Low d. None

11. Vulnerability Rating: Cyber Vulnerabilities		
ID	Station Characteristics	Attribute Options
11.3	**Security of Communication, Signal, and Power Systems** Measures in place to protect the communication system, signal system, and power supply to the transit station.	a. Secured b. Medium c. Marginal d. No security
11.4	**Redundancy of Communication Systems** The station's ability to operate communications systems if the primary system is compromised.	a. Yes b. No
11.5	**Security of Power Supply** Measures in place to protect the power supply to the transit station. The power supply ensures that all communications and security measures are functioning.	a. Secured b. Medium c. Marginal d. No security
11.6	**Effectiveness of Wireless, Radio, or Satellite Systems During Emergencies** Whether these communication modes can function effectively to deliver important messages to and from the transit station if other systems are compromised.	a. High (regional) b. Medium (within jurisdiction) c. Low (system only)

Table 4-3j: Catalog of Station Characteristics and Attribute Options for Operational Security Vulnerabilities

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	Station Characteristics	Attribute Options
12.1	**Emergency Plan** The transit agency has prepared an emergency plan, with procedures and protocols, to use in the event of a disaster. The purpose of emergency plans is to reduce the impact of disasters. By implementing the emergency plan, a transit agency can enhance its capability to respond to and recover from and mitigate against an act of terrorism or natural disaster.	a. Yes b. No
12.2	**Emergency Response Exercises** A well-rehearsed emergency plan enables efficient coordination of rescue and response operations. Drills and training can improve how people function during emergencies.	a. Full scale b. Table top c. Workshop d. None

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
12.3	**Effectiveness of Emergency Plans** Ability and success of the emergency/security response plans implemented by the station. Just having a plan does not protect the station; if the plan is not effective, the station will not be prepared to respond to an emergency. Characteristics of an effective emergency/security response plan are: • Communication plans with easily understandable terminology and methods • Development and exercise of warnings combined with planned areas of refuge and evacuation plans • Development of organizations of trained volunteers among civilian populations such as, Community Emergency Response Teams	a. High b. Effective c. Minimal d. Ineffective
12.4	**Security Plan** The transit agency has prepared a security plan which includes details on how the protective systems, continuity of operations, and other emergency systems will be handled. Included are general plans for system redundancy, memoranda of understanding for response force support, and notification requirements.	a. Yes b. No
12.5	**Security Plan Update Status** Length of time since security plans were last updated. Security plans should be reviewed and updated annually to incorporate changes in threat intelligence.	a. Within 12 months b. 1 to 2 years c. 2 to 5 years d. More than 5 years e. None
12.6	**Transit Agency Mass Evacuation Plan** The transit agency has a procedure for the immediate and rapid movement of people out of the station in the event of an emergency. Mass evacuation plans are developed to ensure the safest and most efficient evacuation time for all people in the station.	a. Yes b. No

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
12.7	**Effective of Mass Evacuation Plan** Ability and success of the mass evacuation plan. An effective evacuation plan uses multiple exits and technologies to ensure full and complete evacuation. The transit agency should post procedures for safe evacuation prominently in the station. The screener should consider the phases of evacuation when determining the effectiveness of the evacuation plan. 1. Detection 2. Decision 3. Alarm 4. Reaction 5. Movement to area of refuge or assembly station 6. Transportation	a. High b. Effective c. Minimal d. Ineffective
12.8	**Continuity of Security** Security and protective measures are maintained during off-peak or closing hours; if not, the station is more vulnerable.	a. Yes b. No
12.9	**Report/Exchange Threat Information** How often the transit agency receives and exchanges threat information with local, State, and Federal law enforcement officials.	a. Frequent b. Seldom/infrequent c. None
12.10	**Training Programs** Training is provided to all transit employees regarding security awareness and emergency response. Training and education for transit personnel (security, maintenance, and operations) is essential because it is the engagement and decision-making of these individuals, operating in their own areas of expertise and responsibility, that will determine the success of emergency preparedness and response. Objectives for training are: • Develop employee awareness of potential threats or hazards. Employees should be able to recognize, report, and respond appropriately to suspicious items. • Develop an understanding of responses and protective actions and what to do for each of the possible emergency situations.	a. Well established b. Marginal c. None

12. Vulnerability Rating: Operational Security Vulnerabilities		
ID	**Station Characteristics**	**Attribute Options**
12.11	**Coordinated Efforts of Local/Regional First Responders** A mutual-aid agreement should be established between the transit agency and entities in the area that would be called upon to supplement the agency's resources during an emergency. The collaboration should include:• Coordinated exercises with both entities for emergency preparedness and response • Sharing of emergency response and security protocols • Information sharing capabilities (e.g., contacts, procedures, resource inventories) • Interoperable communications systems with first responders (	a. Well established b. Marginal c. None

5

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A

Acronyms

BIPS	Buildings and Infrastructure Protection Series
C	consequences
CBR	chemical, biological, and radiological
CBRNE	chemical, biological, radiological, nuclear, explosive
CCTV	closed circuit television
CIKR	Critical Infrastructure and Key Resources
DCF	Data Collection Form
DHS	Department of Homeland Security
EOD	explosive ordinance disposal teams
FEMA	Federal Emergency Management Agency
HSPD	Homeland Security Presidential Directorate
HVAC	heating, ventilation, and air conditioning

IDD	Infrastructure Protection and Disaster Management Division
IDS	intrusion detection system
IRVS	integrated rapid visual screening for mass transit stations
MBTA	Massachusetts Bay Transportation Authority
MS	Microsoft
MTS	mass transit station
NIPP	National Infrastructure Protection Plan
PANYNJ	Port Authority of New York & New Jersey
RMS	Risk Management Series
S&T	Science and Technology Directorate
SCADA	supervisory control and data acquisition
SWAT	special weapons and tactics teams
T	threat
TSA	Transportation Security Administration
UMCS	utility monitoring and control systems
V	vulnerabilities

B

Glossary

Access control. Any combination of barriers, gates, electronic security equipment, and/or guards that can deny entry to unauthorized personnel or vehicles.

Aggressor. Any person seeking to compromise a function or structure.

Assessment. The evaluation and interpretation of measurements and other information to provide a basis for decision-making.

Asset. Person, structure, facility, information, material, or process that has value.

Asset-related communications. Systems available to facilitate rapid information gathering, decision-making, and response (action taking).

Attack. Hostile action resulting in the destruction, injury, or death to the civilian population or damage or destruction to public and private property.

Attribute. Subcategory of characteristic. For example, station elevation is a characteristic, and a below-grade elevation is the attribute. Attributes are presented in the electronic software in a drop down menu. In paper version of the data collection form, attribute options are presented in columns "a" to "e."

Biological agent. Living organisms or the materials derived from them that cause disease or harm to humans, animals, or plants or cause deterioration of material. Biological agents may be in liquid droplets, aerosols, or dry powders.

Business continuity. Ability of an organization to continue to function during and after a disaster.

Catalog. List of station characteristics and attributes that are assessed in the IRVS of mass transit stations. The catalog includes guidance on selecting attributes.

Catenary. System of overhead trolley wires that carry electric current, in which the contact wire is hung from another wire that hangs in a catenary curve; also, any or all of the overhead trolley wire system.

Characteristic. Physical component, functionality, or operation of a mass transit station that is evaluated in the IRVS procedure and listed on the Data Collection Form.

Chemical agent. Chemical substance that is intended to kill, seriously injure, or incapacitate people through physiological effects.

Closed circuit television. Electronic system of cameras, control equipment, recorders, and related apparatus used for surveillance or alarm assessment.

Collateral damage. Injury or damage to assets that are not the primary target of an attack.

Concourse. Open space that accommodates large crowds and allows for efficient distribution of people between locations.

Consequence. Effect of an event, incident, or occurrence. Consequences are divided into four categories: public health and safety, economic, psychological, and governance impacts.

Consequences rating. Degree of debilitation that would be caused by the incapacity or destruction of an asset.

Control center. Centrally located room or facility staffed by personnel charged with the oversight of specific situations and/or equipment.

Control system. Computer-based system used in many types of infrastructure and in many industries to monitor and control sensitive processes or physical functions.

Controlled area. Area into which access is controlled or limited; portion of a restricted area that is usually near or surrounding a limited or exclusion area.

Critical Infrastructure. Vital system or asset, either physical or virtual, that the incapacity or destruction of which may have a debilitating impact on the security, economy, public health or safety, environment, or any combination, across a Federal, State, regional, territorial, or local jurisdiction.

Cyber security. Protection that is intended to prevent damage to, unauthorized use of, or exploitation of, and if needed, restoration of electronic information and communications systems. Includes protection of information networks and wireline, wireless, satellite, public safety answering points, and communication and control systems.

Data Collection Form. Form containing the station characteristics and attribute options that is used in the IRVS of mass transit stations.

Deterrence. Inhibition of criminal behavior by fear especially of punishment.

Direct loss. Cost to rebuild, respond, and recover from an event.

Disaster. Natural catastrophe, technological accident, or human-caused event that results in severe property damage, deaths, and/or multiple injuries.

Downtime. Disruption of a service that is the result of an event, incident, or occurrence.

Emergency. Any natural or human-caused situation that results in or may result in substantial injury or harm to the population or substantial damage to or loss of property.

First responder. Local police, fire, and emergency medical personnel who arrive first on the scene of an incident and take action to save lives, protect property, and meet basic human needs.

Flood. Temporary, partial or complete inundation of normally dry land areas from overflow of inland or tidal waters, unusual or rapid

accumulation or runoff of surface waters, or mudslides/mudflows caused by accumulation of water.

Hazard. Natural or manmade source or cause of harm or difficulty.

Hazardous material. Any substance or material that, when involved in an accident and released in sufficient quantities, poses a risk to people's health, safety, and/or property. Includes explosives, radioactive materials, flammable liquids or solids, combustible liquids or solids, poisons, oxidizers, toxins, and corrosive materials.

Heavy rail. Electric railway with the capacity to handle a heavy volume of passengers.

Indirect loss. Downstream costs resulting from disruption of the service after an event.

Integrated rapid visual screening. Quick and simple procedure to assess the risk and resiliency of a mass transit station.

Intermodal. More than one mode of transportation (e.g., rail, bus, air).

Intrusion detection system. Combination of sensors, control units, transmission lines, and monitor units, integrated to operate in a specified manner.

IRVS Tier 1 assessment. Screening that identifies the primary facility vulnerabilities and.

IRVS Tier 2 assessment. Onsite evaluation by assessment specialists that provides a robust evaluation of system interdependencies, vulnerabilities, and mitigation options.

Key Resource. Publicly or privately controlled resource essential to the minimal operation of the economy and government.

Light rail. System characterized by vehicles that require an operator and are powered by overhead electric catenary or trolley wires. Often some portion of the route runs in the streets of cities or towns (as opposed to a heavy rail system in which vehicles operate on a private right-of-way). Modern equivalent of a trolley or interurban.

Liner. Roof/wall of underground stations or tunnels.

Liner relative thickness. Thickness of the structural roof/wall outlining an underground station to runnel.

Line. Transportation route that is typically distinguished by numbering, name, or color.

Lobby. Area with station attendants and fair collection machines.

Mass transit station. Structure acting as a terminal, typically underground or elevated, serving a mode of transportation for a mass transit system.

Mezzanine. Intermediate story in a station that projects in the form of a balcony.

Mitigation. Ongoing and sustained action to reduce the probability of or lessen the impact of an adverse incident.

Natural protective barrier. Mountains, deserts, cliffs, ditches, water obstacles, or other terrain feature that is difficult to traverse.

Owner/operator. Entity responsible for day-to-day operation and investment in a particular asset or system.

Physical security. Measures/concepts designed to safeguard personnel; prevent unauthorized access to equipment, installations, material, and documents; and safeguard them against espionage, sabotage, damage, and theft.

Platform. Section of pathway, along rail tracks at a train station, metro station, or tram stop, at which passengers may board or alight from.

Prioritization. Process of using risk assessment results to identify where risk reduction or mitigation efforts are most needed and determination of which protective actions should be instituted in order to have the greatest effect.

Progressive collapse. A chain reaction failure of structural members to an extent disproportionate to the original localized damage. Such damage may result in upper floors collapsing onto lower floors.

Rapid transit. Electric railway characterized by high speed and rapid acceleration. Uses passenger railcars operating singly or in multiple unit trains on fixed rails, operates on separate rights-of-way from which all other vehicular and foot traffic are excluded, and uses sophisticated signaling systems and high platform loading.

Replacement value. Current market cost to construct the asset.

Resilience. Ability to resist, absorb, recover from, or successfully adapt to adversity or a change in conditions.

Resilience Score. A numeric value that describes the ability of a mass transit station to resist, absorb, and recover from a potentially disruptive event at a mass transit station.

Risk. Potential for an unwanted outcome resulting from an incident, event, or occurrence, as determined by its likelihood and the associated consequences.

Risk score. Numerical value obtained from the IRVS that describes the risk to a station for a terrorist attack or natural disaster

Sector. Logical collection of assets, systems, or networks that provide a common function to the economy, government, or society.

Signal. Provides information to the train driver about the line ahead.

Signal box. Building or room that houses signal levers or a control panel.

Social impact. Psychological effect on public morale and confidence as a result of an event.

Stand-off distance. Distance maintained between a building and the potential location for an explosive detonation or other threat.

Subway. Underground railroad, generally in a large city. Considered heavy rail because it operates on a dedicated track.

Target density. Number of potential high-value targets surrounding a mass transit station.

Terrorism. Unlawful use of force and violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof in furtherance of political or social objectives.

Third rail. Rail running parallel to one of the two running rails of a track; carries a supply of electricity used to power electric cars or locomotives.

Threat. Natural or manmade occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property.

Threat rating. Likelihood or potential of the occurrence of manmade or natural hazard.

Transportation hub. Place where passengers and cargo are exchanged between vehicles or transport modes. Includes train stations, mass transit stations, bus stops, tram stops, airports, and ferry slips.

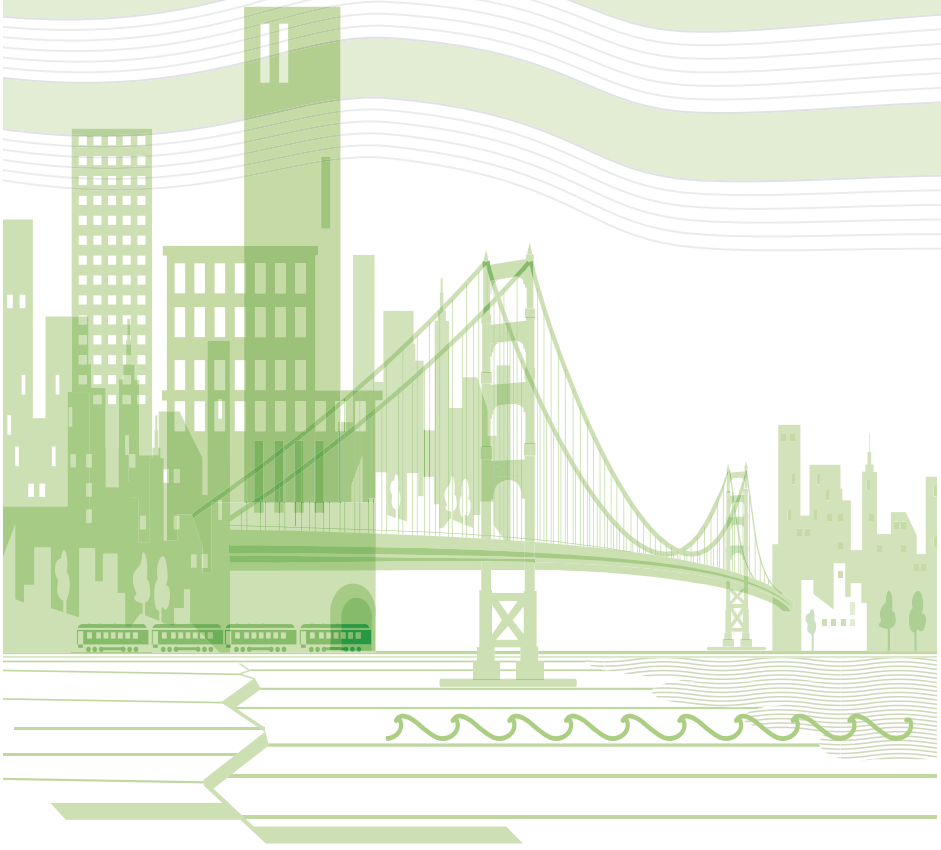
Vulnerability. Physical feature or operational attribute that renders an entity open to exploitation or susceptible to a given hazard.

Vulnerability rating. Weakness of functions, systems, and sites in regard to a particular threat/hazard.

Yard. System or grouping of tracks connected to, but not part of, a main line; used for switching or storing cars, or making up trains.

C

Integrated Rapid Visual Screening (IRVS) Database User Guide



IRVS Database User Guide Table of Contents

Section 1

1. Introduction

The Integrated Rapid Visual Screening (IRVS) Database is part of the IRVS methodology for screening mass transit stations, buildings, and tunnels.

The IRVS Database is a standalone application that can be used to record, store, and manage data. The types of data that can be stored include screening data, digital photos, site plans, floor plans, emergency plans, and GIS products. The database can also be used to generate risk and resilience scores. Managers can use the database to store, search, and analyze data from multiple screenings and generate a variety of reports.

The IRVS Database is a standalone application that is both a data collection tool and a data management tool.

This user guide provides instructions on installing the database, using the database to conduct screenings, and performing administrative functions.

The user guide or a catalog reference can be opened by pressing the F1 key on the keyboard or by selecting **Help [F1]** or **Current Question Help [F1]** (the help function will open up the catalog to the exact location of the characteristics that are being evaluated).

2. Field Database and Master Database

Section 2

The IRVS Database that is used in the field by the screening team is referred to as the Field Database. The data that are collected during the screening and stored temporarily in the Field Database are later transferred to the Master Database at an organization's headquarters. The instructions in this user guide apply to both the Field Database and Master Database unless otherwise indicated.

The Field Database, which is on a laptop, can be used to perform the following functions:

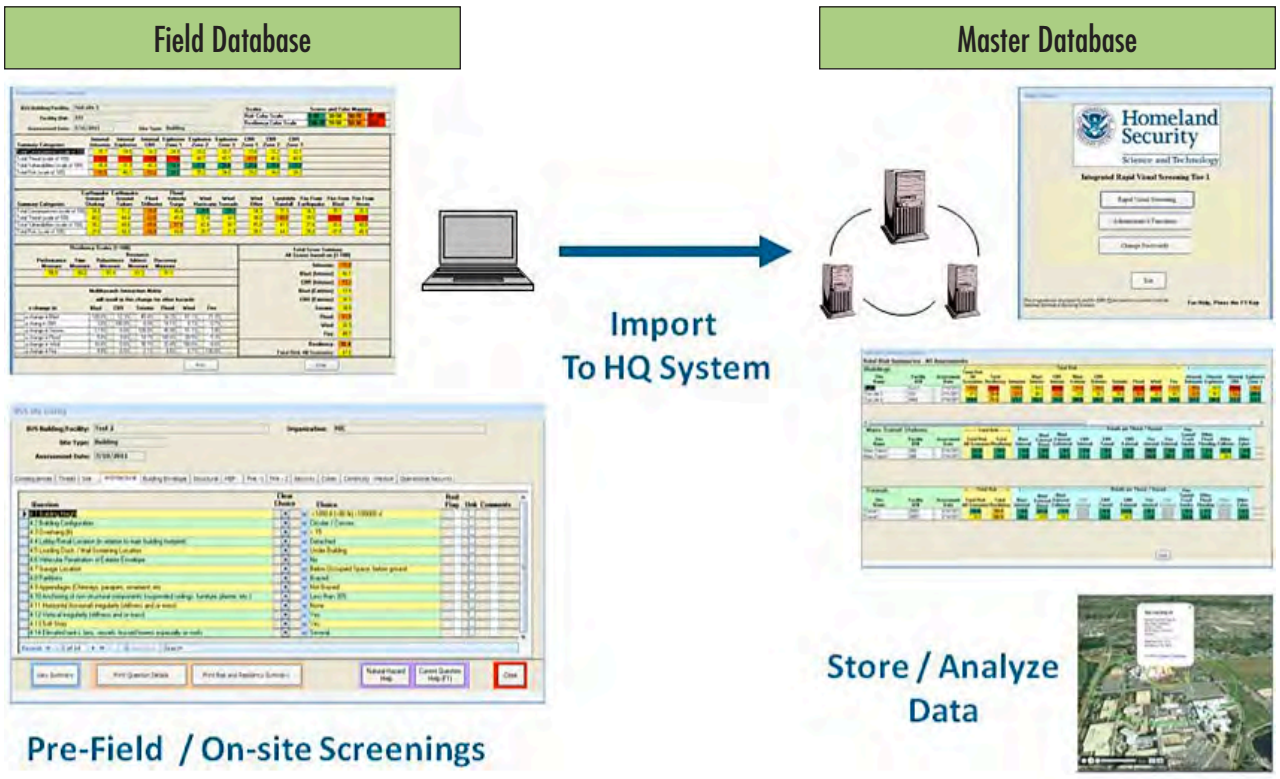
- Create a screening record, which includes site identification, address, sector and subsector identification, facility importance, and geographical coordinates
- Plot and display screening sites using a mapping program
- Enter the pre-field data: hazards, answers to pre-field questions, and structure type
- Enter site evaluation data
- Display the site's risk and resilience scores
- Create an Executive Summary of the screening
- Record the site points of contact (POCs)
- Record the members of the screening team
- Add digital photos, site plans, floor plans, emergency plans, and GIS products
- Transfer the collected screening data to the organization's Master Database
- Purge the collected data from the Field Database and prepare the database for subsequent screenings

The Master Database can be used by managers to store, search, print, display, and analyze data collected from multiple screenings. The Master Database can be used to perform the following functions:

- Import screening data and relevant information (e.g., photos) from Field Databases
- Plot and display screening sites using a mapping program

The Master Database can be used by managers to store, search, print, display, and analyze data collected from multiple screenings.

- Store, search, and analyze data on multiple screenings
- Display and print a variety of reports
- Create a duplicate of an IRVS record for mitigation analysis or "what if" impacts resulting from changes to consequences, threats, vulnerabilities, or resilience
- Generate reports
- Export reports as MS Word documents or PDFs for editing or formatting
- Export screening risk data to MS Excel spreadsheets for editing
- Filter or sort screening records by site identification, address, sector or subsector identification, or facility importance
- Display the total risk summary for one or more sites
- Store, display, and print digital photos, site plans, floor plans, emergency plans, GIS products, and miscellaneous information collected during screenings
- Perform administrative functions



3. System Requirements

Section 3

The system requirements for the IRVS Database are as follows:

- Pentium 4 or equivalent processor
- Windows XP or later
- MS Access Runtime or MS Access 2007 or later
- MS Excel 2007 or later
- 256 MB of RAM
- Adobe Reader

The database has a plotting function that displays site coordinates and IRVS information on a digital map if the computer has an external mapping program that is capable of displaying a Keyhole Markup Language (KML) file. KML is an XML-based language that is used to display three-dimensional spatial data in mapping programs such as Google Earth.

4. Installation

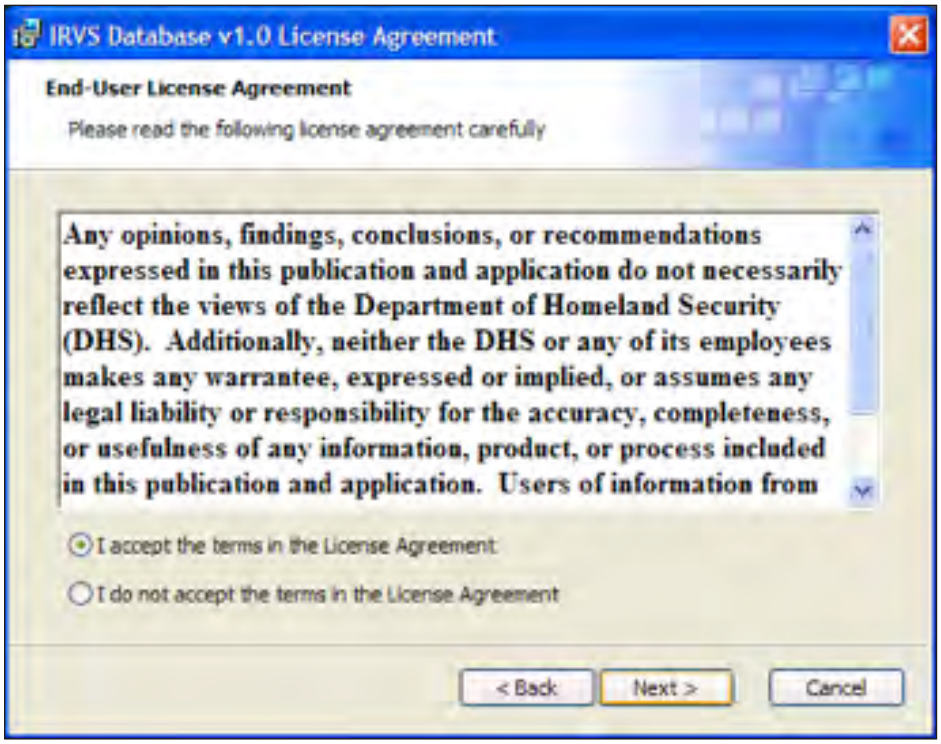
Section 4

The database should be installed on a computer at the organization's headquarters (this copy will become the Master Database) and also on a laptop that will be used in the field (this copy will become the Field Database).

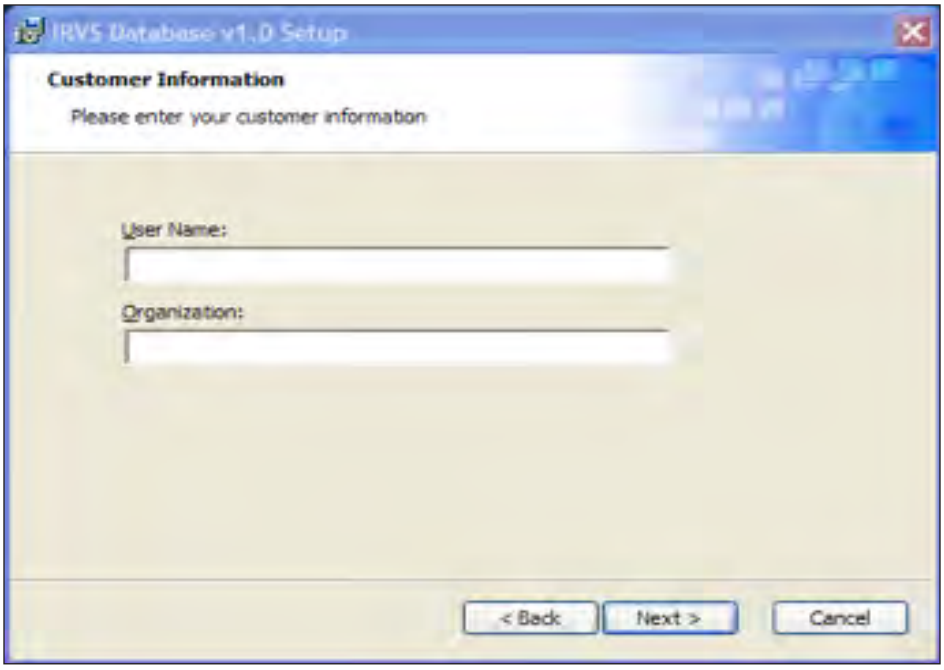
The installation steps are as follows:

1. If you have already downloaded the software, find the SETUP.EXE file by selecting **Start** at the bottom left of the Windows screen, then selecting **Run**, and then typing the location of the SETUP.EXE file (i.e., CD, C:/Temp, or another location on the hard drive). When you have found the SETUP.EXE file, skip to Step #3. If you have not downloaded the program, go to Step #2.
2. Go to the DHS Web site at http://www.dhs.gov/files/programs/scitech-bips-tools.shtm and follow the instructions for downloading the software.
3. **Close** all other programs and double click on the SETUP.EXE file.
4. The IRVS Database Setup Wizard will appear. Select **Next**.

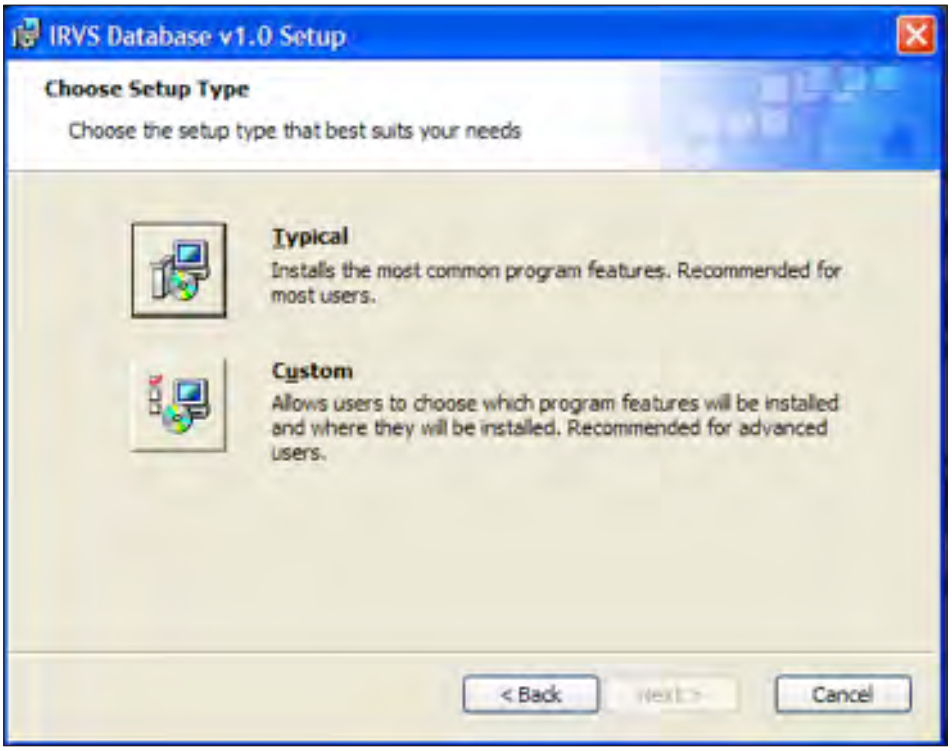
5. A screen showing the End User License Agreement will appear. Read the agreement, select **I Accept the terms of the License Agreement** and **Next**.



6. The Customer Information menu will appear. Fill in the user name and organization. Select **Next**.



7. The Choose Setup Type menu will appear. In most cases you should follow the Typical Installation. The Custom Installation allows the user to change the file name and/or file location. This may be a requirement under an organization's security policy. Check with your System Administrator as needed. Select **Typical** or on Custom, as directed by your system administrator, which will make Next selectable, and then select **Next.**



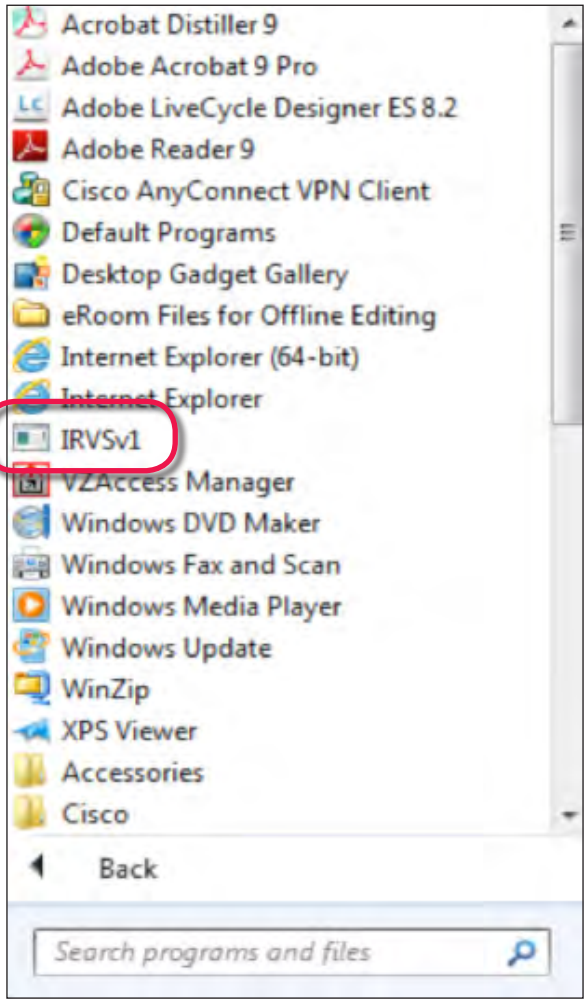
8. The Ready to **Install** menu will appear. Select Install. The amount of time required for the installation depends on the computer.
9. When the installation is complete, the screen below will appear. Select **Finish**.

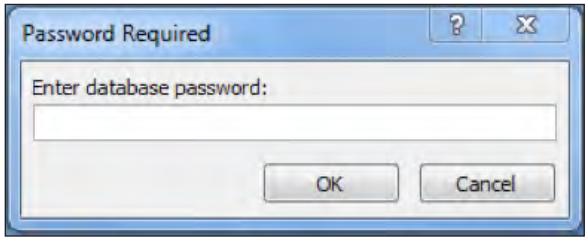
Section 5

5. Logging On

This section explains how to log on using a preloaded or assigned user name and password. Assigning user names is an administrative function that is available only to those with permission to access administrative functions. See Section 10.6.2 for instructions on assigning user names.

1. Double click on the desktop icon for the IRVS Database that was created during the installation or click the **Start button** and then **All Programs/IRVS Database**. The database may also be opened by double clicking the database file (file name: iRVSv1b.accdr) in the newly created IRVS folder. Note: this is a MS Runtime file so it cannot be opened after starting MS Access.





2. The database may also be opened by double clicking the database file (file name: **iRVSv1b.accdr**) in the newly created IRVS folder. Note: this is a MS Runtime file so it cannot be opened after starting MS Access.

   Reminder: the generic database password is: **IRVS2011.**

   After entering the database password select **OK**., and the Login Screen displays.

3. In the **Logon** menu, if you don't have an assigned user name, skip to Step #4. If you have an assigned user name, enter it. Leave the password blank. Select OK. You will be asked to create a password. Follow the instructions in Steps #5 and #6 below). Create the password and skip to Section 7.

4. If you don't have an assigned user name, use one of the following preloaded user names and passwords:

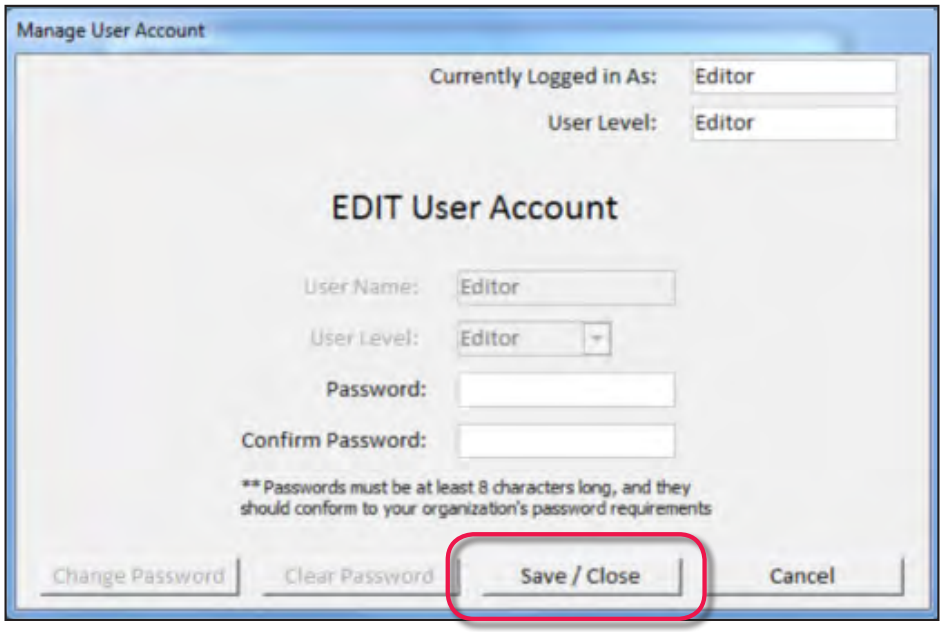
User Name	Password
Administrator	Administrator
Assessor	Assessor
Editor	Editor
Reader	Reader

The Administrator user name/password allows you to access the administrative functions, which include establishing new user accounts and passwords. See Section 9 for information on administrative functions. You must have permission to log on as an Administrator.

5. Select **Continue**.
6. The **Main Menu** of the database will appear. Select **Change Passwords**, and the **EDIT User Account screen will appear**.

7. In the **EDIT User Account** screen, the user name you used will be populated in the **Currently Logged in AS**: field. Also displayed will be your user level. Select **Change Password.**

8. In the new **EDIT User Account** screen, enter a new password in the **Password** field, following the instructions at the bottom of the screen. Retype the new password in the **Confirm Password** field. To cancel, select **Cancel**. To set the password, select **Save / Close**. After setting the password, you will be prompted to login using the new password.



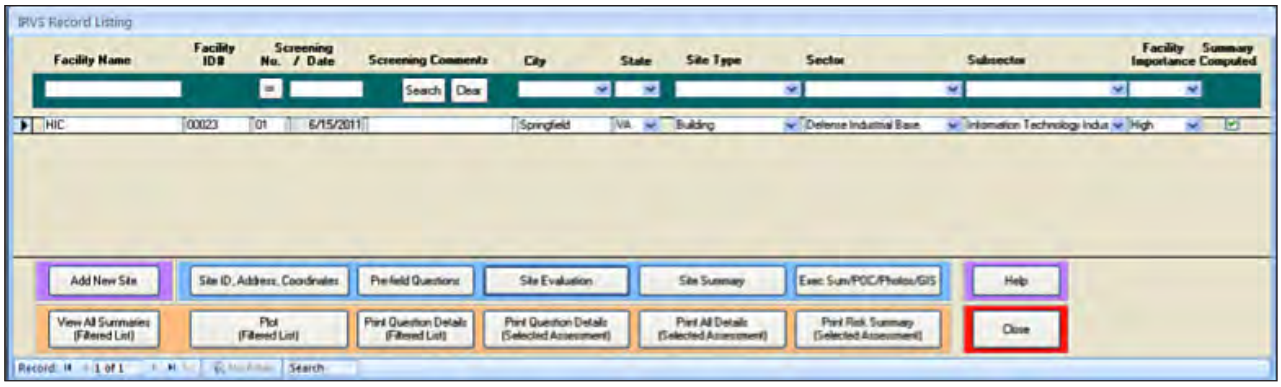
6. Creating and Editing Screening Records

Section 6

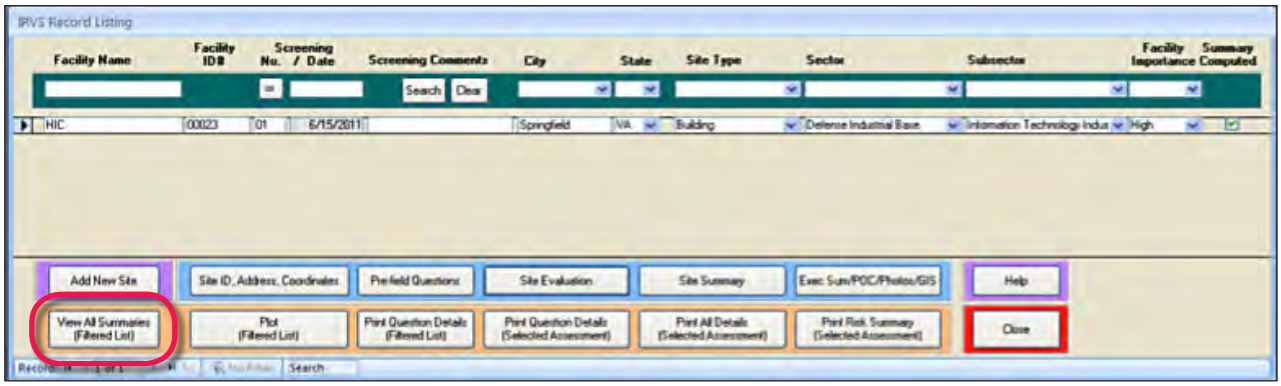
1. From the **Main Menu**, select **Rapid Visual Screening.**

   The **IRVS Record Listing** screen will appear (shown on next page). The screening records that are already in the database, if any, will be listed. You can use the **IRVS Record Listing** screen to create an IRVS screening record and review or edit existing records. Screening records can be deleted only by users with access to administrative functions (see Section 9.2).

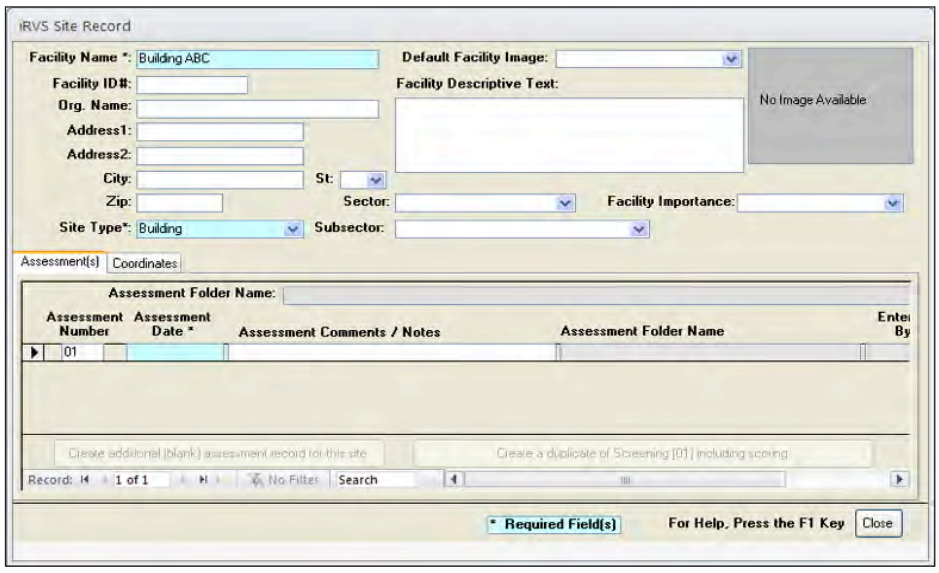
   A screening record includes the facility name, facility identification, address, site type, sector and subsector, facility importance, and geographical coordinates.



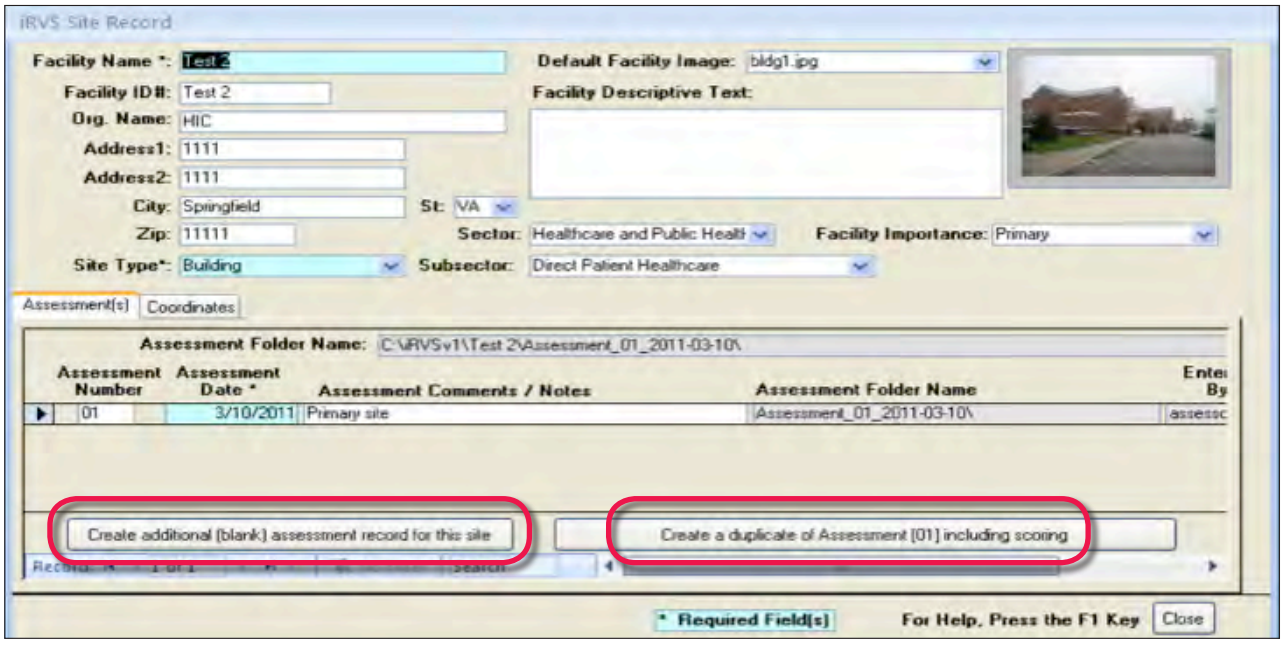
2. To create a screening record, select **Add New Site**, which will bring up the **IRVS Site Record** screen.



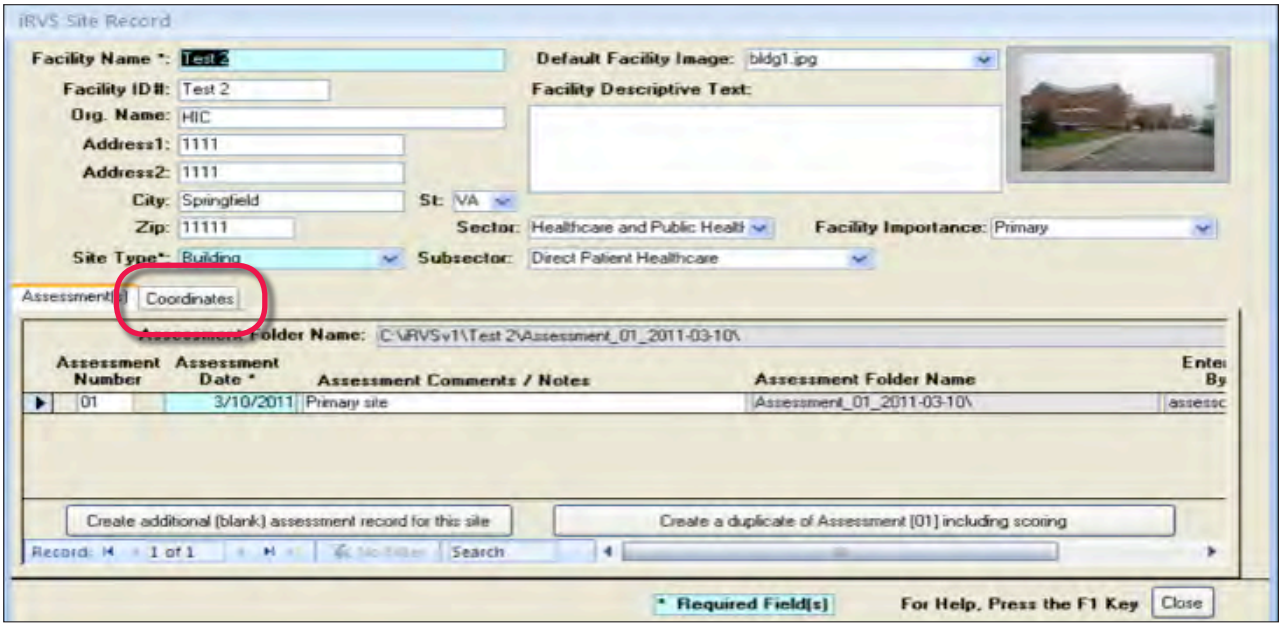
3. In the **IRVS Site Record screen**, complete the following fields: **Facility Name** (required), **Facility ID#** (if applicable), **Org. Name** (name of the organization that owns the facility), **Address**, **City**, and **Zip**. For **State**, select the two-letter abbreviation from the dropdown menu or type in the two-letter abbreviation.



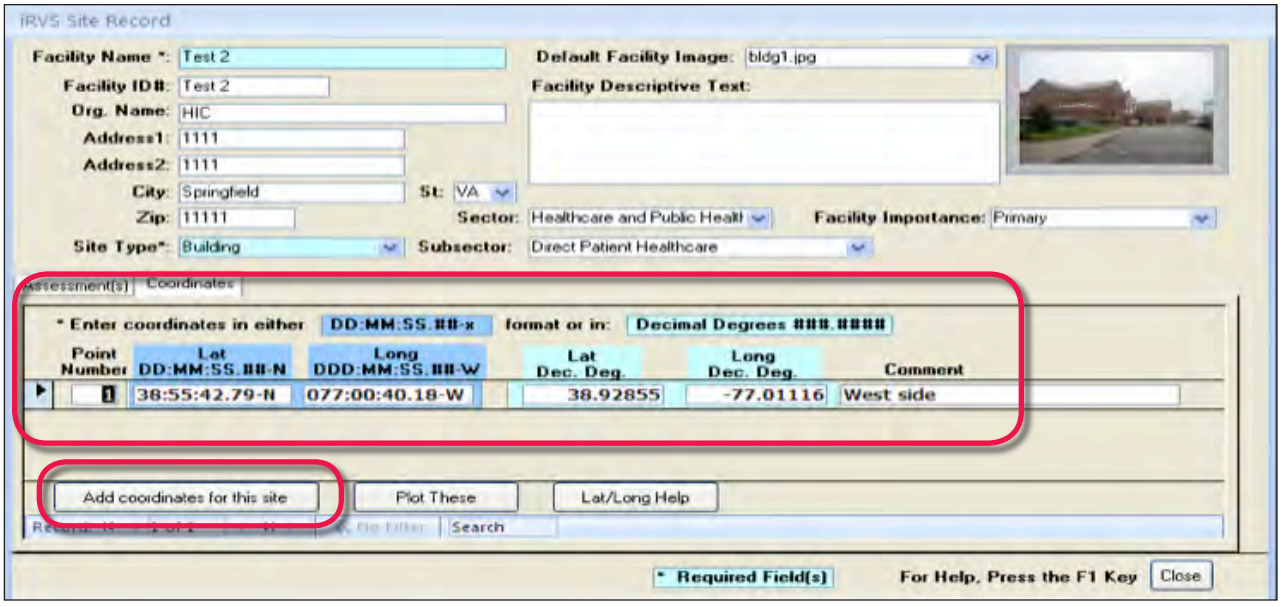
4. For the **Default Facility Image**, select a photo from the dropdown list of photos in the database for this site, if any. The photo will display on this screen when the record is opened. See Section 7.7 for instructions on adding photos.
5. Describe the facility under **Facility Descriptive Text** (e.g., Building ABC is a three-story commercial office property. The first floor has a lobby and offices for building management. The second and third floors have office space that is leased to several organizations.).
6. Select a **Sector** and **Subsector** from the dropdown lists.
7. Select the **Facility Importance** from the dropdown list (High, Medium, Low). There are no predefined criteria for this ranking. This field simply provides an additional way to filter screening records.
8. Select the **Site Type** (required) from the dropdown list (Building, Mass Transit Station, Tunnel).
9. Type in the **Assessment Date** (required) and assessments notes as needed.
10. Select **Create additional (blank) assessment record for this site** to create a new blank record for this site.
11. Select **Create a duplicate of Assessment [number] including scoring** to create a duplicate record that includes evaluation data for use in analysis or a "what if" investigation. For example, an organization may conduct a screening and based on the results, want to decide whether to implement protective measures. The duplicate assessment can be used to predict how the protective measures would affect the risk scores by changing the relevant attributes.



12. Select **Coordinates** to record the coordinates of the screening site and to plot them on a mapping program. Your computer must have an installed mapping program that can read KML files, such as Google Earth, to plot the coordinates on a map. The mapping tool not only enhances the screening evaluation process but also supports risk analysis and post-screening mitigation planning.



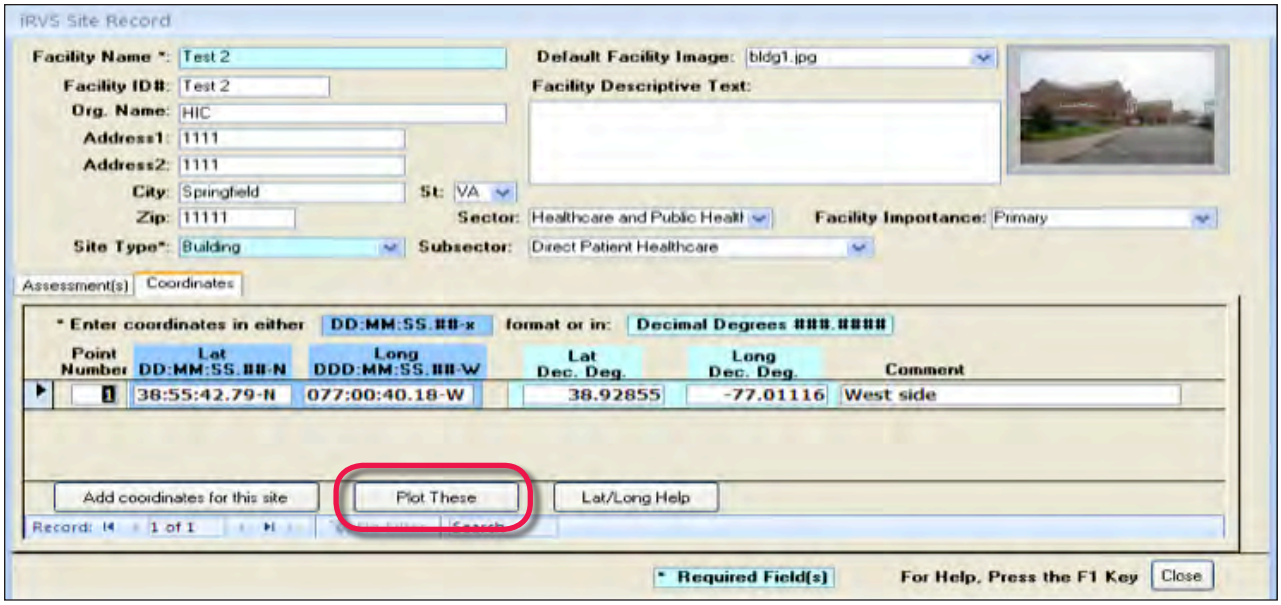
13. Enter the site's latitude and longitude coordinates, as explained below. You can add multiple plot points by selecting **Add coordinates for this site.** The database automatically assigns a point number to each plot.



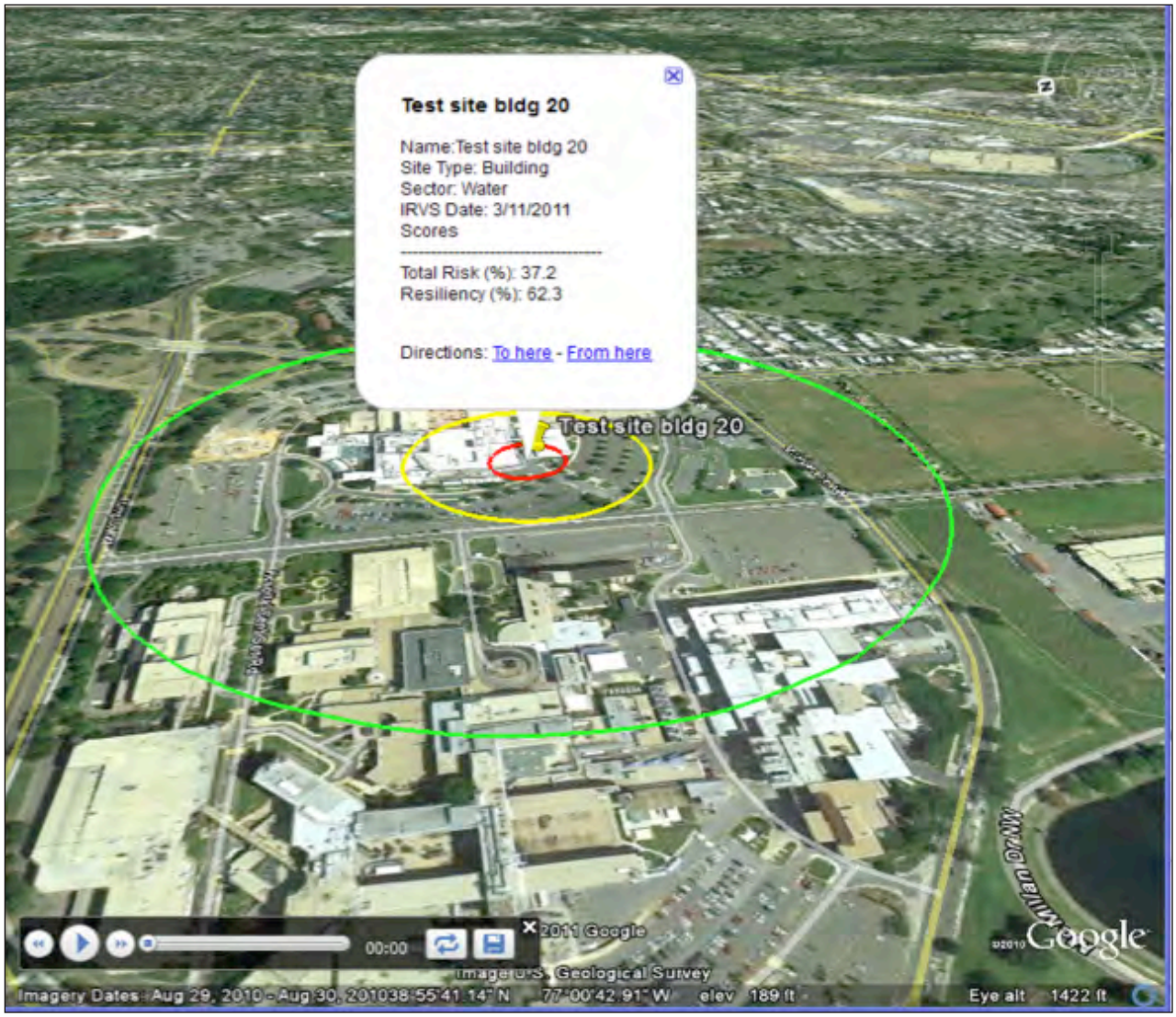
Enter the coordinates in one of the following formats:

- Degrees-minutes-seconds (first two boxes). The decimal-degree equivalents will automatically populate the second two boxes. Values in the decimal-degree format are used to create the KML file for display in Google Earth or other visualization program.
- Decimal-degree values (second two boxes).

14. Select **Plot These** to create a map showing the location of the screening site. As noted above, the map can be created only if your computer has an installed mapping program that can read KML files.

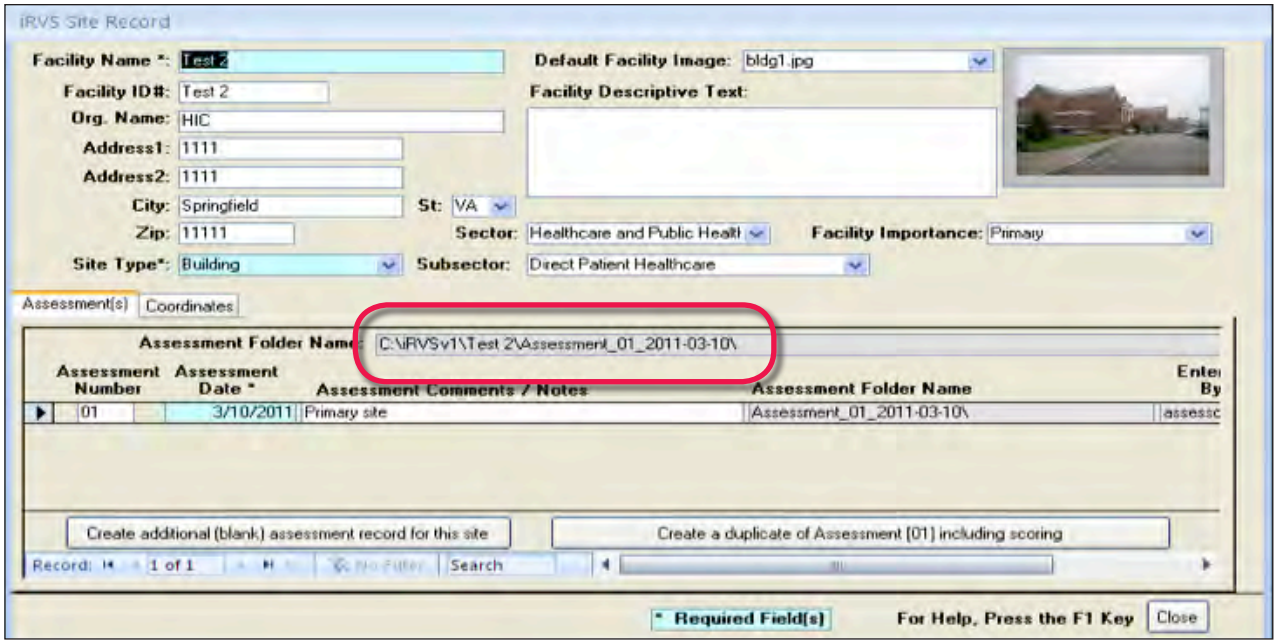


The map will display 100-foot, 300-foot, and 1,000-foot rings (to visualize the target zones) around the site and the screening information that is shown in the map below. Mass transit stations and tunnels are evaluated using only 300-foot and 1000-foot target zones. Risk and resiliency scores will not display until the scores have been calculated.



15. When you have finished entering the information for the screening record, select **Close** on the bottom right of the **IRSV Site Record** screen. Information about where the record will be stored will appear in the message box shown below. Note the information about the three subfolders (Photos, GIS_Portfolio, and Miscellaneous). If you changed the program's location using Custom Installation, note the file path of these subfolders because you will need the file path to load and link the contents of the subfolders to other copies of the database.

16. Select **OK**. The file path will be listed in the **Assessment Folder Name** field, which you will see the next time you open the record.



17. Select **Close** to return to the previous screen.

7. Conducting a Screening

Section 7

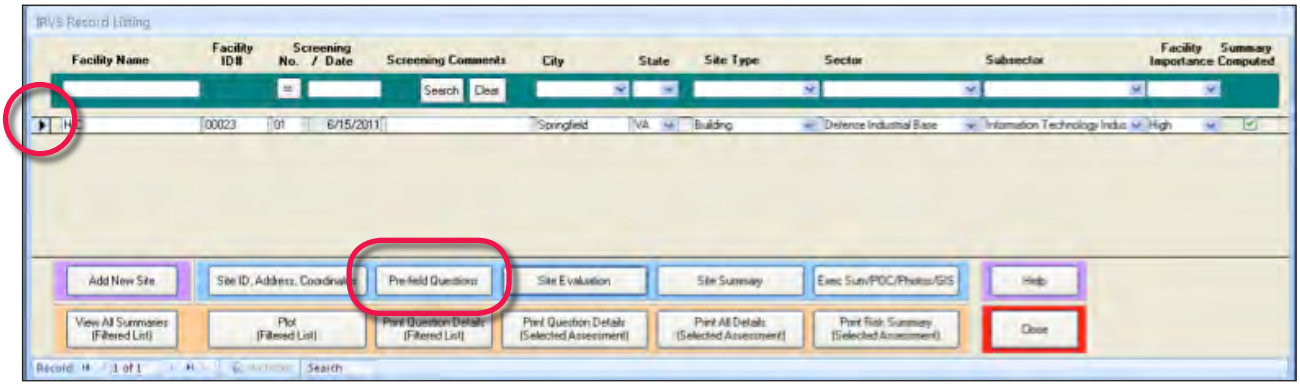
After you have created an IRVS site record, you are ready to start the screening. The steps in the screening are as follows:

- Entering the pre-field data
- Conducting the onsite evaluation
- Generating the risk and resiliency scores
- Creating an executive summary
- Adding points of contact
- Adding the Assessment Team Members
- Adding GIS images (optional)
- Adding miscellaneous information (optional)
- Exporting the screening data to transfer media from the Field Database
- Erasing the screening record from the Field Database

7.1 Entering the Pre-Field Data

Pre-field data include basic information about the site and its target density. Screeners should try to obtain as much pre-field data as possible to ensure that the risk and resiliency scores are as accurate possible. Pre-field data can be obtained on the Internet and from various private sources.

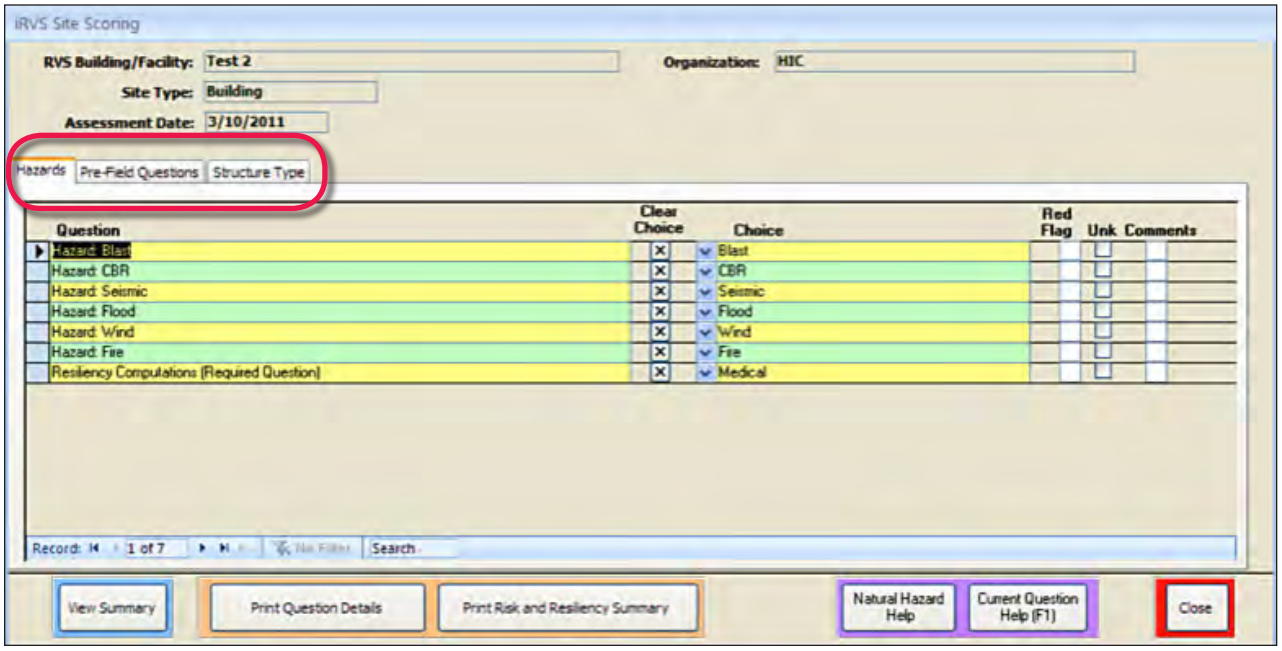
1. In the **IRVS Record Listing** screen, select the record of the site to be screened by clicking the far left column in the row with the record.
2. Select **Pre-Field Questions** to open the **IRVS Site Scoring** screen.



Pre-field data differ according to the site type, as follows:

- For buildings, the **Pre-Field Questions** screen has questions under three tabs: **Hazards, Pre-Field Questions, and Structure Type** (as shown below). For more information about these tabs, see Sections 7.1.1, 7.1.2, and 7.1.3.
- For mass transit stations and tunnels, the **Pre-Field Questions** screen has only one tab: the Pre-Field Questions tab. For more information about the Pre-Field Questions tab, see Section 7.1.1.

3. For each question in the **Question** column, select the appropriate choice by selecting one of the choices in the dropdown list in the **Choice** column. If you want to change your answer, select **X** in the **Clear Choice** column to your clear your answer. Clearing an answer will not affect the **Red Flag, Unk** (unknown), or **Comments** columns.
4. If you need more information about a question, select **Current Question Help [F1]** on the bottom right of the screen, and for more information about a natural hazard, select **Natural Hazard Help** on the bottom right of screen.



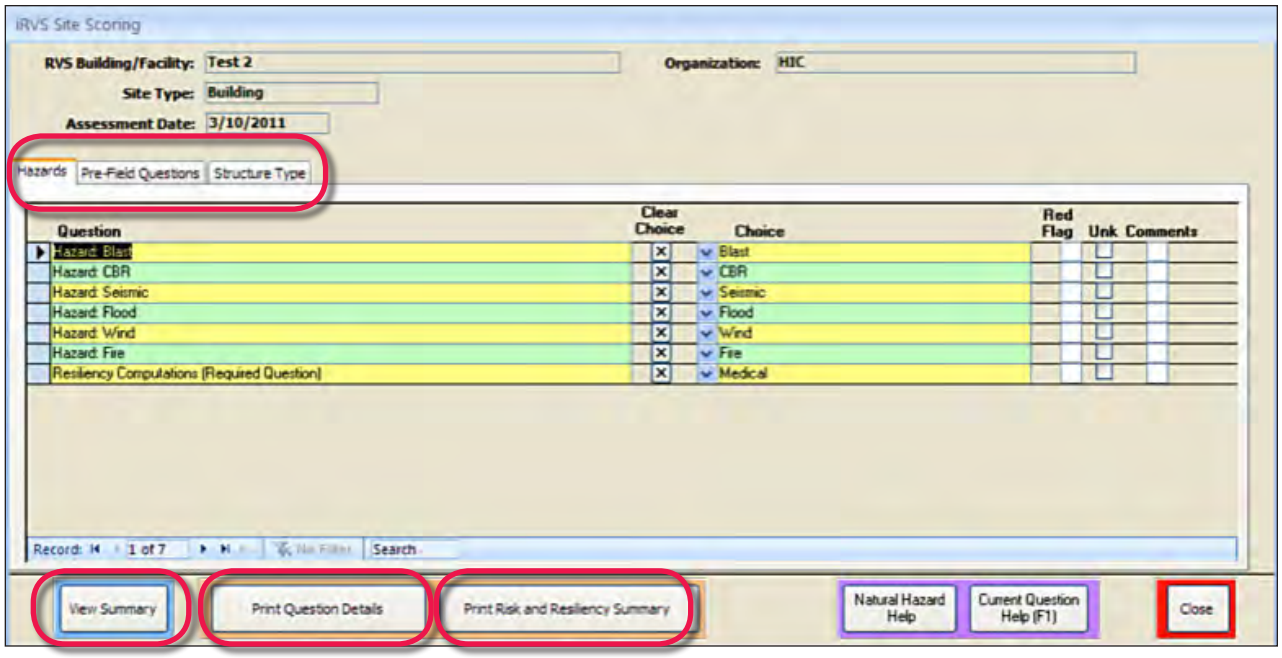
5. If you think there's a concern that requires immediate attention, click the box under the **Red Flag** column. You will be asked to enter a comment that supports your decision to red flag the item. Type in the comment and select **Save**. To remove a red flag, select the red flag.

6. If you don't know the answer, click the box under the **Unk** (unknown) column. You can add the information when you obtain it. To remove a checkmark, select the checkmark.

7. If you want to add information (e.g., about an unusual circumstance), select the box in the **Comment** column to add information. When you select the box, a comment box will appear. Enter your comments and select **Save**. To remove a comment, select the box in the Comment column. Delete the comment and select **Save**. The box will no longer be marked.

8. Answer as many questions as possible. For buildings, answer the questions under all three tabs (**Hazards, Pre-Field Questions, and Structure Type**). For more information about the tabs, see Sections 7.1.1, 7.1.2, and 7.1.3.

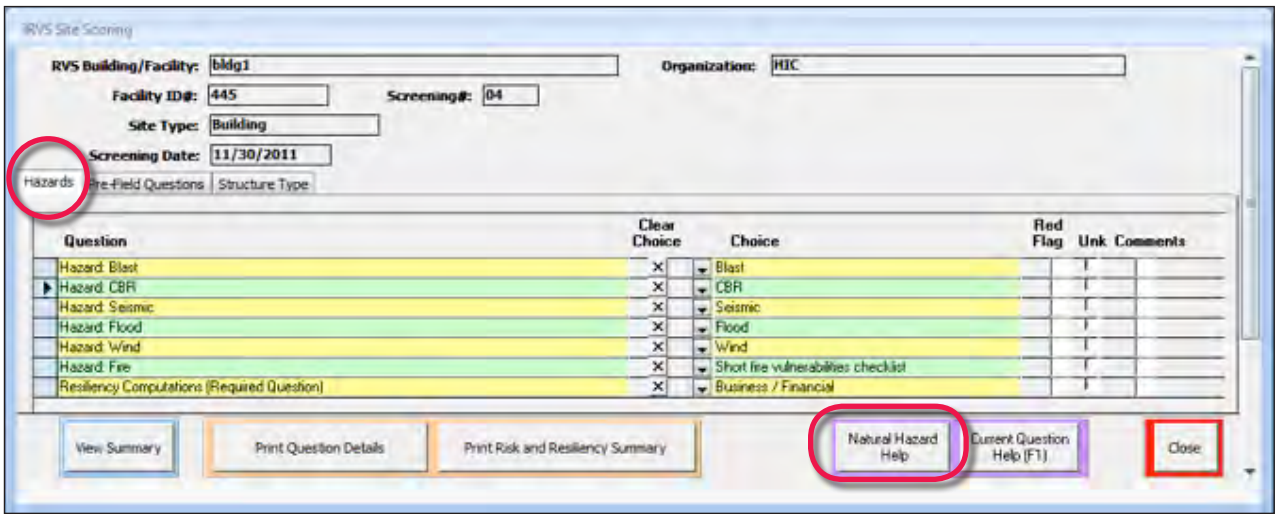
9. For a printable version of the answers to the pre-field data questions, select **Print Question Details**. Select **Print** at the top left to print the answers and **Close Print Preview** at the top right to return to the previous menu.



10. Select **Close** to return to the previous menu.

7.1.1 Hazards Tab (Building Site Type Only)

The hazards that you select for a building affect the questions in the **Pre-Field Questions** tab and the hazards that included in the risk analysis. Complete the questions in the Hazards tab before completing the other two tabs for a building site type.



For information about natural hazards, select **Natural Hazard Help** at the bottom of the **IRVS Site Scoring** screen and select the hazard you need information about in the dialog box that appears.

1. In the **IRVS Site Scoring** screen, select the **Hazards** tab and select the hazards that may affect the building you are screening by selecting the hazard from the dropdown menu in the Choice column. The possible hazards are blast; chemical, biological, and radiological (CBR); seismic; flood; wind; and fire. Under the question column, left click on the row of a Hazard you want to use in the process and the arrowhead on the left side of the form moves to that row and the row is designated for change. Then select the down arrowhead in the Choice column to produce a drop down list of possible answers. Select the name of the hazard to include it in the screening or select on the blank row to not include it in the screening. The IRVS screening is adjusted based on which Hazards are selected. At the completion of this form, the database automatically tailors the IRVS question set and grays out un-needed questions. Only those hazards selected are included in the risk analysis.

   The sixth hazard listed, **Hazard: Fire** has additional choices to tailor the IRVS screening. The three choices for this hazard are listed below:

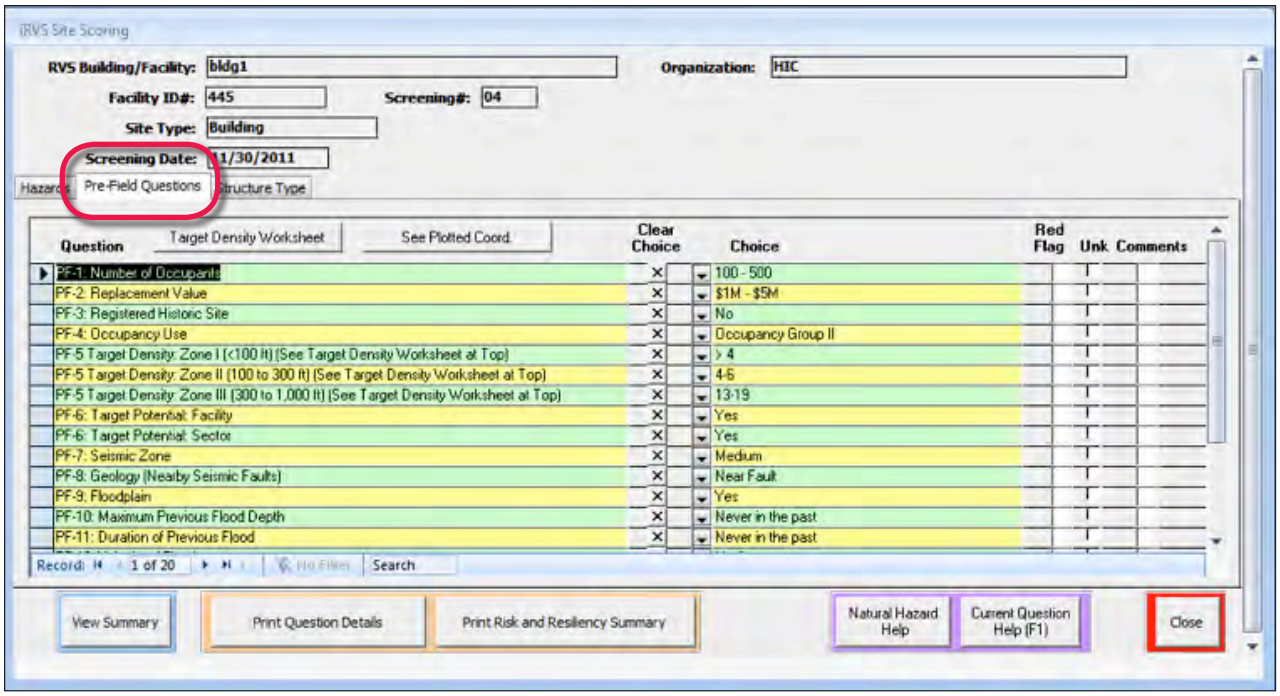
   - **Short fire vulnerabilities checklist.** Fire Tab 1, which has a few fire-related questions, will be displayed in the site evaluation if this is selected.
   - **Fire marshal's list – Longer list – includes all short list attributes.** Fire Tab 2 will be displayed in the site evaluation if this is selected and has more fire-related questions than the short fire vulnerabilities checklist. Choose this selection if you want the longer list of questions.
   - **Blank space.** Choose this selection if you do not want to include the fire hazard in the screening.

2. For **Resiliency Computations (Required Question)**, select one of the options listed below, which refer to the type of facility being screened. Each option provides a form in the site evaluation for Continuity of Operations.

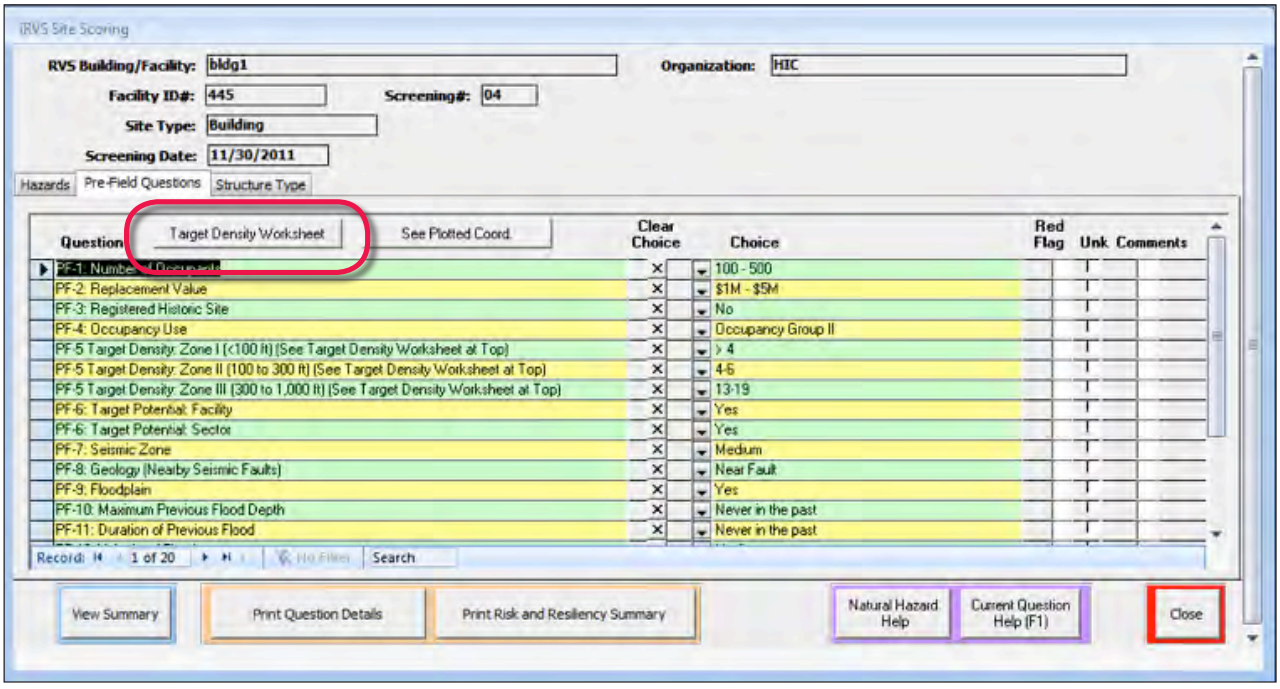
- **No resiliency computations are needed.** If you select this answer, resiliency will not be scored. Choose this if stakeholders are not concerned about the continuity of operations after a disaster.
- **General.** If you select this answer, the resilience section (Continuity of Operations) will be tailored to screen general facilities such as commercial, agricultural, educational, and industrial. A Continuity – General tab will appear during the scoring.
- **Government.** If you select this answer, the resilience section (Continuity of Operations)will be tailored to screen government facilities such as offices, police stations, fire stations, and emergency operations centers. A Continuity – Government tab will appear during the scoring.
- **Medical.** If you select this answer, the resilience section (Continuity of Operations) will be tailored to screen medical facilities. A Continuity – Medical tab will appear during the scoring.
- **Schools (K-12).** If you select this answer, the resilience section (Continuity of Operations) will be tailored to screen school facilities. A Continuity – School (K-12) tab will appear during the scoring.
- **Business/Financial.** If you select this answer, the resilience section (Continuity of Operations) will be tailored to screen business/financial facilities. A Continuity – Finance/Business tab will appear during the scoring.
- **Retail.** If you select this answer, the resilience section (Continuity of Operations) will be tailored to screen retail facilities. A Continuity – Retail tab will appear during the scoring.

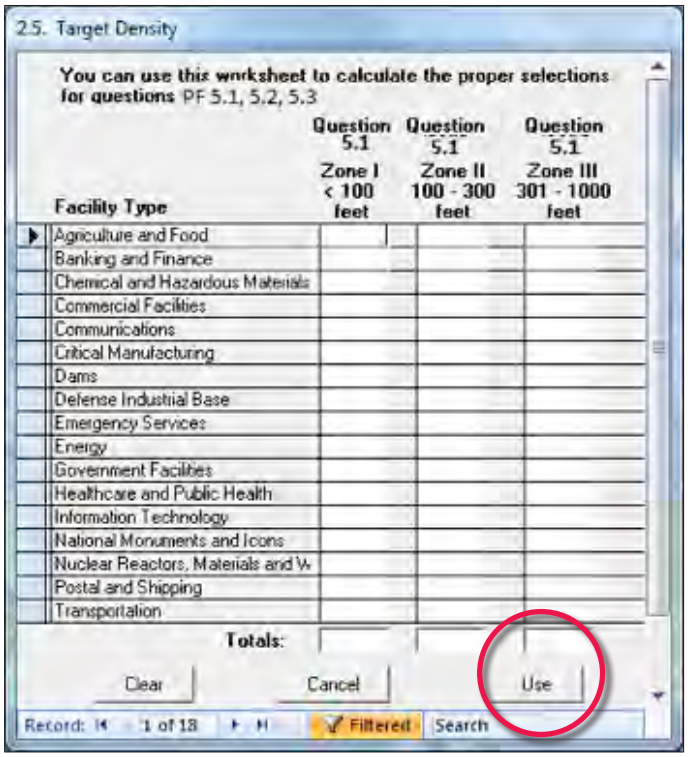
7.1.2 Pre-Field Questions Tab (All Site Types)

1. In the **IRVS Site Scoring** screen, select the **Pre-Field Questions** tab. A list of questions based on the site type (mass transit station, building, or tunnel) will appear. For the building site type only, pre-field questions depend on which hazards were selected under the Hazards tab. The pre-field questions that are not needed will be grayed out and will not be included in the risk analysis.
2. The Pre-Field Tab contains a special Help button labeled Target Density Worksheet at the top of the question list. This Help button is specific to three questions on the Tab
   - Pre-Field Question 5: Target Density Zone I (<100ft)
   - Pre-Field Question 5: Target Density Zone II (100 to 300ft)
   - Pre-Field Question 5: Target Density Zone III (300 to 1,000ft)



Responses to these three questions can either be entered from the drop-down menu of each question or the assessor can use the Target Density Zone Worksheet to answer the questions.





Select the **Target Density Worksheet** button at the top of the question list and a table labeled Target Density will pop-up. The assessor can use the worksheet to calculate the proper selections for questions PF-5, and enter the exact number of facilities for each category and zone into the table. After completing the table, select the **Use** button to automatically populate the answers to the three questions.

3. Complete the answers to the pre-field questions.

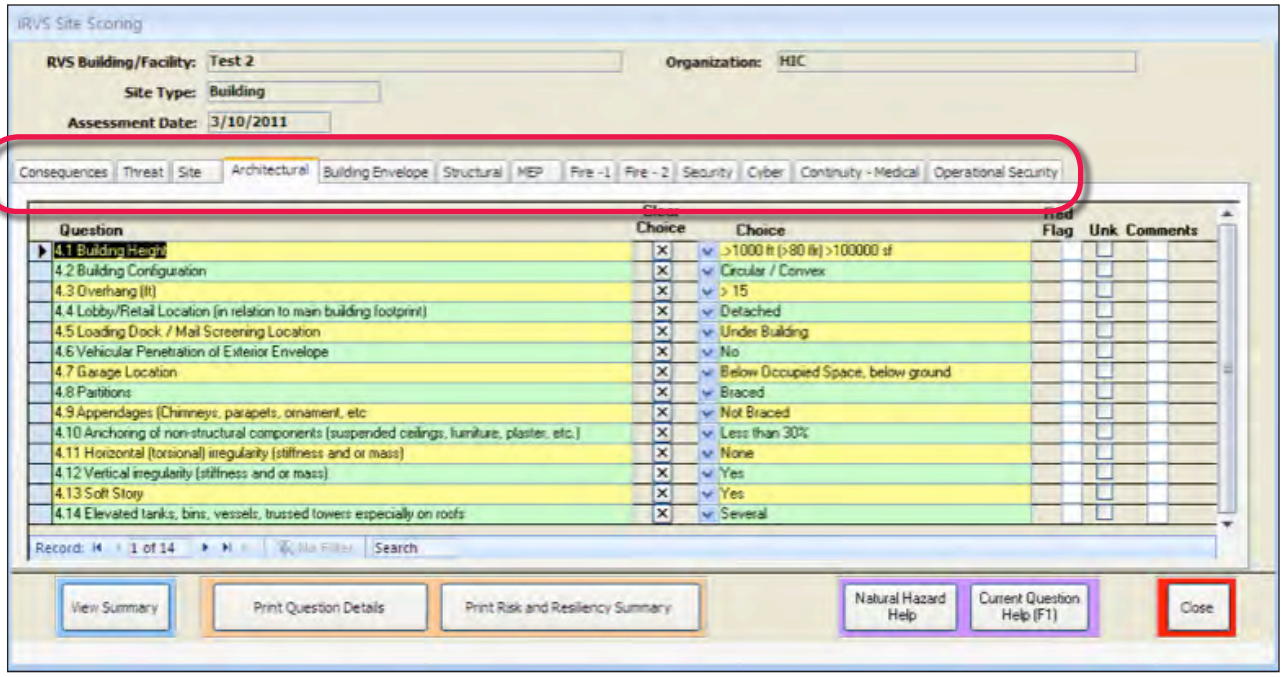
7.1.3 Structure Type Tab (Building Site Type Only)

1. In the **IRVS Site Scoring** screen, select the **Structure Type** tab. This tab will appear only when screening a building. This tab has only one question, **Building Type**, and it is a critical question for the IRVS methodology.
2. Answer the question by selecting one of the choices from the drop-down menu. For help, refer to the catalog, which can be accessed by selecting **Current Question Help [F1]** on the bottom right of the screen.

7.2 Conducting the Onsite Evaluation

After you have answered the **Pre-Field Questions**, you are ready to record the onsite evaluation data.

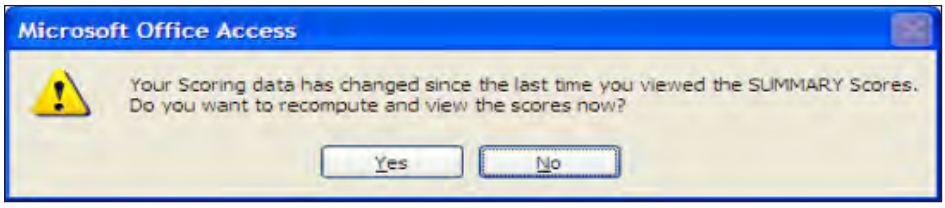
1. In the **IRVS Recording Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select **Site Evaluation** to open the **IRVS Site Scoring** screen. The screen will have 11 to 14 tabs, depending on the site type, hazards, and resiliency selection. Questions that are not needed will be grayed out and will not be included in the risk analysis.
3. Answer the questions under each tab, using the procedure that you followed to enter the pre-field data (see Section 7.1). For help with any of the questions, select **Current Question Help [F1]** on the bottom right of the screen.
4. Select each of the Vulnerability tab (e.g., **Site, Architectural, Building Enclosure, Structural…**) and answer the questions.



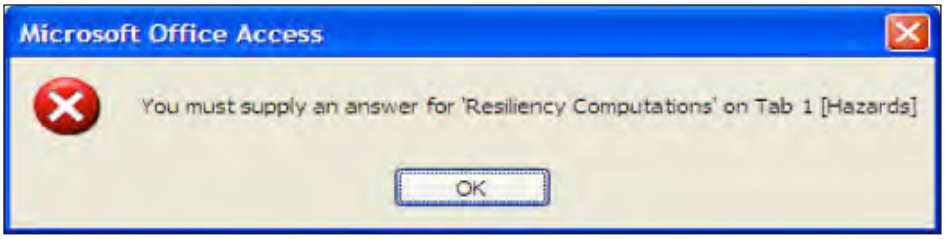
7.3 Generating the Risk and Resiliency Scores

After completing the **Pre-Field Questions** and **Site Evaluation**, you are ready to generate the risk and resiliency scores. Resilience scores will not be generated if you selected **No resiliency computations are needed** in the **Hazards** tab.

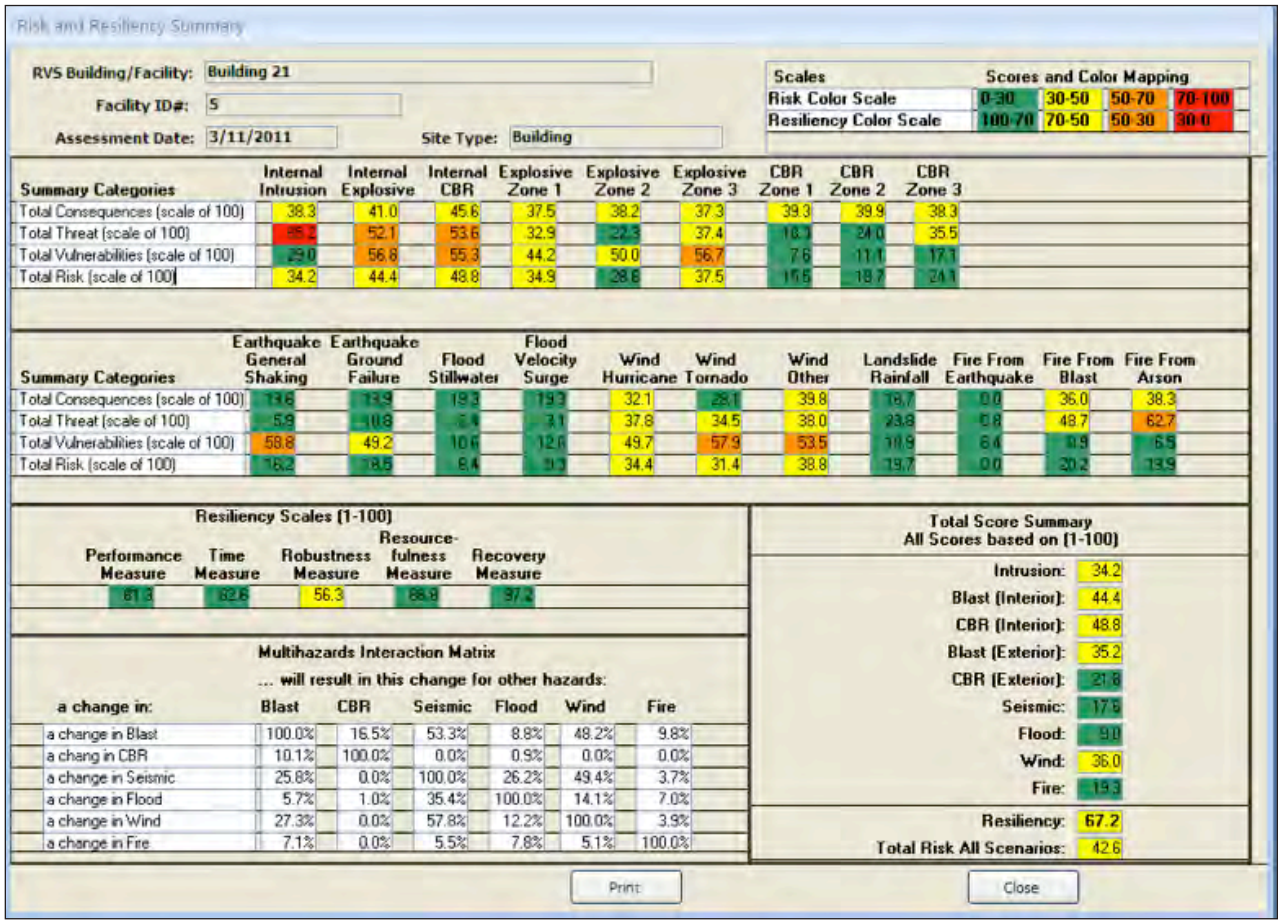
1. In the **IRVS Recording Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Pre-Field Questions** tab or **Site Evaluation** tab to open the **IRVS Site Scoring** screen.
3. Select **View Summary** to open the Risk and **Resiliency Summary** screen. If data have changed since the last time you opened **View Summary**, the message below will appear. Select **Yes**.



4. If required answers are missing, the risk and resiliency scores cannot be calculated, and a message such as the one below will appear. Select **Yes** and fill in the missing answers.



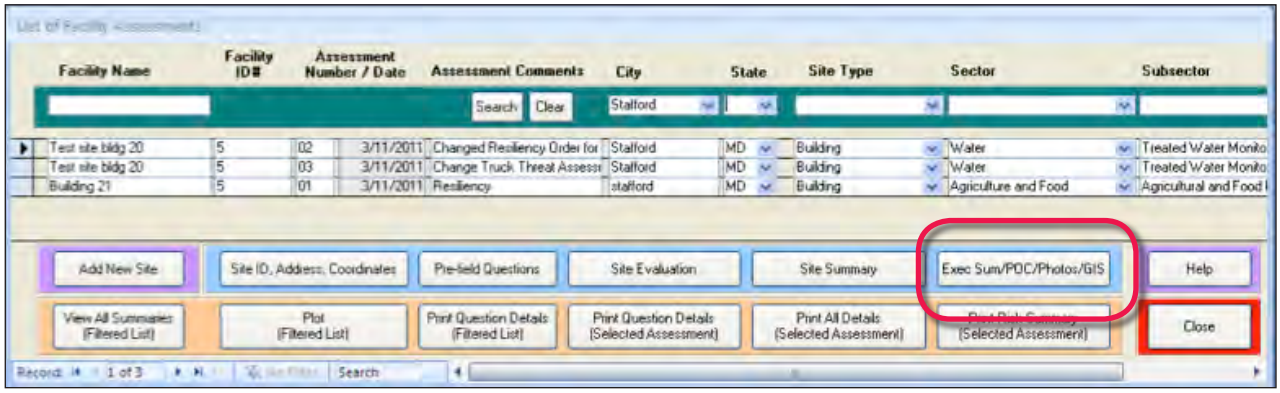
5. If MS Excel is open on your computer, the risk and resiliency scores cannot be calculated, and you will be prompted to close Excel.
6. If you have answered all required questions and MS Excel is not open, the database will generate the **Risk and Resiliency Summary**, as shown below. The time required to generate the summary will depend on your computer.



7. Select **Close** to return to the previous screen.

7.4 Creating an Executive Summary

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select **Exec Sum/POC/Photos/GIS**.



3. Select the **Executive Summary** tab if the three sections of the Executive Summary don't automatically appear.

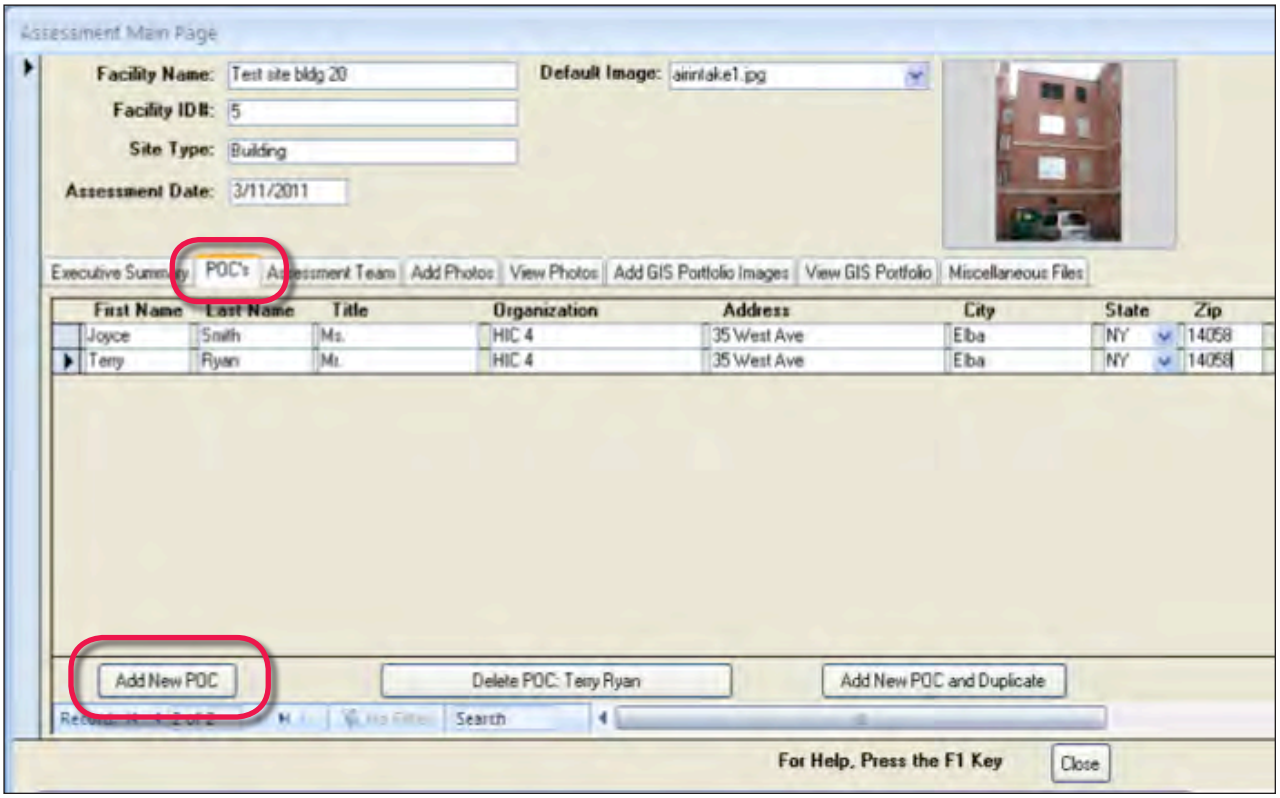
4. Enter information in the **Introduction, Observations, and Recommendations/Remediation** sections. The introduction usually contains the facility name, facility location, screening date, and other relevant background information.

   Select **Close** to return to the **IRVS Record Listing** screen form or select another tab.

7.5 Adding Points of Contact

Points of contact (POCs) are people you identified or met during the screening and who may need to be contacted later for more information.

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select **Exec Sum/POC/Photos/GIS**.
3. Select the **POCs** tab.
4. To add a POC, select the **Add New POC** tab.



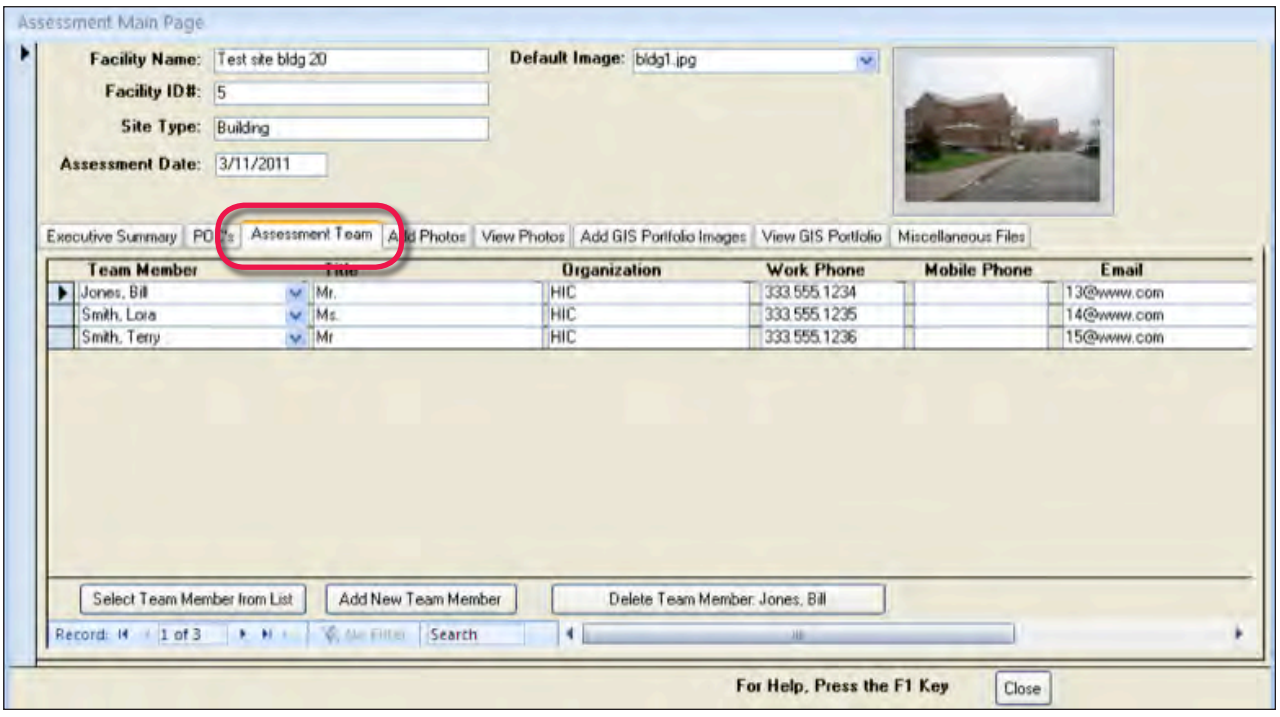
5. Enter information in the fields (**First Name, Last Name, Title, Organization, Address, City, State, Zip, Work Phone, Mobile Phone,**

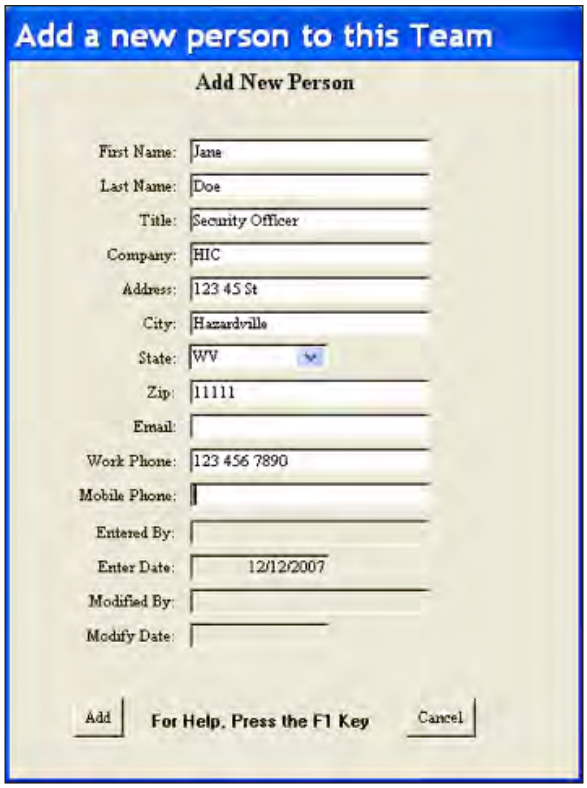
Email). If not all of the fields are visible, slide the bar at the bottom of the screen or use the keyboard arrows to see the remaining fields.

6. Press **Enter** or **Tab** on your keyboard to add the information to the database.
7. To edit the information for a POC, click the far left column in the row with the record and edit the information.
8. To delete a POC, select the POC by clicking the far left column in the row with the record and then selecting **Delete POC: [Name]**.
9. Since some POCs may have the same business address, you can duplicate an existing POC and use the information for the new POC that is the same for the existing POC. Click the left column of the POC with the address to be copied and then select **Add New POC and Duplicate**.
10. When you are finished adding, editing, and deleting POCs, select **Close** to return to the **IRVS Record Listing** screen or select another tab.

7.6 Adding Assessment Team Members

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select **Exec Sum/POC/Photos/GIS**.
3. Select the **Assessment Team** tab.





4. Select **Add New Team Member** and complete the information.
5. To select a Team Member from a list of team members in other records, select **Select Team Member from List**. The user must add at least one new team member before using this function.
6. To delete a Team Member, select the Team Member by clicking the far left column in the row with the record and then selecting **Delete Team Member: [Name]**.
7. After completing the Team Member information, select **Add** to return to the previous screen. The information that you have entered should appear. Use the bar slide or keyboard arrows to see the off-screen information.
8. When you are finished adding or deleting team members, select **Close** to return to the **IRVS Record Listing** screen or select another tab.

7.7 Adding Photos, Setting the Default Image, Deleting Photos, and Viewing Photos

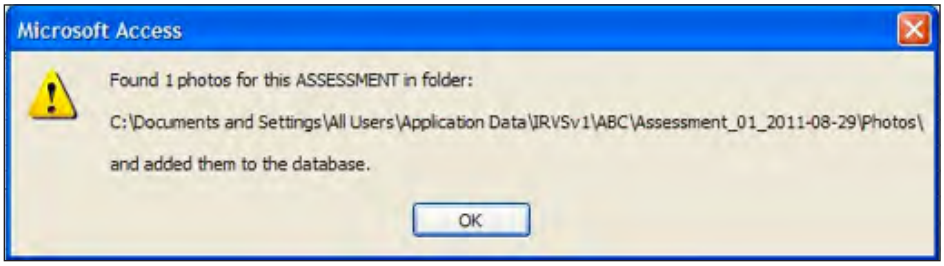
7.7.1 Adding Photos

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select **Exec Sum/POC/Photos/GIS**.
3. Select the **Add Photos** tab.
4. To add a single photo to the database, select **Copy only the selected image** if it is not already selected and select **Browse for a file**. Select the photo you want to add and select **Open**. Select **Yes** in the next menu, which lists the file name of the photo and the file path where it will be saved. The database recognizes any type of file in the "Miscellaneous" folder but only files with a "jpg," "gif," or "bmp" file extension in the "Photo" folder.
5. To add all the photos in a folder, select **Copy ALL from the folder** and select **Browse for a file**. Select the folder with the photos you want to

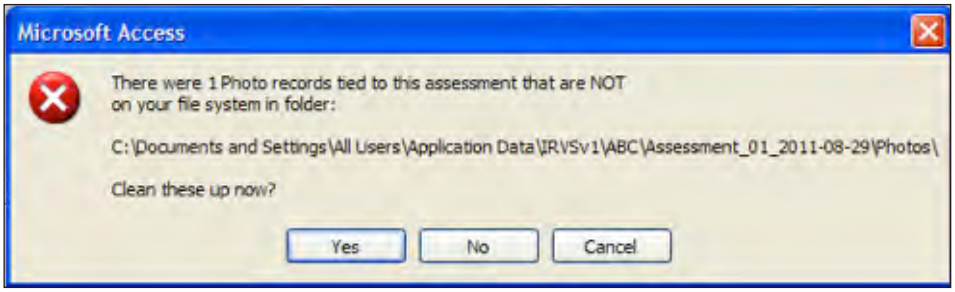
add and select **Open**. Select any file from the folder and select **Open**. Select **Yes** in the next menu, which lists the file name of the photo and the file path where it will be saved.

When the **Add Photo** or **View Photos** tabs are opened, the list of photos in the database is automatically updated after reopening the database if the photos in the subfolders that have been added to the database have changed (e.g., if you use the file manager folder where the photos for the database have been stored to modify current photos, delete photos, or add new photos; the next time you reopen the database, the list of photos will be updated).. See Section 7.7.4 for information on viewing photos.

If you add a photo using the file manager, the message below will appear. Select **OK**.



If you delete a photo using the file manager, the message below will appear. Select **Yes**.



7.7.2 Setting the Default Image

Once selected, the default image for a particular site will appear on various screens in the top right corner. The default image generally shows the screening site. It could be a photo of the building or a sign showing the name of the site. See Section 6, Step #11, for an example of a default image.

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.

2. Select the **Site ID, Address, Coordinates** tab.
3. Select one of the photos you have added in the dropdown menu in the **Default Facility Image** field at the top of the screen. The image will appear in the box at the top right of the screen.

7.7.3 Deleting Photos

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **Add Photos** tab to see the list of photos in the database.
4. Select the photo you want to delete by clicking the far left column in the row with the photo. Select **Delete Photo**.
5. You will be asked to confirm that you want to delete the photo. Select **Yes**.

7.7.4 Viewing Photos

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **View Photos** tab. Thumbnails of the photos will appear.
4. To enlarge a photo, click the thumbnail of the photo and select **Zoom** or **Clip** for different view of the photo. Select **Open File** to open the Windows Picture and Fax Viewer, which allows you to rotate, enlarge, print, and save the photo.
5. If there are more than five photos in the database, use the arrows under the thumbnails to scroll through the thumbnails of the photos.

7.8 Adding GIS Images

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **Add GIS Portfolio Images** tab.
4. Follow Steps #4 and #5 in Section 7.7.1.

7.8.1 Deleting GIS Images

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **Add GIS Portfolio Images** tab to see the list of GIS images in the database.
4. Select the image you want to delete by clicking the far left column in the row with the photo. Select Delete GIS Portfolio Image.
5. You will be asked to confirm that you want to delete the photo. Select **Yes**.

7.8.2 Viewing GIS Portfolio Images

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **View GIS Portfolio** tab. Thumbnails of the images will appear.
4. To enlarge an image, click the thumbnail of the image and select **Zoom** or **Clip** for different view of the image. Select **Open File** to open the Windows Picture and Fax Viewer, which allows you to rotate, enlarge, print, and save the image.
5. If there are more than five GIS image in the database, use the arrows under the thumbnails to scroll through the thumbnails of the image.

7.9 Adding and Deleting Miscellaneous Information

7.9.1 Adding Miscellaneous Information

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **Miscellaneous Files** tab.
4. Follow Steps #4 and #5 in Section 7.7.1.
5. To view the file, click on the file name.

7.9.2 Deleting Miscellaneous Files

1. In the **IRVS Record Listing** screen, if the record of the site you need isn't already selected, select it by clicking the far left column in the row with the record.
2. Select the **Site ID, Address, Coordinates** tab.
3. Select the **Miscellaneous Files** tab.
4. Select the file you want to delete by clicking the far left column in the row with the file. Select Delete File.
5. You will be asked to confirm that you want to delete the photo. Select **Yes**.

7.10 Exporting Screening Data

After a screening has been completed, the screening data in the Field Database must be copied and imported into the Master Database, which are administrative functions. See Section 10.

7.11 Emptying the Database

The final task in conducting a screening is to delete the screening data from the Field Database after the data have been transferred to the Master Database. This task is an administrative function. See Section 10.5.

Section 8

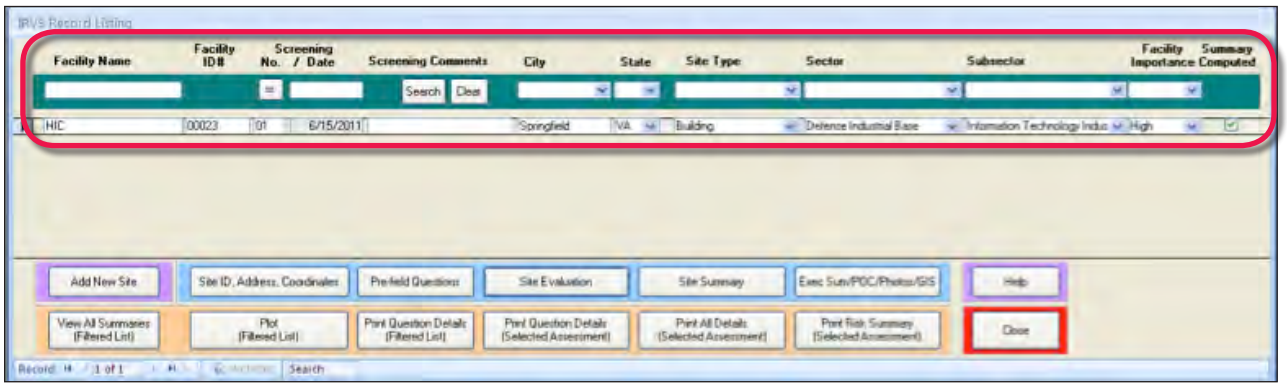
8. Filtering Records

Records can be filtered using the categories of information in a record (e.g., site type, location, sector, facility importance). After you create a filtered list of records, you can view all of the summaries of the records in the filtered list (see Section 8.1) and plot the sites of the records in the filtered list (see Section 8.2).

To filter the records in the database, follow these steps.

1. After logging on to the database, select **Rapid Visual Screening** from the **Main Menu** to open the **IRVS Record Listing** screen.
2. It is assumed that the database already contains more than one record. To filter the list of records, enter a search term or select a term from the dropdown menu in one or more of the fields at the top of the screen. For a range of dates before, after, or on a specific date, use "<" , ">" or "=."For example, if the screener wants to observe all the assessments before June 16,2011, the screener would use "<" by selecting the box to the left of the date input and selecting 6/16/2011 on the pop up calendar.

3. **Select Search.** The records that match the search will be listed.

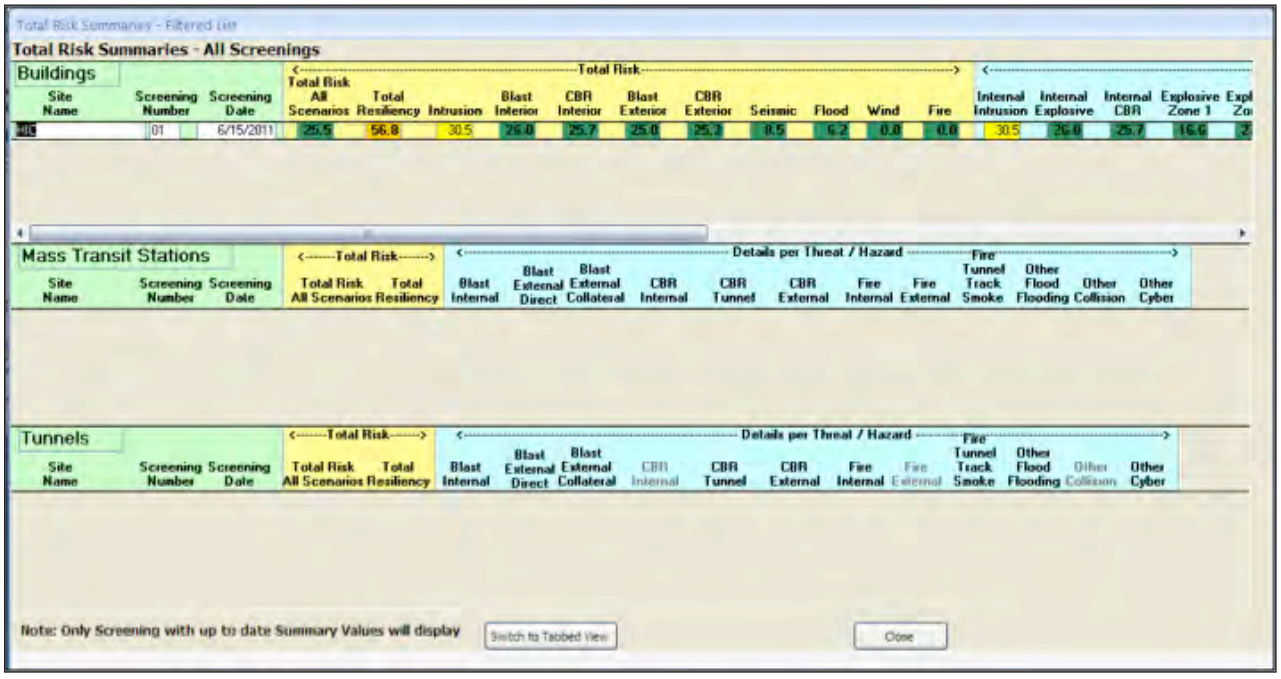


4. To clear the search, select **Clear**.

8.1 Viewing All Summaries

1. After you have created a filtered list, select **View All Summaries (Filtered List)** at the bottom of the screen to display the **Total Risk Summary – Filtered List** screen. If the screener does not filter the records, all the summaries in the database can be seen at the same time. The information that will be displayed is the same as the information that is displayed if you select **Site Summary** for one record except that you get a summary of more than one record. The summaries are grouped by site type.

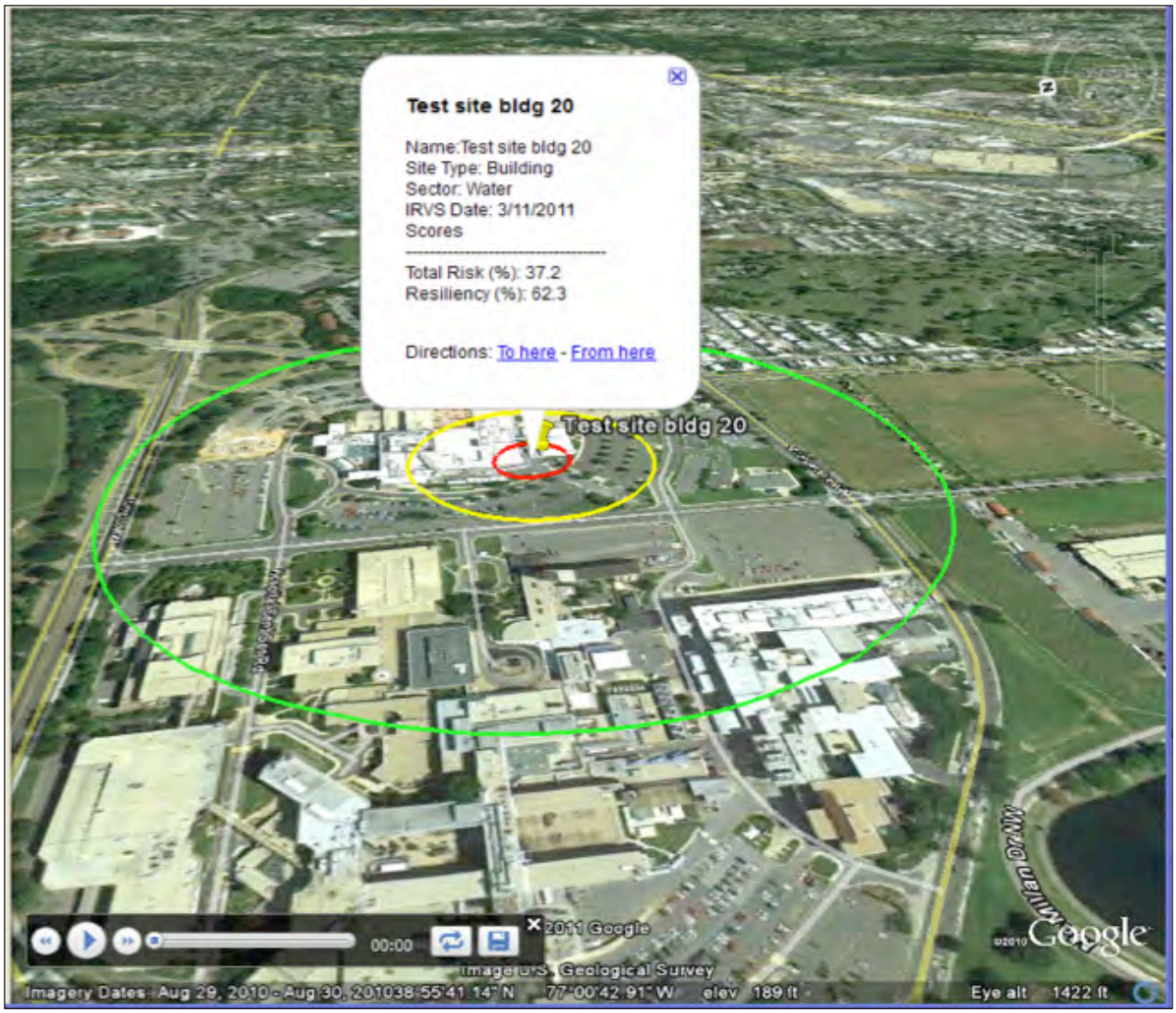
2. To see the summaries for only one site type, select **Switch to Tabbed View**.



8.2 Plotting a Filtered List

If you have entered the coordinates for the screening sites and your computer has an installed mapping program that can read KML files, you can plot the records in a filtered list.

1. After you have created a filtered list, select **Plot (Filtered List)** to plot the sites that are in the filtered list.



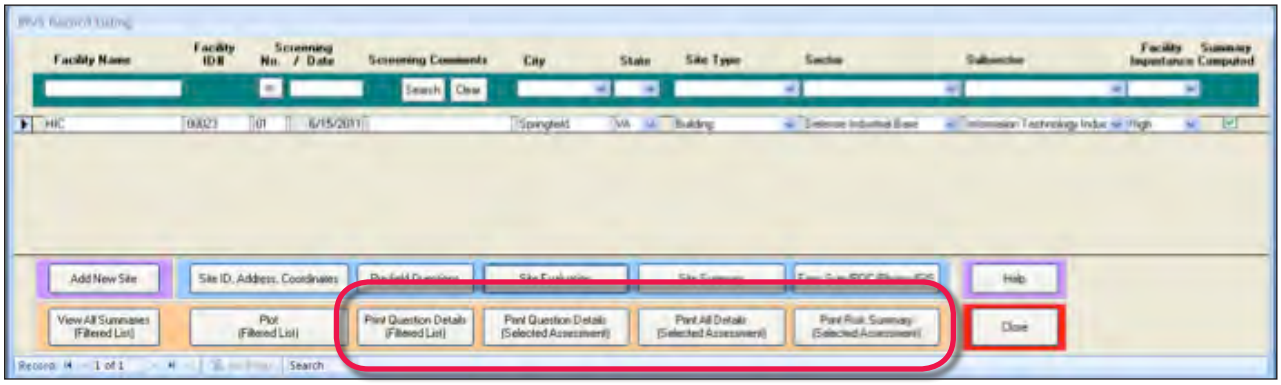
9. Generating and Printing Reports

Section 9

The **IRVS Record Listing** screen has four options for generating and printing reports:

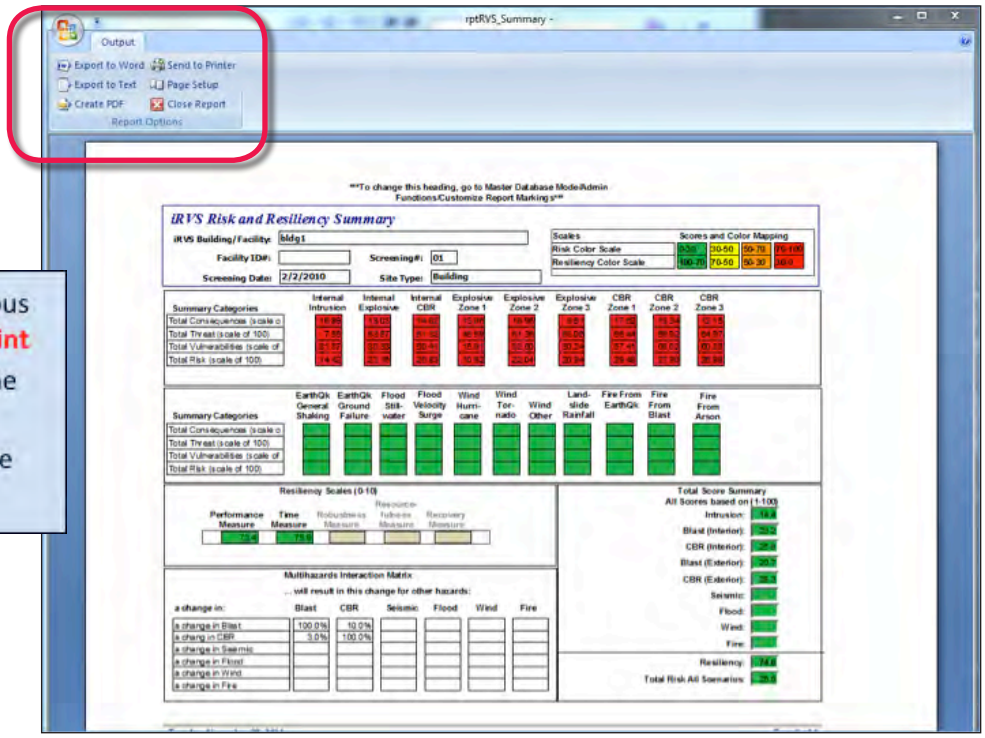
- Print Question Details (Filtered List)
- Print Question Details (Selected Screening Record)
- Print All Details (Selected Screening Record)
- Print Risk Summary (Selected Screening Record)

For all four options, you can print the information or export it as a MS Word document, or Text document, or PDF for editing or formatting by using the Output TAB. After selecting an option, to return to the previous screen, select **Close Report**. If you use the "**X**" on the upper right corner of the screen, you will close the database.



1. To generate and print a list of the answers to the pre-field and site evaluation questions for each record in the filtered list, you must first create a filtered list (see Section 8). Then select **Print Question Details (Filtered List)**. The risk and resiliency scores and other details (e.g., POCs, Assessment Team members, Executive Summary) will not be included.
2. To generate and print a list of the answers to the pre-field and site evaluation questions for a single record, first select a record on the **IRVS Record Listing** screen by clicking the far left column in the row with the record. Then select **Print Question Details (Selected Screening Record)**. The risk and resiliency scores and other details (e.g., POCs, Assessment Team members, Executive Summary) will not be included.
3. To generate and print an expanded amount of data for a single record, first select a record on the **IRVS Record Listing** screen by clicking the far left column in the row with the record. Then select **Print All Details (Selected Screening Record)**. The risk and resiliency scores will not be included.

4. To generate a risk and resilience summary for a single record, first select a record on the **IRVS Record Listing** screen by clicking the far left column in the row with the record. Then select **Print Risk Summary (Selected Screening Record)**.



To return to the previous screen, select **Close Print Preview**. Do not use the "X" in the upper right corner, or you will close the database.

Section 10

10. Administrative Functions

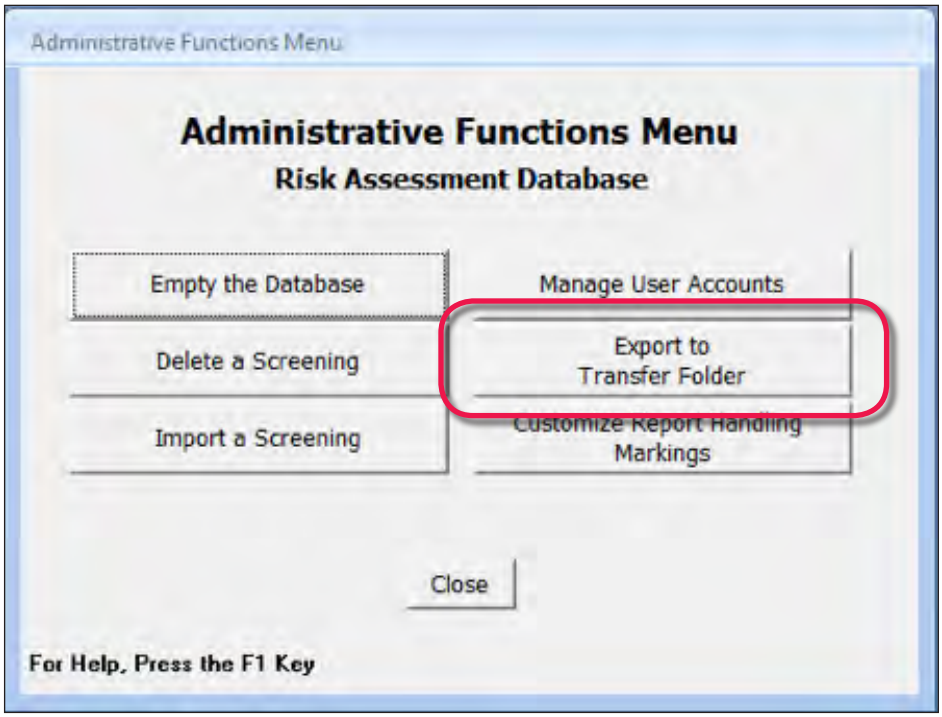
Administrative functions are not available to all users. You must have permission to log on as an Administrator, or your user name must include permission to access administrative functions. The administrative functions are as follows:

- Exporting screening data from the Field Database to transfer media
- Importing screening data into the Master Database from transfer media
- Importing screening data into the Master Database directly from the Field Database
- Deleting a single screening record
- Emptying the database
- Managing user accounts
- Customizing report handling markings

10.1 Exporting Screening Data from the Field Database to Transfer Media

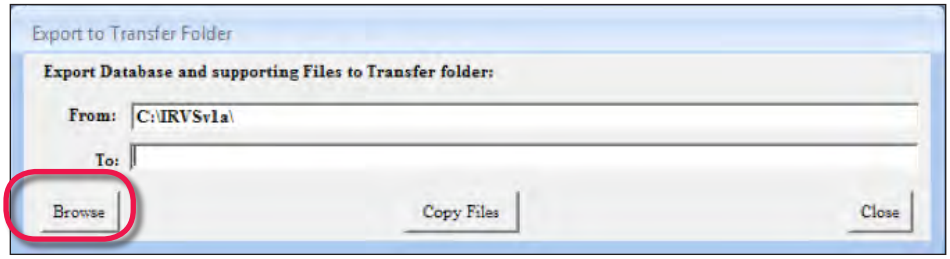
After a screening has been completed, the screening data must be transferred from the Field Database to the Master Database. The transfer can be accomplished in two ways: (1) copying the data to a USB drive, CD, DVD, or other type of transfer media and (2) importing the data directly from the Field Database into the Master Database. Exporting screening data to transfer media is described in this section. For instructions on transferring data from the transfer media to the Master Database, see Section 10.2. For information on importing data directly into the Master Database from the Field Database, see Section 10.3.

1. Log on to the database or, if you are in the database, close the screens until you are back to the **Main Menu**.
2. Select **Administrative Functions**.
3. Select **Export to Transfer Folder**.
4. In the **Export to Transfer Folder** screen, the **From** field (location of the data to be copied) should be populated. Select **Browse** to identify the file path where you want the data to be copied.



5. Select the folder where you want to copy the data and then select **Open**.

6. Select **Copy Files**. You will be asked to confirm that you want to copy the files. Select **Yes**.



7. A message will appear indicating that the transfer is complete. Select **OK** and then **Close** to return to the **Administrative Functions** menu.

8. Give the transfer media containing the data to the Master Database operator (usually the IRVS Program Manager) who will copy the data to a temporary location on his or her computer until the data can be transferred to the Master Database. See Section 10.2 for instructions on importing screening data into the Master Database from transfer media.

10.2 Importing Screening Data into the Master Database from Transfer Media

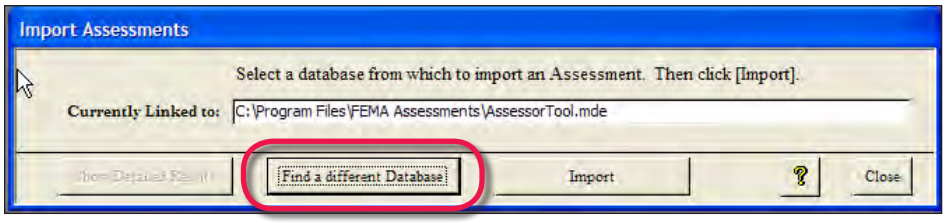
1. Follow the instructions in Section 10.1 for transferring data from the Field Database to transfer media.

2. Insert the transfer media into the computer with the Master Database.

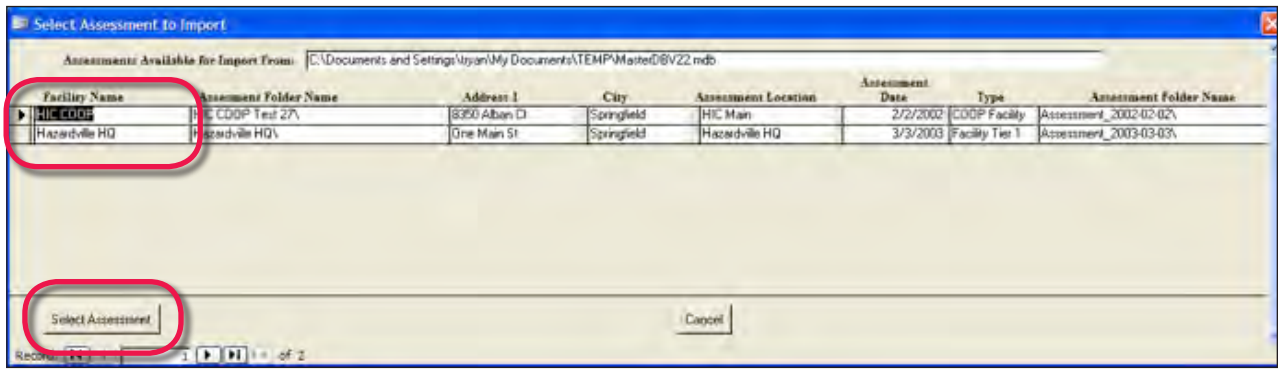
3. Select **Administrative Functions** from the **Main Menu** of the Master Database.

4. In the **Administrative Functions Menu**, select **Import Assessor Database**. This imports the database files with an mdb or mde extension that contain the screening data on the Field Database. The field for **Currently Linked to** in the **Import Assessments** screen will be populated with the last database file the Master Database was linked to.

5. To find a different database file to import, select **Find a different Database**.



6. When you have found the database file you want to import into the Master Database, select file and then select **Open**, which will take you back to the **Import Assessments** screen.
7. Select **Import**.
8. You will be asked to confirm that you want to import the database file. Select **Yes**.
9. A message will appear confirming that the file has been imported. Select **OK**.
10. The **Select Assessment to Import** screen will appear. Select the assessment to be imported and select **Select Assessment**.



11. You will be asked if you also want to transfer the supporting files (e.g., photos) that are tied to the assessment. Select **Yes** if you want to transfer the files. If there are no supporting files, you will get a message to that effect.
12. You will be asked to confirm that you want to transfer the files now. Select **Yes**.
13. Select **OK** to finish.

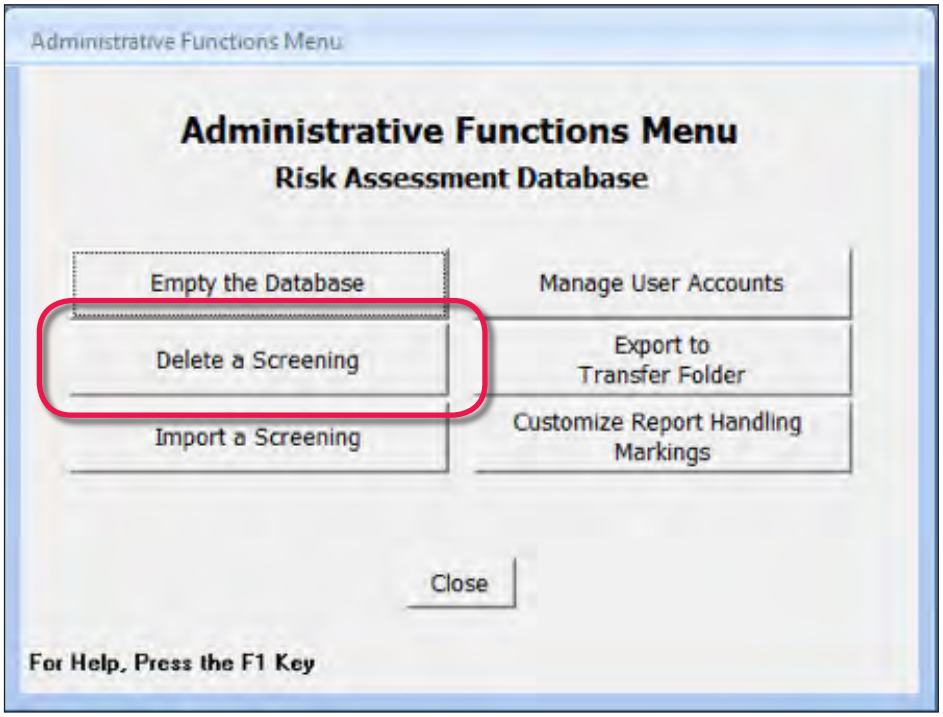
10.3 Importing Screening Data Directly into the Master Database from the Field Database

1. Connect the Field Database laptop to the computer with the Master Database using a USB cable or through a network.
2. Follow Step #3 through Step #13 in Section 10.2.

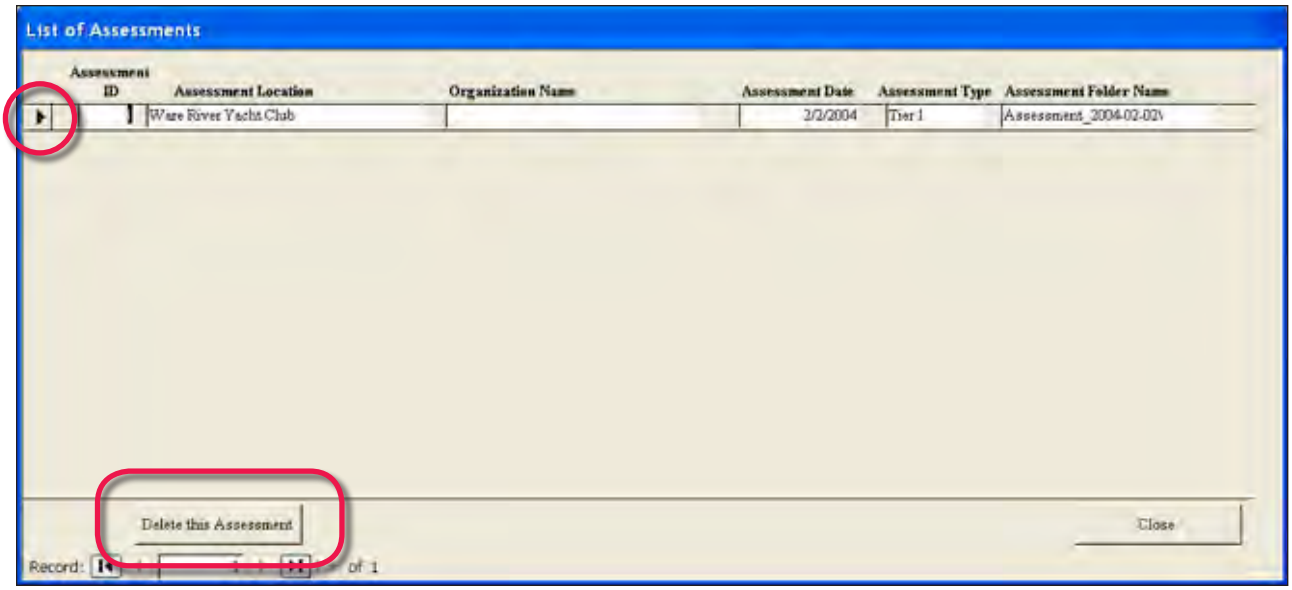
10.4 Deleting a Single Screening Record

If you have permission to access administrative functions, you can delete screening records permanently. Deleted data can't be restored.

1. Log on to the database or, if you are in the database, close the screens until you are back to the **Main Menu**.
2. Select **Administrative Functions**.
3. Select **Delete a Screening**.



4. The **List of Assessments** screen will appear. Select the screening record to erase and then select **Delete This Assessment**.
5. You will be asked to confirm that you want to permanently erase the selected screening record. Select **Yes**. **Warning: The screening record will be erased from the database permanently!**



10.5 Deleting All Screening Records from the Field Database

After the screening records have been transferred from the Field Database to the Master Database, the screening records should be deleted from the Field Database. The records will be deleted permanently and can't be restored. **Before deleting the records, confirm that the records have been successfully transferred to the Master Database.**

1. Log on to the Field Database or, if you are in the database, close the screens until you are back to the **Main Menu**.
2. Select **Administrative Functions**.
3. Select **Empty the Database**.
4. You will be asked to confirm that you want to permanently erase all screening records. Select **Yes** to continue or No or Cancel to cancel.
5. If you selected **Yes**, you will receive a warning that the action is non-reversible. Select **Yes** to continue or **No** or **Cancel** to cancel.
6. If you selected **Yes**, you will receive a final warning asking if you want to delete all files and folders. Select **Yes** to continue or **No** or **Cancel** to cancel.
7. If you selected **Yes**, the records will be deleted, and you will receive a message to that effect. Select **OK**.

Before deleting the records, confirm that the records have been successfully transferred to the Master Database.

8. You will be given the option to keep your customized system defaults or to reset the labels to their original listings. Select the option you prefer and select **Continue with these choices**.

9. Select **OK**. The database will close. The next time you open the database, you will get a message that the **Database** will be re-set. The purged database will have no screening records.

10.6 Managing User Accounts

The **Manage User Accounts** function enables an administrator to add a user, delete a user, and assign a user to one of three user groups. The user group determines the permission level.

The database is preloaded with the following four user names and passwords.

User Name	Password
Administrator	Administrator
Assessor	Assessor
Editor	Editor
Reader	Reader

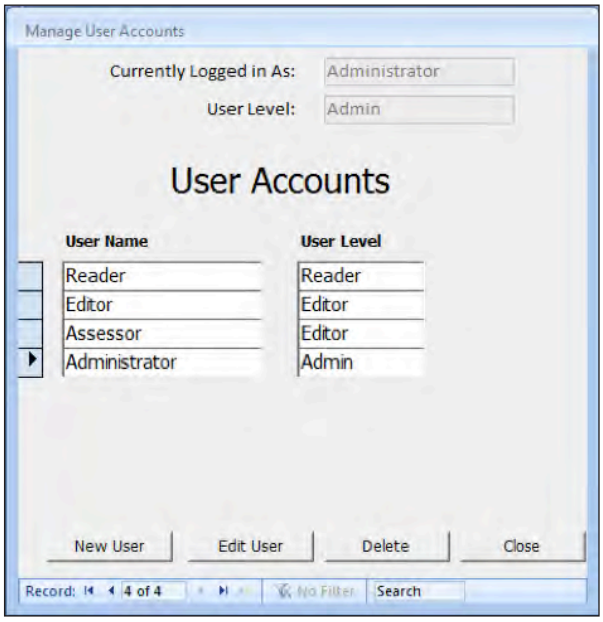
10.6.1 User Groups

Three user groups are available in the database: Administrators (Admins), Full Data Users, and read-only users (Readers).

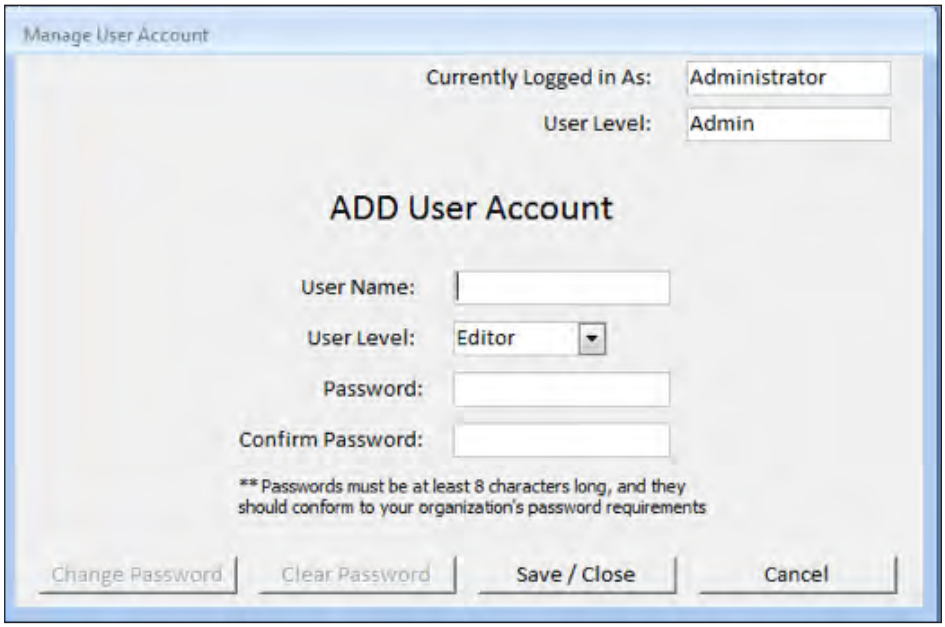
- **Admins** have full access to the database, including the administrative functions. The database starts with two users in this group, **Administrator** and **Assessor**.
- **Full Data Users** can view, record, and update data but not perform administrative functions. The database starts with one user in this group, **Editor**.
- **Readers** can only view data. The database starts with one user in this group, **Reader.**

The password and permission level for the four preloaded user names (Administrator, Assessor, Editor, and Reader) can be changed, but cannot be deleted. This is a safety feature to prevent users from erasing all Administrators from the program.

10.6.2 Add a User



1. From the **Main Menu**, select **Administrative Functions**.
2. From the **Administrative Functions Menu**, select **Manage User Accounts**.
3. From the **Manage User Accounts** screen, select **New User.**
4. From the A**dd a New User Account** screen, type in the new user name.
5. Under User Level select a user group from the dropdown menu.
6. Select **Save/Close**.
7. Select **OK**.



10.6.3 Delete a User

1. From the **Main Menu**, select **Administrative Functions**.
2. From the Administrative Functions Menu, select **Manage User Accounts**.
3. From the **List of Users and the Group to which they belong** screen, select one of the existing users by left clicking on the far left column.
4. Select **Delete.**

5. You will be asked to confirm the deletion. Select **Yes** to confirm or No or Cancel to cancel the action.
6. Select **OK**.

10.6.4 Change the User Level

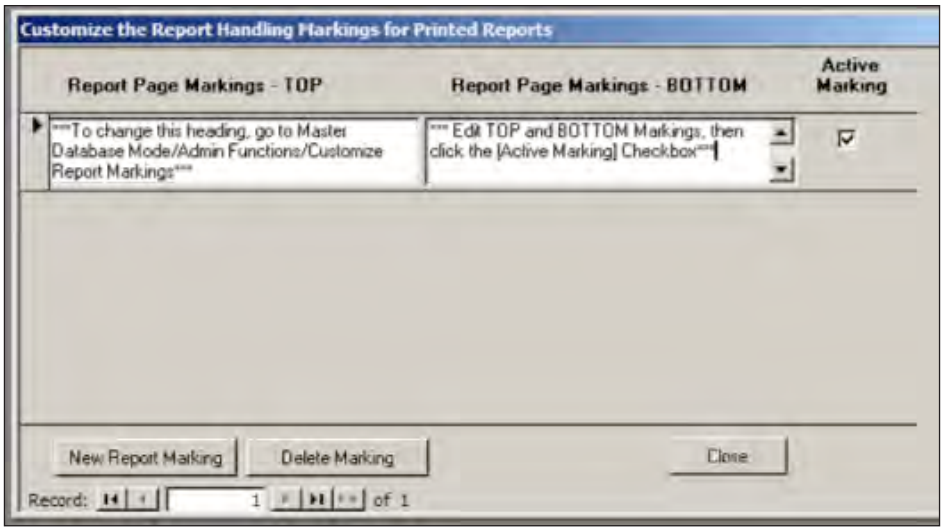
You want need to change the user level that a particular user belongs to.

1. From the **Main Menu**, select Administrative Functions.
2. From the Administrative Functions Menu, select **Manage User Accounts**.
3. From the **User Accounts** screen, select one of the existing users by left clicking on the far left column.
4. Select **Edit User**.
5. Select a level from a dropdown menu.
6. Select **Save/Close** to continue or **Cancel** to cancel the action.

10.7 Customizing Report Handling Markings

The database administrator can establish customized report handling markings that will be automatically printed on the top and bottom of all reports.

1. From the **Main Menu**, select **Administrative Functions**.
2. From the **Administrative Functions Menu**, select **Customize Report Handling Markings**.
3. **The Customize Report Handling Markings for Printed Reports** screen will appear. Edit the default marking or type in the desired text under **Report Page Markings – TOP and Report Page Markings – BOTTOM**.
4. Add top and bottom markings by selecting **New Report Marking**. Select the marking you want to be used when reports are printed by selecting the marking in the **Active Marking** column.
5. Delete top and bottom markings by selecting **Delete Marking**.
6. Select **Close** to return to the previous screen.


Customize the Report Handling Markings for Printed Reports
Report Page Markings - TOP
Report Page Markings - BOTTOM
Active Marking
To change this heading, go to Master Database Mode/Admin Functions/Customize Report Markings
*** Edit TOP and BOTTOM Markings, then click the [Active Marking] Checkbox***
New Report Marking
Delete Marking
Close
Record:
1
of 1

D

Data Collection Form: Paper Version

Pre-Field Information

Complete the information on this page before the field assessment, using additional sheets as needed. The numbers in parentheses refer to the ID number in the catalog. Refer to the catalog for explanations of the information that is requested on this page and the potential sources of the information.

Station name/identification _____

Address/intersection _____

Transit agency _____

Year built _____ Footprint (in square feet) _____

Overview of the station from the transit agency _____

_____

_____

_____

Number of tracks (1.1) _____ Number of levels (1.2) _____

Station elevation (1.3)_____ Replacement value (1.10) _____

Peak daily ridership/transfers (1.4) _____

Terrorist threats against the station (2.3)_____

_____

Terrorist threats against the transit system (2.4) _____

_____

History of flooding affecting the station since opening(2.11) _____

_____

Geology: Soil conditions (3.9) _____

Year(s) of major retrofits (5.3) _____

Retrofit description_____

Operating hours (12.8) _____

Target Density. Number of potential high-value/CIKR targets/buildings within 300 feet and between 300 and 1000 feet of any point of the perimeter of the station (1.7).

CIKR Sector	Within 300 feet	From 300 to 1000 feet
Agriculture and Food		
Banking and Finance		
Chemical		
Commercial Facilities		
Communications		
Critical Manufacturing		
Dams		
Defense Industrial Base		
Emergency Services		
Energy		
Government Facilities		
Healthcare and Public Health		
Information Technology		
National Monuments/Icons		
Nuclear Reactors, Materials, and Waste		
Postal and Shipping		
Transportation Systems		
Water		
TOTAL		

1. Consequences Rating

Characteristic			Attribute Options (a)/(f)	(b)/(g)	(c)/(h)	(d)/(i)	(e)/(j)	Red Flag	Comments
1.1	Number of Tracks		1	2	3 – 4	5 – 8	> 8		
1.2	Number of Station Levels		1	2	3	> 3			
1.3	Station Elevation		At grade	Above grade	Below grade (above water table)	Above water	Below grade, below water table		
1.4	Peak Number of Riders/Transfers per Day		< 1,000	1,000 – 2,000	2,000 – 5,000	5,000 – 10,000	10,000 – 20,000		
	20,000 – 50,000		50,000 – 100,000	100,000 – 150,000	150,000 – 200,000	> 200,000			
1.5	Station Locality		Remote	Rural	Urban	Dense urban	—		
1.6	Nearby/Adjacent Transportation Systems or Public Assembly Structures Venues		None	Close	Tightly integrated	—	—		
1.7	High-Value Targets/CIKR Targets	**1.7.1** Zone 1: Within 300 feet	None	1 – 6	7 – 12	13 – 19	≥ 20		
		1.7.2 Zone 2: Between 300 and 1000 feet	None	1 – 6	7 –12	13 – 19	≥ 20		
1.8	Impact of Physical Loss/ Criticality	**1.8.1** Station	Local	Regional	National	—	—		
		1.8.2 Track	Local	Regional	National	—	—		
1.9	Social Impact		Low	Moderate	High	—	—		
1.10	Replacement Value (in millions of dollars)		< $1m	$1m – $5m	$5m – $20m	$20m – $50m	$50m – $100m		
	$100m – $200m		$200m – $350m	$350m – $600m	$600m – $900m	> $900m			
1.11	Operational Redundancy		Very high	High	Moderate	Low	Very low		
1.12	Estimated Down Time after a Major Disaster		Very short	Short	Moderate	Long	Very long		

2. Threat Rating

Characteristic			Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
2.1	Station Locality		Remote	Rural	Urban	Dense urban			
2.2	Peak Number of Riders/Transfers per Day		< 1,000	1,000 – 2,000	2,000 – 5,000	5,000 – 10,000	10,000 – 20,000		
	20,000 – 50,000		50,000 – 100,000	100,000 – 150,000	150,000 – 200,000	> 200,000			
2.3	Terrorist Threat (Credible)	**2.3.1** Station	No	Previous	Current	—	—		
		2.3.2 System	No	Previous	Current	—	—		
2.4	High Value Targets/CIKR Targets	**2.4 1** Zone 1: Within 300 feet	0	1 – 6	7 – 12	13 – 19	> 20		
		2.4.2 Zone 2: Between 300 feet and 1000 feet	0	1 – 6	7 – 12	13 – 19	> 20		
2.5	Significance of Station		Local	Regional	National	International			
2.6	Function Criticality (within System/ Region)		Very low	low	Moderate	High	Very high		
2.7	Number of Entrances/Exits		1 – 2	3 – 4	5 – 8	9 – 12	>12 or unlimited		
2.8	Plaza/Public Area		N/A	None	Well-controlled	Moderate-control	Not-controlled		
2.9	Protective Deterrence Measures		High	Medium	Low	—	—		
2.10	Accessibility of Off-Duty Vehicles/ Equipment		N/A	No accessibility	Low accessibility	Moderate accessibility	High accessibility		
2.11	Flooding History		N/A	None	Limited	Moderate	Severe		

3. Vulnerability Rating: Site

Characteristic			Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
3.1	Presence of Stand Pipes/Fire Hydrants (Water Supply)		Yes	No	—	—	—		
3.2	Water Drainage		Excellent	Medium	Limited	Deficient	—		
3.3	Natural Barriers		N/A	High	Medium	Low	—		
3.4	Manmade Barriers	**3.4.1** Barriers/ Bollards	N/A	High	Medium	Low	—		
		3.4.2 Fencing	N/A	High	Medium	Low	—		
3.5	Station Elevation		At grade	Above grade	Below grade (above water table)	Above water	Below grade, below water table		
3.6	Depth of Cut and Cover above Station		N/A	Deep	Shallow	Exposed	—		
3.7	Concourse		No	Yes	—	—	—		
3.8	Adjacent buildings		None	Some	Numerous	—	—		
3.9	Geology (Soil Condition)		Hard-rock	Medium	Poor	—	—		
3.10	Accessibility of off-duty vehicles/equipment		N/A	None	Low accessibility	Moderate accessibility	High Accessibility		
3.11	Hazardous Material Storage		No	Yes	—	—	—		

4. Vulnerability Rating: Architectural

Characteristic		Attribute Options					Red Flag	Comments
		(a)/(f)	(b)/(g)	(c)/(h)	(d)/(i)	(e)/(j)		
4.1	Number of Entrances	1	2 – 4	≥ 5	—	—		
4.2	Retail Spaces	None	Low	Medium	High	Very high		
4.3	Integrated/Adjacent Parking garages	None	Adjacent parking	Staff only parking	Public parking	—		
4.4	Lobbies (Number and Size)	None	1 small	1 medium	1 large	2 small		
		2 medium	2 large	3+ small	3+ medium	3+ large		
4.5	Number of Observable or Concealed/Not Observable Occupied Spaces	None	No (1 – 2)	No (3+)	Yes (1 – 2)	Yes (3+)		
4.6	Service Entrances	N/A	No	Yes	—	—		
4.7	Crowding/Congestion	Multiple exit types	Escalators only	Stairs only	Elevators only	—		
4.8	Emergency Exits	More than 4	3 – 4	2	1	none		
4.9	Number of Levels	1	2 – 3	More than 3	—	—		
4.10	Ease of Egress from Vehicle/ Trains to Station	Difficult	Moderate	Easy	—	—		
4.11	Plaza/Public Areas	N/A	None	Well-controlled	Moderate Control	Not controlled		

5. Vulnerability Rating: Structural

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
5.1	Liner Relative Thickness	N/A	Thick	Medium	Thin	Very thin		
5.2	Construction material	High strength concrete/steel	Steel/concrete/ prestressed concrete	Wrought iron	Non-reinforced concrete	Masonry or brick		
5.3	Known Retrofits	Yes	No	—	—	—		
5.4	Longest Span	N/A	< 15 feet	25-40 feet	40 – 50 feet	> 50feet		
5.5	Controlling Height	N/A	< 15 feet	25-40 feet	40 – 50 feet	> 50feet		
5.6	Type of Framing	Shell	Plate	Frame	—	—		
5.7	Seismic Design	N/A	Yes	No	—	—		
5.8	Overall Structural Conditions	Excellent	Good	Average	Below average	Poor		

6. Vulnerability Rating: Ventilation Vulnerabilities

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
6.1	Protection of Ventilation Shafts	N/A	Well protected	Somewhat protected	Not protected	—		
6.2	Protection of Ventilation Structures	N/A	Well protected	Somewhat protected	Not protected	—		
6.3	Redundancy of Ventilation Systems	N/A	Yes	No	—	—		
6.4	Ventilation Hardware Exposure	N/A	Hardened enclosure	Covered, not hardened	Visible	—		

7. Vulnerability Rating: Fire Protection System Vulnerabilities

Characteristic			Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
7.1	Code Inspection		Yes	No	—	—	—		
7.2	Backup Power System		Yes	No	—	—	—		
7.3	Emergency Lighting System		Yes	No	—	—	—		
7.4	Automatic Fire Control Automatic Detection Systems	**7.4.1** Automatic Detection System	Yes	No	—	—	—		
		7.4.2 Fire Control Panel	Yes	No	—	—	—		
		7.4.3 Automatic Detection System Reporting	N/A	Fire department	Off-site control center	Station control panel	No one – local alarm only		
		7.4.4 Activation System	N/A	Release security devices and recall elevators	None	—	—		
7.5	Smoke Dampers in Ventilation System		Yes	No	—	—	—		
7.6	Sprinkler System	**7.6.1** Automatic Sprinkler System	Yes	No	—	—	—		
		7.6.2 Coverage of Automatic Sprinkler System	N/A	Entire station	Partial coverage	—	—		
		7.6.3 Alternate Automatic Extinguishing System	Combi-nation	Clean agent/ water mix	Dry chemical	None	—		
7.7	Station Knox Box		Yes	No	—	—	—		
7.8	Fare Collection System		Open access	Automatic	Restricted turn style	—	—		

8. Vulnerability Rating: Operational Systems

Characteristic			Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
8.1	Power Supply and Distribution: Enclosures		Well protected	Marginally protected	Not protected	—	—		
8.2	Surveillance and Control	**8.2.1** Coverage of Control Systems	Complete	Partial	None	—	—		
		8.2.2 Quality of Control Systems	High	Medium	Low	—	—		
8.3	Public Address and Communications	**8.3.1** Public Notification (Alerts and Signage for Public Awareness)	Low ridership (see ID I.4)						
			Class 3	Class 2	Class 1	Present – non-operational	None		
			High ridership (see ID I.4)						
			Class 3	Class 2	Class 1	Present – non-operations	None		
		8.3.2 Effectiveness of Public Awareness	High	Moderate	Limited	—	—		
		8.3.3 Asset-related Communications	Low ridership (see ID I.4)						
			Class 3	Class 2	Class 1	Present – non-operational	None		
			High ridership (see ID I.4)						
			Class 3	Class 2	Class 1	Present – non-operational	None		
		8.3.4 Effectiveness of Asset-related Communications	High	Moderate	Limited	—	—		
8.4	Quality of Lighting	**8.4.1** Exterior	High	Medium	Low	—	—		
		8.4.2 Interior	High	Medium	Low	—	—		

9. Vulnerability Rating: Nonstructural Vulnerabilities

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
9.1	Quality of Security Personnel Booths	High	Medium	Low	None	—		
9.2	Fixture Attachments	Secured	Not secured	—	—	—		
9.3	Quality of Barriers/Curbs	High	Medium	Low	None present	—		

10a. Vulnerability Rating: Physical Security Vulnerabilities

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
10.1a	Access Control	Yes	No	—	—	—		
10.2a	Intrusion Detection Systems	Yes	No	—	—	—		
10.3a	Video and Surveillance Assessment – Monitored CCTV	Yes	No	—	—	—		
10.4a	Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Detection Equipment	Yes	No	—	—	—		
10.5a	Personnel/Baggage CBRNE Screening	Yes	No	—	—	—		
10.6a	Vehicular CBRNE Screening	Yes	No	—	—	—		
10.7a	Mobile Personnel/Baggage CBRNE Screening	Yes	No	—	—	—		
10.8a	Unarmed Guards/Patrol	Yes	No	—	—	—		
10.9a	Armed Guards/Patrols	Yes	No	—	—	—		
10.10a	Law Enforcement Patrols	Yes	No	—	—	—		
10.11a	Assetrelated Communications	Yes	No	—	—	—		
10.12a	Special Weapons and Tactics (SWAT) Teams	Yes	No	—	—	—		
10.13a	Explosion Ordinance Disposal (EOD) Teams	Yes	No	—	—	—		
10.14a	Interdiction-related Communications	Yes	No	—	—	—		
10.15a	Waterside Intrusion Detection Systems	Yes	No	—	—	—		
10.16a	Vessel Boarding Teams	Yes	No	—	—	—		
10.17a	Dive Teams	Yes	No	—	—	—		

10a. Vulnerability Rating: Physical Security Vulnerabilities (cont.)

Characteristic		Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
10.18a	Patrol Boats	Yes	No	—	—	—		
10.19a	Transit/Maritime Domain Command and Control	Yes	No	—	—	—		
10.20a	Unarmed Guards (Waterside)	Yes	No	—	—	—		
10.21a	Armed Guards (Waterside)	Yes	No	—	—	—		
10.22a	Law Enforcement Patrols (Waterside)							

10b. Vulnerability Rating: Physical Security Vulnerabilities (cont.)

Characteristic			Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
10.1b	Blast Threat: Internal	**10.1b.1** Number of Systems	8 or more	4 – 7	1 –3	None	—		
		10.1b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.2b	Blast Threat: External (Direct)	**10.2b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.2b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.3b	Blast Threat: External (Direct)	**10.3b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.3b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.4b	CBR Threat: Internal	**10.4b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.4b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.5b	CBR Threat: Tunnel	**10.5b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.5b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		

10b. Vulnerability Rating: Physical Security Vulnerabilities (cont.)

Characteristic			Attribute Options (a)	(b)	(c)	(d)	(e)	Red Flag	Comments
10.6b	CBR Threat: External	**10.6b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.6b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.7b	Fire Threat: Internal	**10.7b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.7b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.8b	Fire Threat: External	**10.8b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.8b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.9b	Fire Threat: Tunnel/ Track/Smoke	**10.9b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.9b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.10b	Other Threats: Flood/Flooding	**10.10b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.10b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.11b	Other Threats: Collision (Grade/ Tunnel/Elevated)	**10.11b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.11b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		
10.12b	Other Threats: Cyber	**10.12b.1** Number of Systems	5 or more	3 – 4	1 – 2	None	—		
		10.12b.2 Overall System Effectiveness	High	Effective	Minimal	Ineffective	No security		

11. Vulnerability Rating: Cyber Security

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
11.1	Effectiveness of Cyber Security Plan	High	Medium	Low	None	—		
11.2	Effectiveness of Training Programs	High	Medium	Low	None	—		
11.3	Security of Communication, Signal, and Power Systems	Secured	Medium	Low	No security	—		
11.4	Redundancy of Communication Systems	Yes	No	—	—	—		
11.5	Security of Power Supply	Secured	Medium	Low	No security	—		
11.6	Effectiveness of Wireless, Radio, or Satellite Systems During Emergencies	High (regional)	Medium (within jurisdiction)	Low (system only)	—	—		

12. Vulnerability Rating: Organizational Resilience

Characteristic		Attribute Options					Red Flag	Comments
		(a)	(b)	(c)	(d)	(e)		
12.1	Emergency Plan	Yes	No	—	—	—		
12.2	Emergency Response Exercises	Full scale	Table top	Workshop	None	—		
12.3	Effectiveness of Emergency Plans	High	Effective	Minimal	Ineffective			
12.4	Security Plan	Yes	No	—	—	—		
12.5	Security Plans Update Status	Within 12 Months	1 – 2 years	2 – 5 years	More than 5 years	None		
12.6	Transit Agency Mass Evacuation Plan	Yes	No	—	—	—		
12.7	Effectiveness of Mass Evacuation Plan	High	Effective	Minimal	Ineffective	—		
12.8	Continuity of Security	No	Yes	—	—	—		
12.9	Report/Exchange Threat Information	Frequent	Seldom/ infrequent	None	—	—		
12.10	Training Programs	Well established	Marginal	None	—	—		
12.11	Coordinated Efforts of Local/Regional First Responders	Well established	Marginal	None	—	—		

E

DHS Infrastructure Taxonomy

Infrastructure Taxonomy[1]

This appendix contains an abbreviated version of the Infrastructure Taxonomy prepared by the Department of Homeland Security. It provides a listing of facility types included as part of each of the 18 critical infrastructure categories. Selected facilities provided below focus on facility types that include buildings. This appendix can be used as a reference for tabulating the target density information provided on page 1 of the Data Collection Form).

Agriculture and Food

- Supply
- Processing/Packaging/Production
- Agriculture and Food Product Storage
- Agriculture and Food Product Transportation
- Agriculture and Food Product Distribution
  - Farm Product Wholesalers
  - Grocery and Related Product Wholesalers

1 Source: DHS, 2006, Infrastructure Taxonomy, Version 2, Risk Management Division Office of Infrastructure Protection, Department of Homeland Security, Washington, D.C.

- Food and Beverage Retailers
  - Supermarkets and Grocery Stores
- Food Service and Drinking Facilities
  - Full Service Restaurants
  - Limited Service Food Facilities
  - Drinking Establishments
    - Bars
    - Nightclubs
- Agriculture and Food Supporting Facilities
- Regulatory, Oversight, and Industry Organizations

Banking and Finance

- Banking and Credit
- Securities, Commodities, and Financial Investments
- Insurance Carriers

Chemical

- Chemical Manufacturing Plants
- Hazardous Chemical Transport
- Hazardous Chemical Storage/Stockpile/Utilization/Distribution
- Regulatory, Oversight, and Industry Organizations

Commercial Facilities

- Entertainment and Media Facilities
  - Broadcasting
    - Cable and Other Subscription Programming
    - Radio Broadcasting
    - Television Broadcasting
  - Internet Publishing
  - Motion Picture and Sound Recording Facilities
  - Print Media

- Newspaper and Periodical Publishing
- Other Print Publishing

- Gambling Facilities/Casinos (Resorts)
  - Gambling Cruises Horse and Dog Racetracks
  - Land-Based Casinos
  - Permanently-Moored Casinos
  - Riverboat Casinos
  - Other Gambling Establishments
- Lodging Facilities
  - Bed and Breakfast Inns
  - Hotels and Motels
  - Other Lodging Facilities
- Outdoor Events Facilities
  - Amusement, Theme, and Water Parks
  - Community Parks, Fairgrounds, Pavilions
  - Community Water Facilities
  - Community Special Gatherings
    - Parades
    - Special Events
- Public Assembly/Sports Leagues Facilities
  - Amphitheaters
  - Arenas
  - Convention Centers
  - Golf Courses and Country Clubs
  - Motor Racetracks
  - Movie Theaters
  - Museums, Planetariums
  - Performing Arts Centers and Auditoriums
  - Stadiums
  - Zoos, Aquariums, Botanical Gardens

- Public Assembly/Other Facilities
  - Entertainment Districts
  - Fitness and Recreational Facilities
  - Marinas
  - Skiing Facilities
  - Other Amusement and Recreational Facilities
- Real Estate Facilities
  - Office Buildings
    - Office Buildings – Stand Alone
    - Office Districts
    - Office Parks
  - Residential Units
    - Multi-Family Residences
    - Single-Family Residences
- Retail Facilities
  - Store Retailers
    - Shopping Centers and Malls
    - Shopping Districts
    - Stand-Alone Stores
  - Non-Store Retailers
- Community Organization Facilities
  - Religious Organization Facilities
  - Social Advocacy Organization Facilities
  - Civic and Social Organization Facilities
  - Political Organization Facilities
- Other Commercial Facilities
  - Weather Forecasting Services

Communications

- Wired Communications
- Wireless Communications
- Satellite Communications
- Internet
- Information Services
- Next Generation Networks
- Regulatory, Oversight, and Industry Organizations
- Other Communication Facilities

Critical Manufacturing

- Primary Metal Manufacturing
- Machinery Manufacturing
- Electrical Equipment, Appliance, and Component
- Manufacturing
- Transportation Equipment Manufacturing

Dams

- Dam Projects
- Navigation Locks
- Mine Tailings Dams
- Hurricane Barriers
- River Control Structures
- Levees
- Regulatory, Oversight, and Industry Organizations
- Other Dam Facilities

Defense Industrial Base

- Shipbuilding Industry
- Aircraft Industry

- Missile Industry
- Space Industry
- Combat Vehicle Industry
- Ammunition Industry
- Weapons Industry
- Troop Support Industry
- Information Technology Industry
- Electronics Industry
- Electrical Industry Commodities
- Electronic Industry Commodities
- Mechanical Industry Commodities
- Structural Industry Commodities

Emergency Services

- Law Enforcement
- Fire, Rescue, and Emergency Services
- Search and Rescue
- Emergency Medical Services
- Emergency Management

Energy

- Electricity
- Petroleum
- Natural Gas
- Coal
- Ethanol
- Regulatory, Oversight, and Industry Organizations

Government Facilities

- Personnel-Oriented Government Facilities
  - Personnel-Oriented Buildings and Structures

- Offices and Office Building Complexes
  - Agency Headquarters
  - Field, District and Satellite Offices
  - Legislative Chambers and Offices
  - Judicial Chambers and Offices
  - Data and Call Centers
- Housing
- Correctional Facilities
- Embassies, Consulates, and Border Facilities
- Educational Facilities
  - Pre-Kindergarten
  - Licensed Day Care Facilities
  - K-12 Schools
  - Higher Education Facilities
  - Specialized Education Facilities
- Personnel-Oriented Land

- Service-Oriented Government Facilities
  - Service-Oriented Buildings and Structures
    - Emergency Services
    - Maintenance and Repair Shops
    - Operations, Command, Dispatch, and Control Centers
    - Training Buildings
    - Libraries
  - Service-Oriented Land
- Government Research Facilities
  - Government Research and Development Buildings and Structures
    - Analysis and Assessment Research Facilities
    - Environmental Research
    - Basic Science Research

- Aerospace Research Facilities
- Military Research

- Government Research and Development Land

- Government Storage and Preservation Facilities
  - Storage and Preservation Buildings and Structures
    - Archive and Record Centers
    - Warehouses
    - Weapons and Ammunition Storage
    - Precious Metal Storage
    - Currency Storage
    - Special Nuclear Materials and Waste Storage
  - Storage and Preservation Land
- Government Sensor and Monitoring Systems
  - Global Positioning System
    - Global Positioning System (GPS) Space Segment
    - GPS Control Segment
  - Government Observation Systems
- Government Space Systems
  - Military Facilities
    - Launch Vehicles
    - Launch Facilities
    - Mission Control Facilities
    - Satellites
  - National Aeronautics and Space Administration (NASA) Facilities
    - Launch Vehicles
    - Launch Facilities
    - Mission Control Facilities
    - Satellites
  - Military Facilities

  - Army Bases
  - Navy Bases
  - Marine Corps Bases
  - Air Force Bases
  - Coast Guard Bases
  - National Guard Facilities
  - Joint and Combined Military Installations
- Reservations
- Other Government Facilities
- Other Government Buildings and Structures
- Other Government Land

Healthcare and Public Health

- Direct Patient Healthcare
- Public Health Agencies
- Healthcare Educational Facilities
- Health Supporting Facilities
- End-of-Life Facilities
- Regulatory, Oversight, and Industry Organizations

Information Technology

- Hardware Production
- Software Production
- Information Technology Services
- Internet
- Next Generation Networks
- Regulator, Oversight, and Industry Organizations

National Monuments and Icons

- National Monument/Icon Structures
- National Monument/Icon Geographic Areas

- National Monument/Icon Documents and Objects
- Other National Monuments and Icons

Nuclear Reactors, Materials and Waste

- Nuclear Power Plants
- Research, Training, and Test Reactors
- Nuclear Fuel Cycle Facilities
- Radioactive Waste Management
- Nuclear Materials Transport
- Deactivated Nuclear Facilities
- Radioactive Source Production and Distribution Facilities
- Regulatory, Oversight, and Industry Organizations
- Other Nuclear Facilities

Postal and Shipping

- U.S. Postal Service
- Couriers
- Other Postal and Shipping Facilities

Transportation Systems

- Aviation
- Railroad
- Road
- Maritime
- Mass Transit
- Pipelines
- Regulatory, Oversight and Industry Organizations

Water

- Raw Water Supply
- Raw Water Transmission

- Raw Water Storage
- Water Treatment Facilities
- Treated (Finished) Water Storage
- Treated Water Distribution Systems
- Treated Water Monitoring Systems
- Treated Water Distribution Control Centers
- Wastewater Facilities
- Regulatory, Oversight, and Industry Organizations