UNITED STATES MILITARY ACADEMY
West Point, NY

A SOLDIER'S GUIDE FOR

INFRASTRUCTURE INFORMATION & DATA COLLECTION

(I2DC)

15 June 2005

This document was prepared by the USMA Infrastructure Assessment Team

Dacunto, P. MAJ	G&EnE	Klosky, L. DR	CME
Doyle, B. CPT	G&EnE	Lindberg TJ CPT	SE
Epolito, W. MAJ	G&EnE	Manous, J. COL	G&EnE
Fleming, S. LTC	G&EnE	Trainor, T. LTC	SE
Guerrie, M. MAJ	G&EnE	Welch, R. COL	CME
Jordano, J. MAJ	G&EnE		

Direct inquires concerning this document to the following.

COL Joe Manous
Department of Geography & Environmental Engineering
745 Brewerton Road
United States Military Academy
West Point, NY 10996
(845) 938-2930
Joe.Manous@us.army.mil

Table of Contents

Purpose 1
Infrastructure Categories 1
Prioritization 2
Assessment 2
Data Collection 3
Sanitation (WW) (Wastewater Treatment) 5
Wastewater Treatment Datasheet 7
Water Supply (WS) 13
Water Supply Data Sheet 15
Energy (EN) 19
Trash (SW) (Solid and Hazardous Waste Disposal) 23
Solid & Hazardous Waste Datasheet 25
Transportation 33
Telecommunications 35
Agriculture 37
Building and Structures 39
Building & Structure Datasheet 40
Chemical Industry and Hazardous Materials (HAZMAT) 45
Cultural or Historical 47
Public Health and Safety 49

INFRASTRUCTURE INFORMATION & DATA COLLECTION (I^2DC)

Purpose

This document provides a basic understanding of the major infrastructure components involved with recovery and sustainability operations. It is intended for use as a "stand alone" instrument by individuals not trained in engineering or recovery operations. Through an awareness of "infrastructure", based on use of this document, any individual in an area of operations becomes a potential reconnaissance asset.

The value of infrastructure reconnaissance is not only the identification of a problem, but providing the relevant information necessary for planning and reconstruction by those skilled in an appropriate specialty. In addition to information gathering, a basic understanding of how infrastructure operates and the associated difficulties in repair can guide tactical operations and operational decision making so as to minimize the resources (time, people, funds) required to reestablish "normalcy" upon the conclusion of hostilities.

This document provides an "initial" data collection standard corresponding to an individual with little experience with the design and function of infrastructure. Consequently, the recipient of the collected infrastructure data (brigade or higher headquarters) should possess a basic level of infrastructure understanding to efficiently prioritize, request, and interpret data collected. A "detailed" data collection guide is distributed separately (TBP).

Infrastructure Categories

Infrastructure includes all "real property" (i.e., buildings, roads, facilities, etc) constructed to support a society. Infrastructure spans the spectrum of those structures and services that enhance a life style to those that make survival possible. Within this spectrum, infrastructure can be subdivided into the following unprioritized categories.

- **S**anitation (WW) (Wastewater Treatment)
- **W**ater Supply (WS)
- **E**nergy (EN) (electrical power production, bulk fuel storage and distribution)
- **T**rash (SW) (Solid and Hazardous Waste Disposal)
- **T**ransportation (TR) (highways, railroads, airports, waterways)
- **T**elecommunications and Media (TM) (cellular service, telephone service, commercial radio, television)
- Agriculture (AF) (farmland, irrigation systems, distribution systems)
- Buildings and Structures (BS) (political offices, records facilities, financial institutions, academic buildings, police stations, industry complexes, public housing)
- Chemical Industry and HAZMAT (HA)

- Cultural or Historical (CH) (places of worship, locations of historical or cultural significance)
- Public Health and Safety (PH) (hospitals, clinics, firefighting)

Prioritization

Resources to deal with infrastructure issues are always in short supply. Whether the issue is time and people to conduct a reconnaissance or funding for materials to restore a facility, prioritization of effort is necessary. Final prioritization is always governed by the specifics of a given situation, but in the absence of detailed analyses, the following prioritized general criteria can be applied.

1. Effort – The amount of expertise required to repair or replace a facility or operation; or the availability and transportation required for repair or replacement of specialty equipment.
2. Health and Safety – The magnitude of impact a task has on the health and safety of a population.
3. Cost – The monetary cost to repair or replace a particular type of facility or operation.
4. Local Perception – Perceived importance by the local population.
5. Self-governance – The level of impact that the loss of function by a facility or operation has on the continued or resumption of self-governance (e.g., municipal facilities, medical facilities, police stations, media centers, etc) in an area.
6. Interdependence – The interdependence of this item with the completion of other tasks, subcategories, or categories of infrastructure activities.

The application of these criteria within the infrastructure categories presented yields the following prioritized list of infrastructure components. The acronym LSC refers to the specific action(s) required, where L is locate, S is secure, and C is collect data.

1. Bridges or tunnels with no bypass (L,S,C)
2. Electrical Power Generation (L,S,C
3. Potable water supply (L,C)
4. Religious Centers (L)
5. Trash Removal (C)
6. Airports/Airfields/Heliports (L,S,C)
7. Sewage treatment (L,C)

Assessment

The process of assessing the condition, adequacy, and repair requirements for infrastructure is complicated and requires technical expertise and experience. The use of the following infrastructure descriptions and checklists do not provide these perquisites.

This document does provide a guideline for data collection that can facilitate a technical evaluation of an infrastructure's condition and adequacy. However, the final determination of

infrastructure condition and suitability in not only technical, but also political, social, and economic in nature. This document does not address these additional non-technical considerations and as such cannot be a sole reference for determining infrastructure classification (e.g., red, amber, or green classification). By its nature, an infrastructure assessment is a multi-disciplinary activity that requires input from various military staff sections and other US governmental organizations with a final decision determined by the unit commander.

Data Collection

Collection of information on infrastructure is challenging without a thorough understanding of how or why a particular structure or facility functions. As an example, a paved road may appear to be in good condition, but the surface appearance provides little information concerning the road's performance if traveled by numerous large convoys. As stated previously, this document serves as a guide for gathering pertinent information that can facilitate the repair and recovery of key infrastructure.

Each infrastructure item investigated should include the following CCIR.

- Location (grid coordinates, proximity to other structures; site conditions such as location close to a river, etc)
- Size (power produced, people housed, etc)
- Supporting Facilities (electrical power, water required, etc)
- Quantity (number of similar components such as buildings)
- Method of Operation (steel or concrete bridges, chlorinated or ozonated disinfection of drinking water, etc)
- Size of Population Supported (total number of people and percent of total population)
- Current State of Operation (currently operable; when the facility was last fully functioning, where are the operators, etc)

The interpretation of these CCIR vary significantly (e.g., public housing versus electrical power generation facilities), but the requirements for the information is consistent. In many cases, there can be several technical methods of achieving a desired output (e.g., using a gas turbine versus using steam to produce electrical power) with each method having a very different appearance. Therefore, sample sketches or photographs can be misleading. As a guide to data collection, infrastructure specific descriptions of operations and data collection requirements are included for each of the infrastructure categories.

The most difficult item in infrastructure data collection is Method of Operation as this topic requires the most knowledge of infrastructure function. The field collection of photographs and sketches can be of extraordinary assistance in interpretation of data collection results. To be useful, photographs must always include a scale such as a ruler (small pictures) or a large stick or sign (large pictures) with dimensions clearly visible in the photograph. The use of data plates and statements by facility operators can also be of enormous value.

The goal at the end of the data collection is to describe accurately:

1) the level of service intended by the facility,

2) a description of the method or technique used to provide that service,
3) how well the service is currently being provided, and
4) if poor (or no) service is being provided, what specifically is the cause.

Sanitation (WW) (Wastewater Treatment)

Purpose

Wastewater treatment provides two primary functions:

1) Prevent the spread of pathogenic diseases such as cholera, hepatitis, typhoid, etc., which are spread from sewage through direct human contact, contamination of drinking water, or contamination of food supplies (e.g., irrigation or washing).

2) Prevent the degradation of natural water supplies that provide water for drinking, irrigation, commercial, and industrial uses.

Background

Waste material produced by living organisms contains high concentrations of organic material and serves as a host for bacteria and viruses, which can cause human illness. This organic material is food (substrate) for a variety of microscopic organisms and will remain a viable host for these organisms until completely consumed. In addition to organic material, the bacteria require oxygen to grow and will consume all of the oxygen in a water body if the waste material is of sufficient concentration to permit high bacterial growth. This oxygen depletion will kill all other aquatic life and create an even greater amount organic waste for disposal.

Rivers, lakes, and groundwater (aquifers) have a natural "cleaning" capacity and with sufficient time will allow bacteria to consume organic wastes making the water safe. The length of time to achieve this cleansing varies with amount of waste present and ability of oxygen to diffuse from the atmosphere into the water.

Wastewater treatment replicates this natural cleansing process through the containment of water-saturated waste and the infusion of oxygen to accelerate the bacterial consumption of organic material before the water is released to surface waters.

Function

A wastewater treatment facility consists of a collection system (sewage pipes and pumps), physical separators that remove large objects, settling tanks that allow small objects to settle and floating oils to be removed, and some method of aeration to enhance bacterial growth that will facilitate the consumption of waste. There are several and varied methods of aeration with some dripping water over bacteria covered stones while others pump air into a bacteria filled tank. A common element is a requirement for electricity to accomplish aeration and to pump the water through the treatment processes.

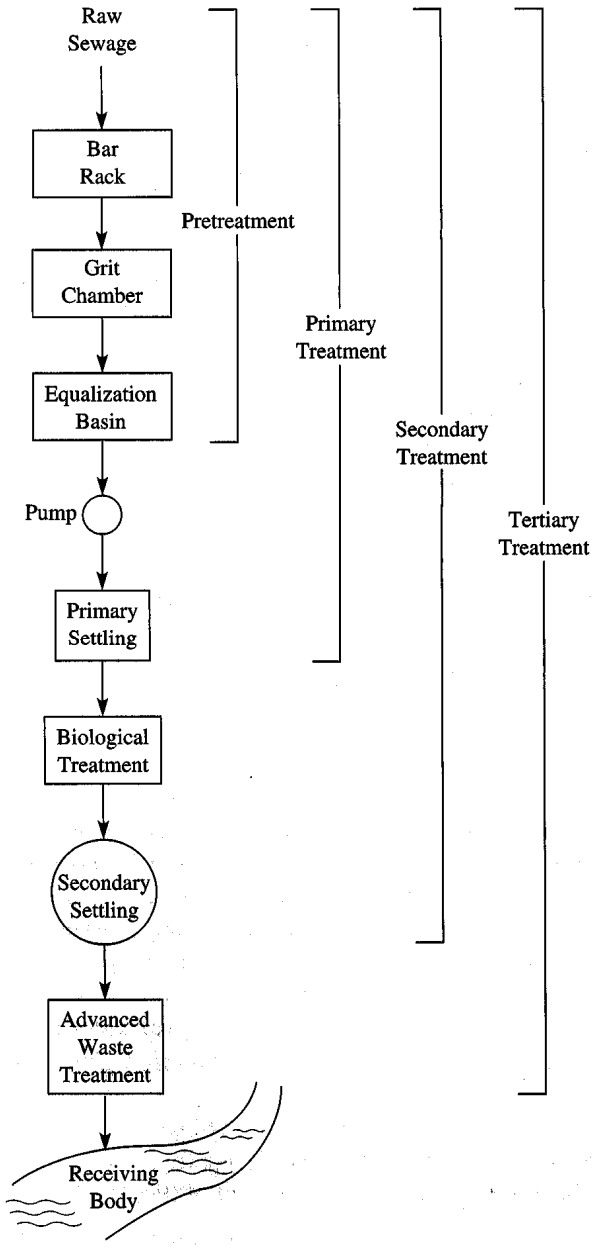
CCIR

1) Identify the location(s) of wastewater treatment facilities. These are normally found on low ground (water movement by the force of gravity).
2) Identify the population and neighborhoods with sewage pipes providing flow to the plant. Locate pumps, pumping stations, and major conduits required for this operation.
3) Determine the operational status of any pumps within the plant (present and/or operational).
4) Determine the status of the electrical supply to the facility.
5) Identify the last time the facility was functional.

6) Take pictures of the facility, pumps, basins, aeration structure, and electrical distribution system. Be sure to include an object in each picture that can be used to identify and scale the size of the object being photographed.

A generalized wastewater, treatment plant diagram follows to facilitate context and identification of components.

Figure: Davis & Cornwell. Introduction to Environmental Engineering, 3ed, 1998, p. 362.



Pre treatment protects the plant from mechanical abrasion and clogging. This enhances the plant's treatment efficiency and mechanical longevity.

Primary treatment removes material that floats or settles via gravity.

Secondary treatment (sometimes found in developing countries) uses aerobic (oxygen breathing) bacteria to remove dissolved or soluble material.

Advanced or tertiary treatments (rarely found in developing countries) are additional processes used to rid the water of a particular contaminant of interest that may have escaped previous treatment processes.

Wastewater Treatment Datasheet

Supplies Required:

1. 120 foot rope marked in one-foot increments.
2. Digital camera
3. Notebook
4. Pen/pencil/eraser
5. This data sheet

1. Facility Identification

a) Facility Name	
b) Location (grid coordinate)	
c) Names and contact information of personnel familiar with the facility	
d) What is the size and type of population being served?	
e) When was the last time this facility functioned (date)?	
f) Draw a sketch of the arrangement of the facility. Include dimensions and draw to scale is possible.	

2. Extent of damage

a) Is the facility operational?	Yes ____ No ____
b) Sections Destroyed or Missing	
c) Sections present, but inoperable and why	

3. Electricity

a) Does the facility have electrical power?	Yes ____ No ____
b) If there is no electrical power, when was the last time electrical power was available?	
c) What is (or supposed to be) the source of electrical power?	

4. Incoming flows (m^3/day).

a) What is the capacity of the facility (m^3/day)?	
b) What is the approximate amount of sewage reaching the facility each day (m^3/day)?	
c) What is the approximate distribution of sewage reaching the plant? • Residential sewage (m^3/d) • Industrial discharge (m^3/d) • Storm water, river water, or other water flows (m^3/d)	

5. Sewers

a) Are the sewers <u>that do provide flow</u> to the facility functioning?	Yes ____ No ____
b) If the sewers do not function, explain the problem	

5. Facility Description

Does this facility have any of the following components?

a) Lagoons or other large storage ponds If yes, • How many? • What are the approximate length, width, and depth of each?	Yes ____ No ____

b) Equalization basin to regulate flow into the facility If yes, • How many? • What are the approximate length, width, and depth of each?	Yes ____ No ____
c) Bar racks or other structures to keep large solids out of the facility If yes, • How many? • What are the approximate length and width of each?	Yes ____ No ____
d) Grit chambers or sedimentation basins that allow sand, glass, and other large grit to settle before entering the facility If yes, • How many? • What are the approximate length, width, and depth of each?	Yes ____ No ____
e) Comminutors or large grinders that grind bone, wood, and other debris very fine If yes, • How many? • Who is the manufacturer and what is the model number?	Yes ____ No ____
f) Sedimentation and flotation basins (primary treatment) that removes very small particles from the bottom and skims oil, grease, and soap from the top If yes, • How many? • What are the approximate length, width, and depth of each?	Yes ____ No ____

g) Biological growth (activated sludge) inside large tanks (secondary treatment) that removes dissolved sewage material through consumption by bacteria. Always requires air to be forced into the tank. If yes, • How many tanks are there? • Describe the smell associated (actually a good clue as to how well the tank works) • What is the approximate length, width, and depth of each? • How many air pumps are required for the facility? • What is the manufacturer and model of air pump? • How many water pumps for sewage are required for the facility and where are they located within the facility? • What is the manufacturer and model of the water pumps?	Yes ____ No ____
h) Biological growth (trickling filter) on rocks or plastic media using sewage sprayed on the rocks (also secondary treatment) that removes dissolved sewage material through consumption by bacteria. Air is provided by normal airflow between the filter media (e.g., rocks). If yes, • How many trickling filters are there? • Describe the smell associated (actually a good clue as to how well the tank works) • What is the approximate length, width, and depth of each? • How many water pumps for sewage are required for the facility and where are they located within the facility? • What is the manufacturer and model of the water pumps?	Yes ____ No ____

6. Effluent

a) Does the facility monitor the quality of effluent If yes, • What types of measurements conducted? • What method(s) are used for the measurements? • How often are measurements conducted and who conducts the measurements?	Yes ____ No ____
b) What is the downstream distance (km) for users of this water for: • Drinking Water • Bathing and Laundry • Irrigation • Aquatic food source (i.e., fishing) • Recreation	

7. Solids Disposal

- How are the waste solids from the plant disposed?	
• Dumped in a pile	Yes ____ No ____
• Buried in a landfill	Yes ____ No ____
• Used as fertilizer	Yes ____ No ____
• Other	

Water Supply (WS)

Purpose

Water supply provides water at adequate pressure for use in residential or industrial applications. These purposes primarily include drinking, bathing, irrigation, cooling, and fighting fires. Water that will come in close contact with people through drinking or washing food must also be treated so that it is "potable", i.e. free of disease-causing organisms known as "pathogens" (e.g., bacteria or viruses that cause diseases such as cholera, hepatitis, etc) or debris, which may support the growth and survival of such organisms.

Background

Both groundwater (water obtained from wells) and surface water (from lakes and streams) can become contaminated by waste material from humans and animals. This waste material provides high concentrations of organic materials that can serve as a host for bacteria and viruses. These bacteria and viruses will cause humans to become sick if ingested. While this "non-potable" water can be used for some purposes (firefighting, irrigation, etc.); water that humans will ingest or come in close contact requires treatment. This treatment, which occurs in a "water treatment plant," kills pathogens and removes organic and inorganic material from the water that might provide a host for the continued growth of pathogens.

Water for irrigation and industrial purposes (cooling, etc.) is usually untreated, but normally all water used within a municipality (fire flows included) comes from water treatment plants to prevent a requirement for separate water distribution systems. Water in distribution systems often must be stored in large tanks or towers to provide a pressurized, ready supply of water during peak demand and to store treated water when demand is low.

While conventional water treatment is effective in removing pathogens and organic material, it will not effectively clean water contaminated by heavy metals, petroleum products, solvents, pesticides, or other contaminants such as many produced from industrial processes. Treatment of this water requires advanced and specialized procedures to make safe, which are beyond the scope of this data collection effort.

Function

Water supply systems must collect water from some source, treat it as required, and then distribute it through water mains (large pipes), storage tanks, and finally service connections (small pipes) for individual users.

A water treatment facility must be linked to a water source through gravity flow or pumping stations. The plant uses pretreatment to separate large objects and debris, and then flocculation (chemical process that causes small particles to stick together), and settling tanks to bring small debris in the water together and settle them out. Water should then be filtered to remove small, potentially harmful debris. Finally, disinfection (often with chlorine) ensures remaining pathogens (viruses, bacteria, etc.) are killed before the water is sent to the distribution system. The distributed water should contain some sort of residual (low concentration) disinfectant to kill any new pathogens that might enter the water supply.

The US military uses a physical separation process called reverse-osmosis (RO) for its portable water treatment operations. This method is very effective and can even desalinate (i.e., remove salt) from seawater, which is not possible using traditional water treatment facilities.

However, these plants are technically complicated, expensive, and require significant energy supplies to operate. For these reasons, RO is not used commonly used for municipal water treatment except for situations where electrical energy is readily available, seawater is the only water source, and sufficient funding is available.

CCIR

1) Identify the location(s) of water treatment facilities. These must have access to a water source.
2) Identify the status of the water storage and distribution system. Are the water towers intact? Do fire hydrants and taps function?
3) Find out the status of any pumps within the plant (present and/or operational).
4) Determine the status of the electrical supply to the facility.
5) Identify the last time the facility was functional.
6) Take pictures of the overall facility, pumps, settling basins, and electrical distribution system. Be sure to include an object in each picture that can be used to scale the size of the object being photographed.

Water Supply Data Sheet

Supplies required:

1. Digital camera
2. Notebook
3. Pen or pencil
4. This data sheet

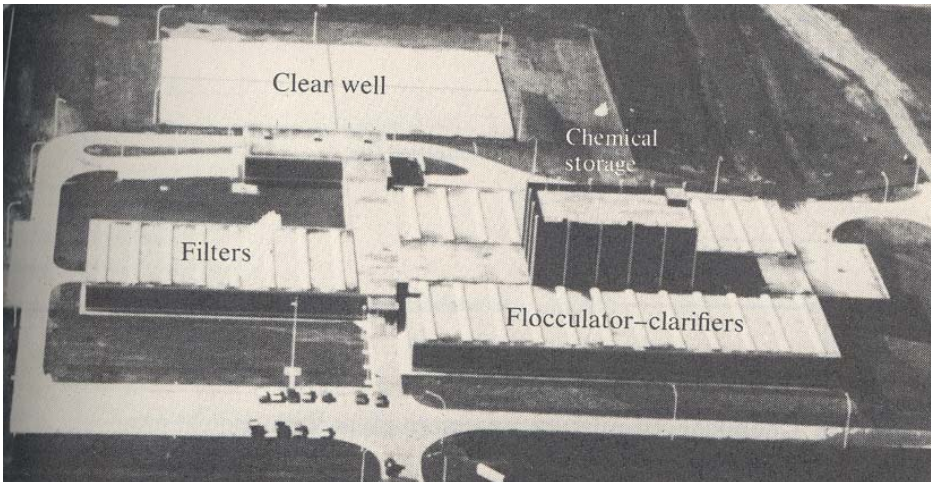
If you do not know or cannot determine the answer to a question, leave it blank or give an explanation of why you cannot determine the answer.

1. Identify status of the water storage and distribution system

Does this facility have any of the following components?

a) Are the water towers intact? List the grid coordinates of water towers or water storage tanks.	Yes ____ No ____ • • • •
b) Do fire hydrants and taps function? List any common reasons for nonfunctioning taps and hydrants.	Yes ____ No ____ • • • •
c) Where fire hydrants and taps do function, does the water look or smell bad? List any common reasons for nonfunctioning taps and hydrants.	Looks bad: Yes ____ No ____ Smells bad: Yes ____ No ____
d) Look for pumping stations within the distribution system, which will be housed in small buildings and have electricity supplied. Water mains from the distribution system will flow through the small building containing the pumps. • Are the pumps operational? • Does the facility have electricity? • Take a picture of the pumps, including a rifle/person for scale. • Take a picture of the pump data plates, if any are visible	Yes ____ No ____ Yes ____ No ____

2. Locate facility



Aerial view of a water treatment plant. From *Water Supply and Pollution Control* by Warren Viessman and Mark Hammer. 5th Edition. New York: HarperCollins, 1993. Figure 9.12.

a) Facility Name	
b) Identify the location of the water treatment facility. It must have access to a water source and will have large basins and tanks. (See photo above of typical plant). • Grid coordinates • City or region in which plant is located • Draw a sketch of the arrangement of the facility. Include dimensions and draw to scale is possible.	
c) Names and contact information of personnel familiar with the facility	
d) What is the size and type of population being served?	
e) When was the plant last operational?	
f) Consolidate any papers, plans, or data sheets found as you move through the plant in a secure location. Where is the location of critical data?	
g) Does the facility have electrical power?	Yes ____ No ____

h) If there is no electrical power, when was the last time electrical power was available?	
i) What is (or supposed to be) the source of electrical power?	
j) Take pictures of the water tanks, buildings and other equipment in the plant. Always include a rifle or a person for scale.	
k) List any apparent damage to the plant, and take a picture of the damage. Always include a rifle or a person for scale.	• • •

Energy (EN)

Purpose

Energy includes all power sources required for an industrialized or information technology society to function or for developing countries to become industrialized or IT based.

Background

There are varieties of energy sources, but the function of energy can be divided into heat production for warmth and food preparation, electricity for light, heating or cooling, and industrial production, and internal combustion for either industrial purposes or vehicle operation.

Currently, the largest sources of energy are fossil fuels in the form of oil or coal. Both can be used to produce heat for warmth, cooking, and electricity generation. Refined oil (gasoline, diesel, JP8), however, is the predominate fuel for ground, marine, and air vehicle operation with few viable alternatives available in the near future. Natural gas, which is retrieved from the Earth is being developed around the world as a supplement for coal and oil, but requires a specific infrastructure to deliver and handle safely.

The other major energy sources, hydropower, and nuclear energy, are used almost exclusively to produce electricity. Nuclear power is widely used in Europe, but is a cautious option for developing countries. Hydropower is effective, but requires a specific type of topography and significant capital investment (and time) to develop.

Finally, combustible organic materials such as wood and dung continue to be used in developing countries for individual or family heating and cooking, but have little industrial application. Similarly, waste-to-energy plants (incineration of municipal waste to produce electricity) or methane production from sewage or other organic wastes are viable energy production methods, but require some technical expertise and are not normally found in developing countries.

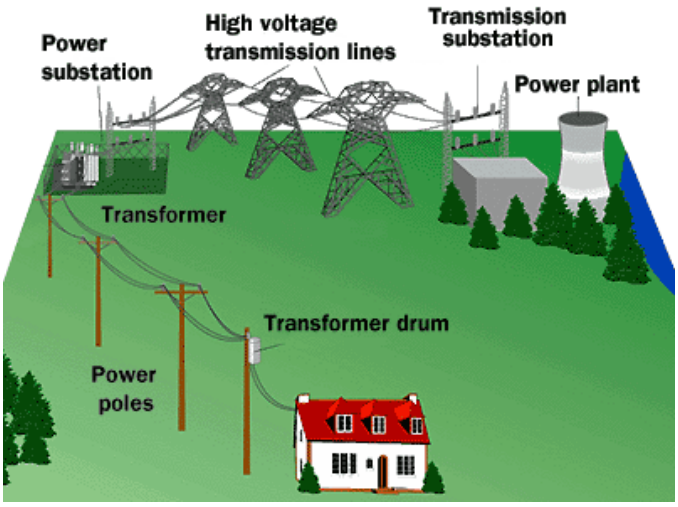
Function

Energy provides heat for warmth and food preparation, electricity for light, heating or cooling, and industrial production, and internal combustion for either industrial purposes or vehicle operation.

Electrical power consists of a Power Grid composed of three parts: Generation, Transmission, and Distribution. Almost all large, power plant generation (except hydropower) uses steam to turn a turbine, which is connected to an electrical generator. Steam is produced from water heated by burning coal, oil, natural gas, or using heat released from a fusion nuclear reaction. Hydropower produces electricity by using the force of water (instead of steam) to turn a generator. Another relatively common form of large electrical generation is a gas turbine, which uses natural gas to power a gas turbine engine that turns a generator. For all types of large-scale electrical generation, except a gas turbine, a large and constant supply of water is required. The resulting electricity is usually 3-phase Alternating Current (AC), which will require transforming before transmission and use.

The purpose of Transmission is to move electricity from the point of generation to the point of use. Unfortunately, there are few practical methods of storing large amounts of electricity (i.e., battery), so generation is targeted to meet peak demand with excess electricity

grounded (wasted) into the earth. AC current traveling over long distances will loose voltage due to resistance to its movement caused by the transmission wires. To compensate for this electrical loss, electrical substations increase the electrical voltage from thousands to hundreds of thousand of volts. A typical transmission voltage range is 155,000 to 765,000 volts, with a maximum transmission distance of 300 miles.



After passing through the transmission lines, the power enters the distribution grid through a power substation where the voltage is stepped back to less than 10,000 volts and distributed in multiple directions. The substation contains circuit breakers and switches to allow disconnections and repairs. From the power station, the electricity (typically 400 to 500 volts) runs through a multipoint connection point, or BUS, to individual distribution lines, which transfer the electricity to the end users? At the point of usage, the electricity is often "stepped down" to an even lower voltage for end users. In the US, end-user electricity is 110 volts at 60 cycles (hertz) per-second, while in Europe (and Iraq) electricity is provided at 220 volts at 50 cycles (hertz) per-second

<u>CCIR</u> (Data Collection Checklist)

1) Locate and identify the size, type (i.e., coal, oil, nuclear, hydropower, etc), owner, and status of all large electrical generation facilities in the area.
2) Locate and describe the general condition of any local electrical power connection to an external power grid.
3) Determine the approximate percentage of population with individual electrical generators.
4) Locate and identify the number, sizes, and owners of liquid fuel (e.g., gasoline, diesel, heating oil, etc) storage, distribution, and dispensing facilities.
5) Locate any bulk fuel or natural gas pipelines located in the area.
6) Using local fuel dispensing records, develop an estimate for the bulk fuel demand for the area.

Energy Systems and System Specific CCIR

1) Electrical Generation (L,C)
    a. Location, types (e.g., coal, oil, natural gas, etc), and general condition of electrical generation facilities
    b. Location, type, capacity of electrical substations
    c. Location and condition of transmission line systems
2) Liquid Fuels (L,C) (gasoline, diesel, heating oil, aviation fuel)
    a. Location, number, sizes, and general condition of liquid fuel storage facilities
    b. Location, number, sizes, owners, and general condition of liquid fuel distribution facilities
    c. Location, number, and general condition of liquid fuel dispensing facilities
    d. Major sources of liquid fuels to the region
    e. Routes for movement of liquid fuels into and away from the area.
    f. Names of liquid fuel transportation, storage, distribution operators
3) Gas Fuels (L,C) (natural gas, propane)
    a. Location, number, sizes, and general condition of gas fuel storage facilities
    b. Location, number, sizes, owners, and general condition of gas fuel distribution facilities
    c. Location, number, and general condition of gas dispensing facilities
    d. Major sources of gas fuels to the region
    e. Routes for movement of liquid fuels into and away from the area.
    f. Names of liquid fuel transportation, storage, distribution operators

Trash (SW) (Solid and Hazardous Waste Disposal)

Purpose

Solid and hazardous waste must be managed to maintain host country functionality and ensure public health and safety. The proper management of solid and hazardous waste:

1) Prevents the spread of diseases resulting from pathogens spread to humans via direct contact, contamination of drinking water, or contamination of food supplies
2) Reduces human exposure to hazardous materials by storing such materials in a safe, isolated location or transforming contaminants to innocuous compounds via a host of remediation technologies

Background

Solid waste is any non-liquid, non-soluble material ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes also include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Municipal solid waste (more commonly known as trash or garbage) consists of everyday items such as product packaging, yard clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. "Hazardous waste" is a subset of "solid waste." Hazardous waste is any by-product of society that can pose a substantial hazard to human health or the environment when improperly managed. It possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity).

When solid and hazardous waste is improperly managed, it is very likely that contaminants will move into surface and ground waters and complicate a number of different infrastructure components.

"Developing countries have a number of special characteristics that may make improper solid and hazardous waste management a more serious problem than comparable practices in more developed countries:

- Lack of infrastructure that might ameliorate some of the risks of poor practices (e.g., proper treatment of drinking water);
- Lack of education in environmental risks;
- Unique subpopulations at special risk (e.g., scavengers who make their living sorting through refuse); and
- Inadequate health care systems." (LaGrega et al., 86)

Function

Solid and hazardous waste must first be collected and transported to a treatment facility. A critical component is moving the waste material away from the living areas. In developing countries, the most likely technologies will include landfilling and burning. Open dumps are easy to build/operate but do little to protect the population and environment from contaminant exposure. Engineered landfills, while basic in concept, are more difficult to construct and operate – especially with respect to leachate (contaminated water runoff) and gas collection/treatment. Burning is a common means of reducing the volume of solid waste

requiring disposal. However, burning may not eliminate all risks posed by pathogens and will contribute to the contamination of groundwater and surface water supplies and air pollution. Incineration technologies, however, are designed to minimize residual pollution by combusting wastes at temperatures in excess of 800 degrees Celsius (1500 degrees Fahrenheit). This high temperature combustion will mineralize (convert waste into elemental compounds) while killing all pathogens within the waste. Incineration does require special equipment, an energy source, substantial costs, and specialized operator skills to implement.

Incineration is especially effective in dealing with chemical and industrial wastes that pose significant toxic or infectious properties.

CCIR

1) Identify the location(s) and status of any operational landfills (dumps).
2) Identify the status and security of any collection organization (trucks, etc.).
3) Find out the status of any incinerators (present and/or operational).
4) Identify any significant contamination sites.
5) Take pictures of the overall facilities, and subsystems. Be sure to include an object in each picture that can be used to scale the size of the object being photographed.

Solid & Hazardous Waste Datasheet

Supplies required:

1. Digital camera
2. Notebook
3. Pen or pencil
4. This data sheet

If you do not know or cannot determine the answer to a question, leave it blank or give an explanation of why you cannot determine the answer.

1. Identify status of solid waste collection

a) Is solid waste collected on a regular schedule? • What is the frequency of collection? • What is the name of the organization that collects the waste? • How is the solid waste collected (e.g., garbage trucks, open trucks, etc)? • Where are the collection points?	Yes ____ No ____
b) Approximately how much solid waste (tons) is produced per week by the town, city sector, etc.?	
c) What is the volume of solid waste backlog (tons) within the town, city sector, etc.?	

2. Open Dumps

a) Are there any open dumps in sector?
• Where are the open dumps located (grid coordinates and relative location to nearest population center)
• What routes are used to access the open dumps?
• Approximate surface area currently used (Take Picture)
  o Length (m)
  o Width (m)
• Approximate surface area available for future use (Take Picture)
  o Length (m)
  o Width (m)
• Is the waste in the landfill covered with earth at the end of each day?
• How many people scavenge through the waste material each day?
	Yes ____ No ____
	
	Yes ____ No ____

b) Nearby water sources (Take Pictures)
• Type of water body: flowing stream, dry streambed, flowing river, dry riverbed, pond, lake
  o Distance to water body (m)
• Location of water wells in the vicinity
  o Use of water wells (drinking, industrial, irrigation, etc)	

c) What is the distance (km) from the dump to the nearest airfield, airport, or heliport? • Is the dump located in an airfield, airport, or heliport flight pattern? • If yes, which airfield, airport, or heliport?	Yes ____ No ____

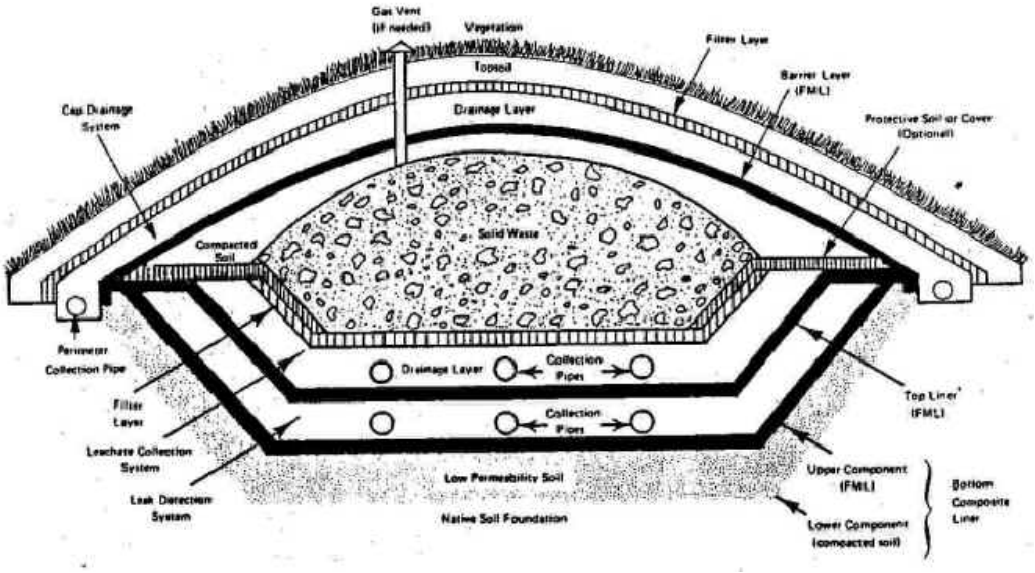
3. Engineered Landfills

a) Are there any operating landfills in sector?	Yes ____ No ____
• Where are the landfills located (grid coordinates and relative location to nearest population center)	
• What routes are used to access the landfills?	
• Approximate surface area currently used (Take Picture) o Length (m) o Width (m)	
• Approximate surface area available for future use (Take Picture) o Length (m) o Width (m)	
• Is the waste in the landfill covered with earth at the end of each day?	Yes ____ No ____
• How many people scavenge through the waste material each day?	
• Who is the operator of the landfill, and what is their contact information?	
• Who delivers waste to the landfill?	
• Is there a fee for using the landfill and, if so, what is the fee?	

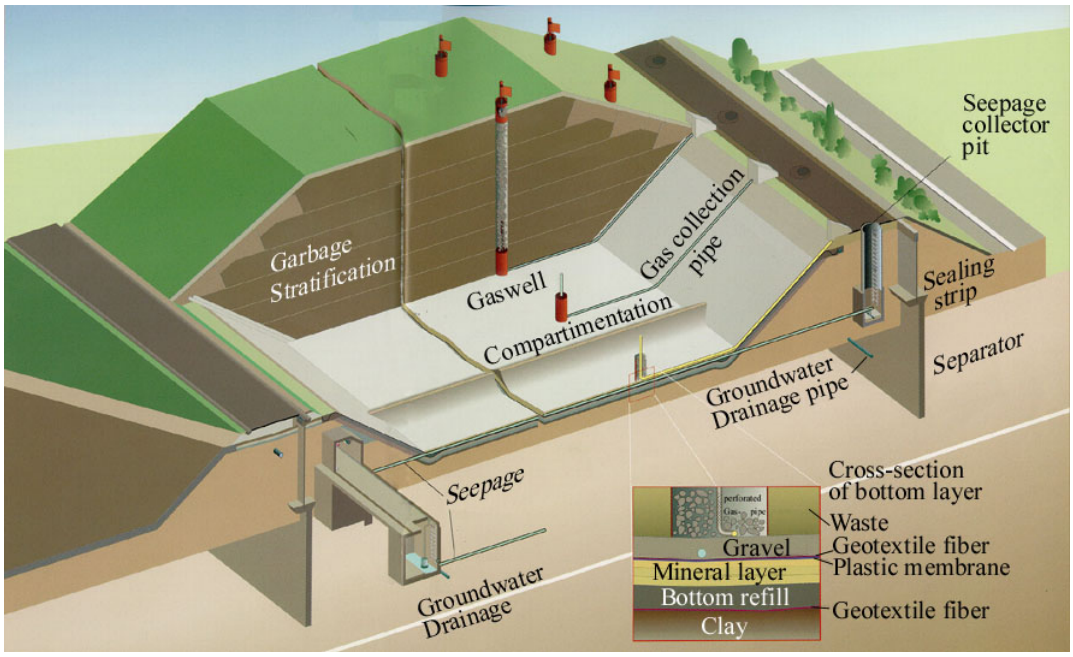
b) Nearby water sources (Take Pictures)
• Type of water body: flowing stream, dry streambed, flowing river, dry riverbed, pond, lake
  o Distance to water body (m)
  o Uses of water body (drinking, industrial, irrigation, etc)
  o
• Provide the location of water wells in the vicinity using grid coordinates and a sketch map.
  o Use of water wells (drinking, industrial, irrigation, etc)
  o
• Does the landfill have groundwater monitoring wells?
  o If yes, where are they located?
• Does the operator test the monitoring wells or nearby surface waters for contamination?
  o If yes, what tests are conducted?
	Yes ____ No ____
	
	Yes ____ No ____

c) What is the distance (km) from the landfill to the nearest airfield, airport, or heliport? • Is the dump located in an airfield, airport, or heliport flight pattern? • If yes, which airfield, airport, or heliport?	Yes ____ No ____

Engineered Landfill - (**SOURCE:** Environmental Research Foundation, P.O. Box 5036, Annapolis, MD 21403, Fax (410) 263-8944; Internet: erf@rachel.org, Phone: (410) 263-1584; Fax: (410) 263-8944, Web site: http://www.rachel.org)



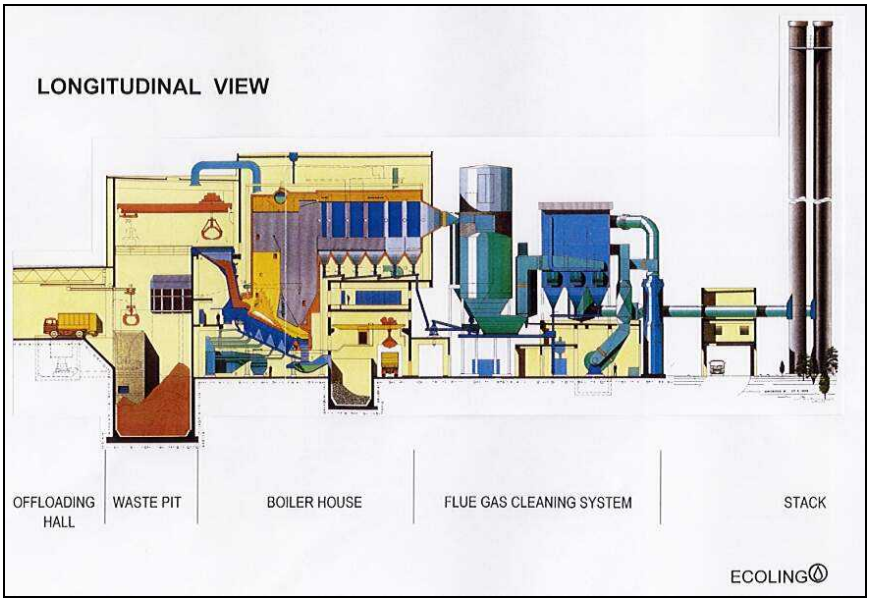
(**SOURCE :** http://www.sbg.ac.at/ipk/avstudio/pierofun/waste/landfill/step-2.jpg)



4**. Incinerators**

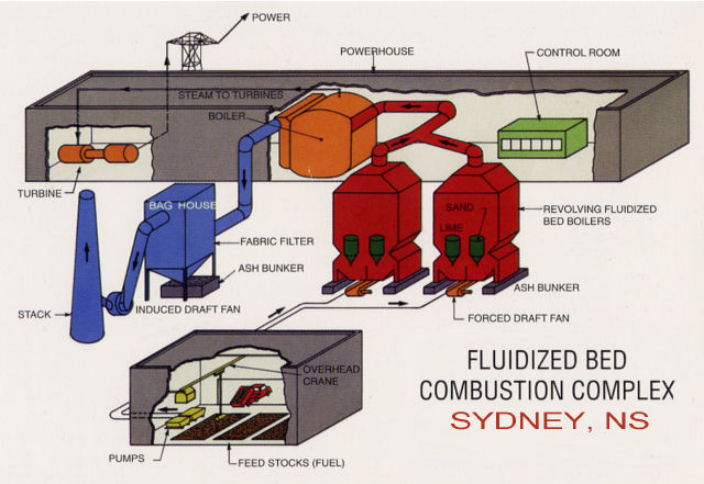
a) Are there any operating incinerators in sector? (Take pictures) • Where are the incinerators located (grid coordinates and relative location to nearest population center) • What routes are used to access the incinerators? • Who delivers waste to the incinerators? • Is there a fee for using the incinerators and, if so, what is the fee?	Yes ____ No ____
b) What is the type of incinerator? Grate, Hearth, Fluidized Bed, etc? • Who constructed the incinerator? • Who is the operator of the incinerators, and what is their contact information? • What was the original design purpose for the incinerator (municipal waste, chemical wastes, demilitarization of wastes, etc)	
b) What type materials have been incinerated in this facility	
c) What population centers or agricultural areas are within 20 km downwind of this facility?	

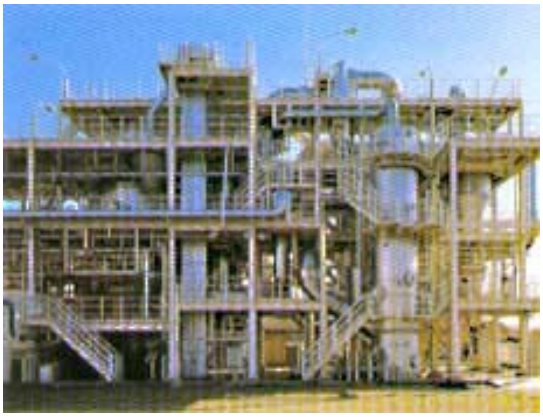
Grate-Type Incinerator (**SOURCE:** http://www.ecoling.ch/imag_prospects/longitudinal.jpg)



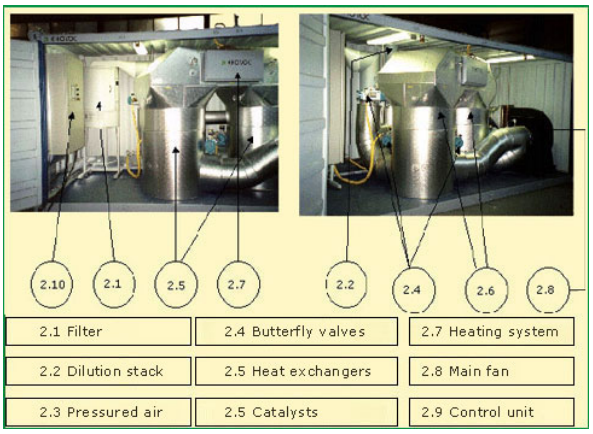
Hearth-Type Incinerator (**SOURCE:** http://www.iwi-systems.com/images/DR1200XL-A.JPG)

Fluidized Bed Incinerator (**SOURCE:** http://**www.safecleanup.com/ incinrat/fbc.htm**)
(**SOURCE:** http:// **www.tsk-g.co.jp/ en/tech/env/env6-1.html**)

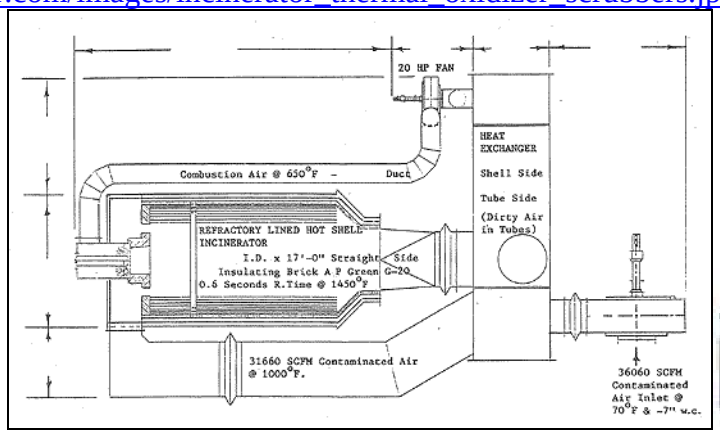




Catalytic VOC Incinerator (**SOURCE:** http://www.ehovoc.fi/englanti/kuvat/refep.jpg



Thermal VOC Incinerator (**SOURCE:** http://www.endersprocess.com/images/incinerators-thermal.gif) (**SOURCE:** http://www.tri-mer.com/images/incinerator_thermal_oxidizer_scrubbers.jpg)



Transportation

Purpose

Transportation networks support the movement of people and material. Transportation facilities are the basic requirement for economic growth and development as well as the development/sustainment of a given standard of life. The bulk of the populace and the economic activity will use street systems to support automobile traffic, commercial traffic, and public transportation. Road networks are also essential for law enforcement and emergency response. Harbors, seaports, rail networks, highways, and airports allow a location to connect with the rest of the country and world and are key to military and civilian sustainment operations. The loss of any one system may not diminish military operations, but may be disastrous to peacekeeping or peacemaking operations and the return to normal daily life for a local populous.

Background

The use of waterways and road networks has been the primary method of movement of goods, people, and military operations since before the beginning of recorded history. The movement of people and material is crucial to the functioning of civilian and military operations. Determining the presence, capabilities, and vulnerabilities of the basic transportation systems in an area of operations, especially key components (i.e. hubs) and choke points (tunnels, bridges, etc), is essential to the successful operation, maintenance, and security of a transportation network.

Function

Transportation networks support the movement of people and material. All use hubs of various types to control the loading/unloading of goods and people. All have efficient routes and support facilities to meet the demands from society. For example, airports need runways and a control tower, railroads need track and switching mechanisms (e.g., continuous movement on single-track lines), and ports require minimum navigation depths and material handling equipment.

CCIR (Data Collection Checklist)

1) Determine and locate the key transportation (road, rail, marine, air) networks and hubs used by the local populous.
2) Determine, locate, and secure critical transportation components such as; choke points (bridges, tunnels, mountain roads, etc) that do not have a ready bypass; irreplaceable facilities such as ports; and time sensitive, essential facilities such as airfields that are critical to the safe and continuous operation of the transportation systems.
3) Determine the capability for each transportation system.
4) Determine each transportation system's operational status.
5) Determine key items from outside the Area of Operations required for operation of a transportation system and secure the transportation systems that provide those services.
6) Determine the availability of material handling equipment, light sets, haul assets, etc. required to support loading and unloading of material and equipment at each hub.

Transportation Systems and System Specific CCIR

1) Road Networks (L)
    g. Location and condition of freeways, urban streets, and rural roads
    h. Location of difficult bypass areas
2) Bridges (L,S,C)
    a. Location and general condition
    b. Type of bridge (concrete, steel, etc) and critical dimensions (length, width, height)
    c. Type of span (dry ground, river, lake, roadways, etc)
    d. Number of connected spans and number of vehicle lanes
    e. The rated vehicle bridge weight capacity
3) Airport/Airfield/Heliport (L,C)
    a. Location, size (length and width), orientation, and general condition of the runways, taxiways, and parking aprons
    b. Landing and parking capacity of US aircraft on the facility
    c. Location, size, and general condition of maintenance facilities, temporary storage structures, terminal and passenger areas, material handling equipment
    d. Location, type, and quantity of fire fighting equipment, fuel storage and dispensing equipment, material handling equipment (MHE), and runway repair equipment
4) Rail Network (L,C)
    a. Location, number, type and general condition of track, locomotives, and rail cars
    b. Location, size, and general condition of terminal and passenger areas, maintenance facilities, and cargo storage structures
    c. Location, type, and quantity of fuel storage and dispensing equipment, material handling equipment (MHE), and track repair equipment
5) Tunnels (L,S,C)
    a. Location and general condition (roadway, loose rock, running water, etc)
    b. Key dimensions (height, width, length) and number of vehicle lanes provided
    c. Location, size, type, and general condition of air handling equipment for the tunnel, fire fighting equipment, and evacuation routes
6) Ports/Harbors (L,C)
    a. Absolute location (grid coordinate) and relative location (e.g., location on a river, lake, ocean, estuary, etc)
    b. Navigation draft, lane widths, and number of lanes
    c. Location, size, number, and general condition of docks
    d. Type and condition of the transportation networks leading from the dock
    e. Location, size, number, and general condition of cargo storage areas near the port facilities
    f. Location, type, quantity, and general condition of material handling equipment (MHE), fire fighting equipment, and fuel storage and dispensing equipment
7) Public Transportation (L)
    a. Location of bus companies and associated maintenance facilities
    b. Number, type, and general condition of buses per bus company
    c. Location, type (e.g., electric or oil), and general condition of local rail service

Telecommunications

Purpose

Communication systems provide for the flow of information between people and institutions. These systems can take many forms, including public and private business. Important public uses include the distribution of information related to public health and safety, local, national and world news, coordination of law enforcement and emergency response, and governmental functions. Business use is also essential, as economies will become stagnant or degrade without ready access to communication networks for coordination of effort and advertising. Important private uses include entertainment, personal contact, and knowledge building (e.g., news, education, and internet).

Background

Effective communication systems are essential to the proper functioning of a society, and become progressively more important as the society becomes more developed. However, business and private users tend to expand their use according to what technology is available rather than only using what they need to function. This trend is driven by a strong desire for the "best" communication systems rather than actual need (i.e., cell phones with cameras for private individuals), so demand and need are not necessarily linked. Less sophisticated economies require less in terms of communication systems, but the availability of new communication services will often spur economic growth.

Communication systems and their coverage can vary widely, even over short distances. Key systems within the communications infrastructure include the media (newspapers, radio, TV), telephone (conventional and wireless), internet services, and postal services. Loss of any of these systems, or even a decrease in quality, can lead to a decline in security, law enforcement, and emergency response services, loss of economic opportunity, a decline in popular confidence in the government, and in general cause dissatisfaction by local populations. In urban settings, these declines in service can significantly impair law enforcement and emergency response.

Function

The main technologies enabling the large-scale transfer of information are printing, broadcast, and internet with each of these transmission methods supporting a wide variety of end-user technologies. Broadcast television and radio are a significant source of information when present, and can exert a broad influence on a population. For commerce, reliable telephone service is essential for operations beyond the street-vendor level. Traditional telephones rely on an extensive network of wires linked to switches, which are sophisticated and difficult to replace. Cellular telephones require cell towers linked to this same switching system, and service requires being within line-of-sight LOS of a tower at a distance of less than 10 miles.

CCIR (Data Collection Checklist)

1) Locate and secure all broadcast (television and radio) studios, transmitters, and antennae towers. Determine broadcast wattage/range.
2) Locate major print media (e.g., newspaper, magazine, etc) preparation centers and printing locations. Determine their circulation, printing frequency, and political inclination.

3) Locate and secure the principal hubs (switching stations) for the telephone networks. Take pictures of all switching equipment and encourage locals to operate and maintain system. If possible, determine number of calls per day that the station can handle.
4) Locate cellular telephone towers. Towers essential to commerce, emergency services, and security operations should be secured.
5) Determine the communication capabilities of any local emergency responders and law enforcement.
6) Locate and secure local internet provider services and determine their physical connection means to the global worldwide web.

Agriculture

Purpose

Agriculture performs two basic functions within a society. First, it is a source of food for a population, but of equal importance, agriculture can form a key component of the economic strength of a country as both a producer of cash crops for export and a source of employment for a sector of the population.

Background

An agrarian history is often well intertwined within a society's behavior patterns. Agriculture includes a wide range of industries to include livestock, orchards, and aquafarming as well as traditional planted crops. While in some developing countries sustainment farming remains a necessity, in most countries agriculture is important as both a food supply to meet basic needs and as a form of trade competition to keep imported food prices from rising. The importance of non-food (e.g., cotton) agriculture to a region's economic vitality and diversification should not be overlooked.

Function

Successful agriculture requires the following key steps.

1) The land must be suitable for the crops (e.g., livestock, corn, etc) raised and be capable of sustaining production indefinitely with acceptable levels of soil replenishment
2) The selection of crops should be suitable for the climate, soil conditions, and training of the farmers
3) Sufficient water is available for the crops selected or the sale price of the crop warrants the cost of irrigation
4) A market must exist for the crops produced
5) For sustained agricultural development, the farmers and government must be knowledgeable about the long-term impacts of the selected land and crop combinations

CCIR

1) Locate and determine the farm sizes and crop types (i.e., corn, wheat, goats, hogs, etc) produced on the major farmed areas in the region
2) Identify the sources, amounts, and types of food imported to the region
3) Identify the routes of transport and transporters of agricultural products into and out of the region.
4) Identify the extent, water source, and type of irrigation used on crops in the area
5) Locate the number, sizes, owners, and food sources for the major food storage and food distribution centers within the area
6) Identify the number of people to be fed within an area and an estimate of the food stores held by family groups
7) Take pictures of major food storage and distribution centers.
8) Identify the locations and types of non-sustainable agriculture practice in the region (e.g., abandoned aquaculture farms due to waste contamination, excess salt concentrations or salinization of farmland due to poor irrigation practices, types of insect infestations, etc).

Building and Structures

Purpose

The buildings and structures infrastructure category includes public housing, private housing, commercial buildings & structures, and governmental buildings & structures. These provide shelter, storage space, and various other purposes. They are essential for the day-to-day living and governance of the population.

Background

The buildings and structures encompassed in this category serve a variety of needs for the indigenous populations. From housing populations to providing locations from which governmental power is exercised, these buildings provide safe and convenient places to work and live.

Function

These facilities require two basic supporting actions. Units must protect the structures from physical damage, as well as protect access to them for those who need to use the structures for their authorized purposes.

CCIR

1) Identify, locate, and describe the general condition of publicly maintained buildings and structures.
2) Identify the operational status of publicly maintained buildings and structures, who is controlling them, and what security measures are in place.
3) Describe the relative location of publicly maintained building and structures (i.e., proximity to structures of military or cultural importance, population centers, as well as other publicly maintained buildings and structures).

Building & Structure Datasheet

Supplies Required:

1. 120 foot rope marked in one-foot increments.
2. Digital camera
3. Notebook
4. Pen/pencil/eraser
5. This data sheet

1. Facility Identification

a) Facility Name	
b) Location (grid coordinate)	
c) Names and contact information of personnel familiar with the facility	
d) What is the purpose of the building (e.g., store records, public housing, etc.)?	
e) When was the facility last used?	
f) Draw a sketch of the arrangement of the facility. Include dimensions and draw to scale is possible.	

2. Electricity

a) Did the building ever have electrical power?	Yes ____ No ____
b) Does the building currently have electrical power?	Yes ____ No ____
c) What is the frequency of electrical power availability?	
d) If there is no electrical power, when was the last time electrical power was available?	
e) What is (or supposed to be) the source of electrical power?	

3. HVAC (heating, ventilation, and air conditioning)

a) Did the building ever have heat?	Yes ____ No ____
b) Does the building currently have a heat system installed? If yes, • How is the building heated (radiators, forced air, electric baseboard, etc)? • What is the fuel source for the heat (coal, natural gas, oil, etc)? • Is the heat system currently operational?	Yes ____ No ____ Yes ____ No ____ Partially _____
c) Does the building currently have air conditioning installed? If yes, • What type of air conditioning is used (swamp coolers, central air, window air conditioning, etc)? • Who is the manufacturer and what model of air conditioners are used? • Is the air conditioning currently operational?	Yes ____ No ____ Yes ____ No ____ Partially _____

4. Plumbing

a) Did the building ever have functional indoor plumbing?	Yes ____ No ____
b) Does the building currently have functional indoor plumbing?	Yes ____ No ____
c) When functioning how many of the following are available in the facility? • Latrines (number of lavatories, toilets, urinals, showers per latrine) • Kitchen or other food preparation areas • Swimming pools or ponds Locations and number of potable water sources	Yes ____ No ____ Yes ____ No ____ Partially _____

4. Structural

a) What is the type of building (reinforced masonry, unreinforced masonry, steel frame, concrete frame, or wood)?	
b) What is the type of exterior finish (masonry block, brick, concrete, stucco, wood, metal, stone, etc)? • Are the walls intact? • Take a picture of the exterior walls, including a person or rifle for scale. • Take a picture of any section of the wall that has been damaged. Describe the damage (bullet holes, mortar fire, earthquake, etc) • What is the maximum caliber round to which the walls provide protection (5.56mm, 7.62mm, 50 caliber, etc)	Yes ____ No ____
c) How many floors are in the building?	
d) Does the building have a basement? • How is the basement used?	Yes ____ No ____
e) How many staircases, elevators, or escalators are in the building? • Which of the elevators or escalators are operational?	
f) Is the roof peaked or flat? • What type of material is the roof covering (clay tile, concrete tile, slate, synthetic (asbestos tile), asphalt shingle, composite (tar and paper), etc. • Does the roof leak?	Yes ____ No ____
g) Take pictures of any interior or exterior structural damage to floors, walls, or roof.	

5. Security

a) Is the building currently secured from looting or unauthorized entry?	Yes ____ No ____
b) Can the building be secured from looting or unauthorized entry in its current state?	Yes ____ No ____
c) Who currently controls access (security) to the building and what is their contact information?	
d) Does the building have security guards? • Are the guards armed and with what weapons? • Who is the guards' employer?	Yes ____ No ____
e) Does the facility have an electronic surveillance system? If yes, • Who is the manufacturer and what is the model of the surveillance equipment? • Draw a sketch of the surveillance system coverage. • Take pictures of the surveillance equipment.	Yes ____ No ____

Chemical Industry and Hazardous Materials (HAZMAT)

Purpose

The chemical sector provides products that are essential to [a state's] economy and standard of living such as fertilizer for agriculture, chlorine for water purification, and polymers that create plastics from petroleum for innumerable household and industrial products.

Background

Assurance of supply is critical to consumers of chemical products for various reasons. Many large municipal water works maintain only a few days supply of chlorine for disinfecting their water supplies. Agricultural chemicals, particularly fertilizers, must be applied in large volumes during very short time periods.

Some products cannot be transferred between transportation modes. Facilities with "just-in-time" delivery systems maintain fewer and smaller chemical stockpiles. The industry's ability to protect and assure the quality of its own chemical stockpiles is also important. Because chemicals are vital to many applications, contamination of key chemical stocks could impact a wide range of other industries, thereby affecting public health and the economy. In addition to the risk of contamination at product storage facilities, many chemicals are also inherently hazardous and, therefore, represent potential risks to public health and safety. Unfortunately, the risk profiles of chemical plants differ tremendously because of differences in technologies, product mix, design, and processes.

As in most other industries, the chemical industry relies on the availability, continuity, and quality of service and supplies from other critical infrastructures. For example, [in the U.S.] the chemical industry is the Nation's third largest consumer of electricity. An assured supply of natural gas at competitive prices is another crucial resource for the sector.

(Purpose and Background taken from: *The National Strategy for the Physical Protection of Critical Infrastructures and Key Assets*, February 2003).

Function

The chemical industry and HAZMAT must be assessed and properly managed to ensure public health. A critical component is moving dangerous materials away from the living areas and reducing contact with humans and other organisms whenever possible. In developing countries, the most likely long-term solutions for storing/treating spent chemicals and HAZMAT include landfilling and incineration. Engineered landfills, while basic in concept, are difficult to construct and operate – especially with respect to leachate and gas collection/treatment. Incineration technologies range in complexity and associated cost/effort.

CCIR

1) Identify the location(s) and operational status of all chemical production facilities.
2) Obtain lists and quantities of raw materials, intermediate by-products, and finished products found at chemical production facilities.
2) Identify the status and security of any transportation organization (trucks, etc.) used to transport raw, intermediate, or finished chemical products.
3) Determine the status of long-term storage/treatment technologies currently or recently used for disposal of chemical and HAZMAT materials.
4) Identify any significant contamination sites.
5) Take pictures of the overall chemical facilities and subsystems. Be sure to include an object in each picture that can be used to scale the size of the object being photographed.

Refer to the Solid and Hazardous Waste Data Sheet for specific information requirements.

Cultural or Historical

Purpose

People feel passionately about locations of cultural or historical significance and these structures or locations can facilitate a feeling of unity between people. These locations can carry significance in terms of collective images of self, sources of great and often times competing pride, and may serve as physical manifestations of a populations' identity. Included in this category are places of worship, monuments with significance to a range of ethno / linguistic / religious groups, museums, theaters, and schools.

Background

Locations of cultural, religious, and/or historical significance can often generate strong emotional sentiments among various groups. Appropriate courtesies and protections displayed toward these locations can generate goodwill, while lack of such considerations can ferment discontent and create hostility within affected groups.

Function

These facilities require two basic supporting actions. First, the structures must be protected from physical damage or defiling and second, access to the locations for the intended purposes must be continued.

CCIR (Data Collection Checklist)

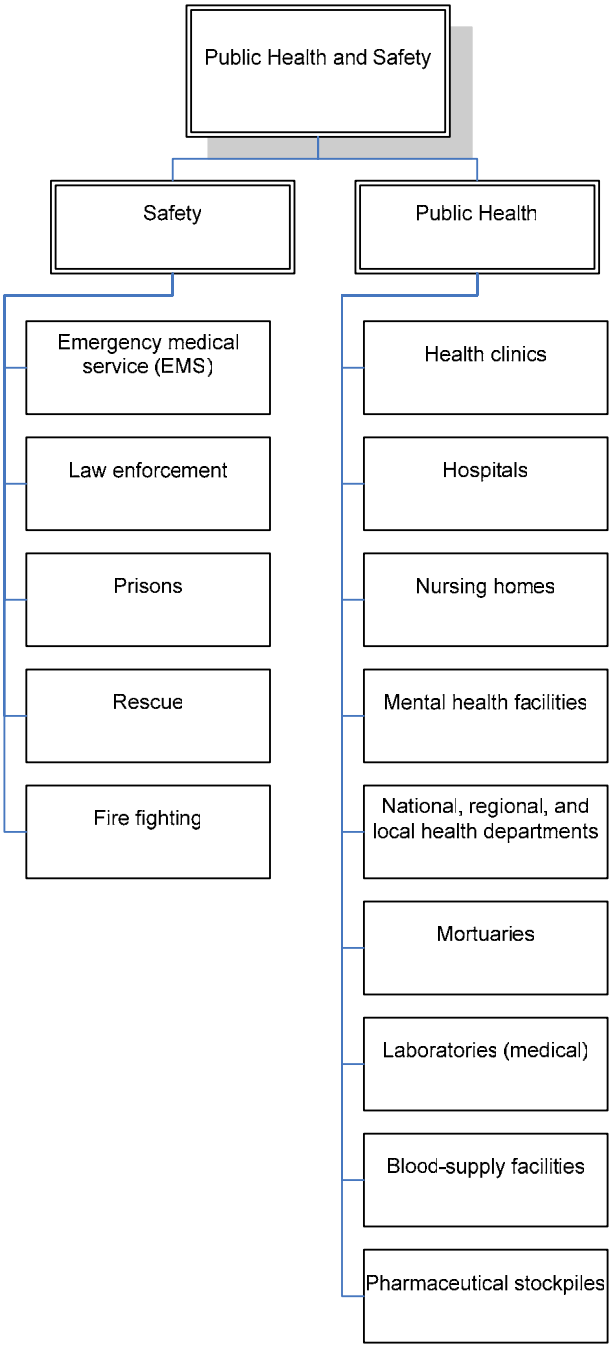
1) Identify, locate, and describe the general condition of facilities with cultural and historical significance
2) Identify the operational status of cultural or historical facilities, who is controlling the facility, and what security measures are in place
3) Describe the relative location of the cultural or historical facilities (i.e., proximity to other structures of cultural or historical, military, or political importance, approach routes, major population centers, etc).

Refer to the Building & Structure Data Sheet for specific information requirements.

Public Health and Safety

Purpose

The purpose of the public health and safety infrastructure category is two-fold. The first purpose of this category is to attend to the short and long-term health needs of a population. The second purpose is to ensure that emergency response capabilities are maintained and coordinated with other agencies, while at the same time ensuring that law and order is maintained within the confines of a town/ region/ nation's borders.



Background

After the most fundamental human, or physiological, needs (e.g. food, water, air) have been satisfied, Abraham Maslow's hierarchy of needs states that the need for safety is the most pressing concern (http://www.akri.org/cognition/motivate.htm). Because of this fundamental human need, the absence or non-availability of institutions within the public health or safety category will prevent, or at least seriously degrade, efforts to improve other critical infrastructure categories.

Function

These facilities require two basic supporting actions. First, the structures must be protected from physical damage or defiling and second, access to the locations for the intended purposes must be continued.

Public Health

Hospitals, clinics, and public health sub-systems play a critical role in mitigating and recovering from the effects of natural disasters or deliberate attacks on a nation. Physical damage to these facilities or disruption of their operations could prevent a full, effective response and exacerbate the outcome of an emergency.

Safety

This second component (or system) of the public health and safety infrastructure category consists of organizations and institutions that are employed to save lives and property in the event of an accident, natural disaster, or terrorist incident; as well as to ensure that good order and discipline is maintained. Furthermore, unlike most critical infrastructures, which are closely tied to physical facilities, these systems consist of highly mobile teams of specialized personnel and equipment.

It should be noted that the prisons system was added to this category because of its relationship with law enforcement, and because the absence of an effective prison system jeopardizes the safety of the citizens of a town, region, or nation.

CCIR

Public Health

1) Identify the location, by type (e.g. health clinic, hospital, etc.), of public health sub-systems in the AO.

2) Identify the operational status of the facility in terms of percentage of design capacity at which it is currently operating. *For example, if the hospital was designed to be a 140-bed facility, could the hospital accommodate 140 patients requiring beds? If not, what is the percentage of beds it can accommodate?*

3) Identify the location of any HAZMAT (e.g. cylinders of oxygen or other gas), chemicals, toxic or infectious agents, or medical waste/ by-products at the facility and determine if the current method of storage, disposal, and/ or securing of the material is adequate. If any of the aforementioned items are unaccounted for, determine the quantity of item missing, by type of material, as well as the approximate date that the items were last accounted.

4) For facilities that care for mental health patients, ensure that dangerous patients and/ or criminals are accounted and being attended by the proper authorities.
5) Determine the status of the national, regional, and/ or local health departments/ bureaucracies that are in place to manage the rest of the sub-systems in this category.
6) Determine if appropriate systems are in place to dispose of deceased persons.

Safety

1) Identify the location, by type (e.g. fire, EMS, police, etc.), of safety sub-systems in the AO.
2) Assess the communication capabilities of the different sub-systems – Are they able to communicate effectively with members inside their organization at the scene of an incident? Are they able to communicate effectively with organizations outside of their immediate organization (e.g. police, hospital, etc.)?
3) Identify the condition of vehicles and special pieces of sets, kits, and outfits that the organization needs to perform its mission.
4) Determine if any firearms or weapons are unaccounted. If so, determine quantity (by-type) that are missing, as well as the approximate date those weapons were determined to be missing. Determine if the means of storing and securing the weapons is adequate to prevent theft.
5) Identify the operational status of the organization in terms of percentage of design capacity at which it is currently operating. For example, if the fire station was designed to be able to fight a one-alarm fire at an apartment building, subjectively assess how close the fire station is to achieving that standard.
6) Identify the location of any HAZMAT (e.g. cylinders of oxygen or other gas), chemicals, toxic or infectious agents, or medical waste/ by-products at the facility and determine if the current method of storage, disposal, and/ or securing of the material is adequate. If any of the aforementioned items are unaccounted for, determine the quantity of item missing, by type of material, as well as the approximate date that the items were last accounted.
7) For facilities, which are used to incarcerate criminals ensure that prisoners are accounted and being attended by the proper authorities. If they are not accounted then determine the date that the persons were last accounted by the proper authorities.
8) Determine the status of the national, regional, and/ or local health departments/ bureaucracies that are in place to manage the rest of the sub-systems in this category.

Refer to the Building & Structure Data Sheet for additional infrastructure specific information requirements.

Reference: http://www.whitehouse.gov/pcipb/physical/securing_critical_infrastructures.pdf, (pp 41 – 44)