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## Special Text, ST 55-06-1, Transportation Intelligence, June 1954

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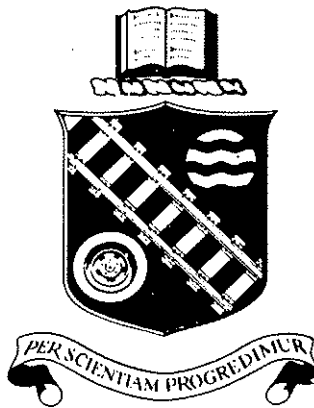
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# TRANSPORTATION INTELLIGENCE



THIS TEXT SUPERSEDES ST 55-06-1, SEPTEMBER 1953

This text is approved for resident and extension course instruction at The Transportation School only. It reflects the current thought of this school and conforms to printed Department of the Army doctrine as closely as possible.

## THE TRANSPORTATION SCHOOL

Fort Eustis, Virginia

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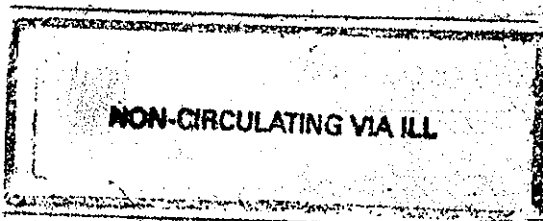


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# THE TRANSPORTATION SCHOOL

## Fort Eustis, Virginia



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# CHAPTER I

## GENERAL

### 1. PURPOSE

This text is intended for use by all persons concerned with doctrine, responsibilities, and procedures for the production of transportation intelligence.

### 2. SCOPE

The responsibilities and functions of transportation officers and transportation staff sections with regard to transportation intelligence are explained and the organization for collection and production of transportation intelligence is discussed. Procedures described herein are in accord with accepted Department of the Army doctrine and apply to all echelons of command. (Reference is made to FM 30-16 for over-all responsibilities and organization for the production of technical intelligence, and particularly for the processing of foreign materiel.) Fundamentals concerning direction of the collection effort, collection of information, and production, dissemination, maintenance, and use of transportation intelligence are listed. Standing Transportation Information Requirements for highways, railways, ports, and inland waterways are outlined in detail, and sample field collection reports based on these requirements are shown. An appendix giving definitions of technical transportation terms and illustrations of facilities and equipment is included.

### 3. DEFINITION AND ROLE OF TRANSPORTATION INTELLIGENCE

a. Definition. Transportation intelligence is intelligence concerning the land transportation facilities of an actual or potential theater of operations. It includes data concerning the characteristics, development, organization, materiel, and operation of such facilities.

b. Role. Transportation intelligence provides data essential to both strategic and tactical planning, including data pertaining to ports, inland waterways, highways, and railways.

# CHAPTER 2

## RESPONSIBILITIES

### 4. GENERAL

The collection of transportation information and the production and dissemination of transportation intelligence are command responsibilities. Normally the functions related to those responsibilities are delegated to the transportation officer. In this text, the term "transportation officer" refers to the transportation special staff officer at each level of command outside the continental United States, including the assistant G4 for transportation of combat divisions.

### 5. INDIVIDUAL RESPONSIBILITIES

a. Assistant Chief of Staff, G-2. The G2 at Department of the Army and lower levels evaluates and interprets transportation intelligence in relation to a given operational situation to determine the probable courses of action of opposing forces. FM 30-16 specifies the responsibilities of G2 and the technical services with regard to technical intelligence.

b. Chief of Transportation. The Chief of Transportation is charged with the following responsibilities:

- (1) Producing and maintaining information and intelligence peculiar to the needs of the Transportation Corps, and for G2, Department of the Army, including intelligence concerning--
  - (a) The characteristics, condition, capacities, activities, limitations, vulnerabilities, and potentials for military use of foreign railway, highway, port, and inland waterway routes, equipment, operations, facilities, and installations.
  - (b) The design, performance, manufacture, storage, military requirements, maintenance, operational capabilities, and limitations of foreign transportation equipment; and related military organizations, installations, and techniques.
- (2) Insuring that facilities and appropriate programs of instruction are provided for the general and specialized transportation intelligence training of transportation personnel and units. (FM 30-16 contains a list of subjects to be covered in intelligence training. Methods of intelligence training are prescribed in TM 21-250, FM 21-5, FM 30-5, FM 30-101, FM 30-102,



FM 30-103, and FM 30-104. The responsibilities of the Chief of Transportation with regard to technical intelligence training are stated in FM 30-16.)

- (3) Performing the intelligence functions common to the chiefs of all technical services (FM 30-16).

c. Transportation officer.

- (1) The transportation officer provides for the transportation and intelligence training required to qualify intelligence personnel under his control for performance of their duties. He also exercises staff supervision over similar training in subordinate staff sections and Transportation Corps units.
- (2) He provides technical supervision over intelligence activities of subordinate transportation staff sections and transportation units and gives assistance when possible.
- (3) He is responsible for the operations discussed in chapter 4.

d. Transportation intelligence officer.

- (1) This officer is chief of the intelligence branch, plans and intelligence division, of the transportation officer's staff. He assists in the preparation of, and carries out, the transportation officer's intelligence plan. The commanding officer of an assigned or attached transportation detachment may, in addition, serve as the transportation intelligence officer. (The technical intelligence coordinator of the G2 staff advises and assists the transportation intelligence officer and other technical intelligence officers.)
- (2) He trains his own section or unit in intelligence functions and insures appropriate technical training in transportation subjects. Normally, he is delegated the staff supervision of intelligence training in subordinate staff sections and units, and collaborates with the operations officer in the preparation of training programs, as may be directed.

e. Transportation units and staffs. Elements of transportation special staff sections and transportation operating units must make known to the transportation officer their anticipated and current needs for intelligence. They must also transmit to the transportation officer any available transportation information of the type discussed in this text. This latter responsibility includes the prompt reporting and submission of any foreign transportation documents or captured transportation equipment which may come into their possession.

f. Other transportation personnel. All transportation personnel must make known to their own commander or the commander of the nearest Army unit any information concerning enemy transportation systems, facilities, or materiel. Documents will be turned in, and any new or unusual items of equipment turned in or reported and properly safeguarded.

g. Unit commanders. The unit commander will insure that all personnel under his command know and understand their intelligence duties. Information given to unit commanders as described in subparagraph f above will be forwarded to the nearest transportation intelligence officer without delay. Captured enemy transportation materiel will be processed in accordance with FM 30-16.

# CHAPTER 3

## ORGANIZATION

### 6. GENERAL

Army-wide organization for the collection, production, and dissemination of technical intelligence is prescribed in FM 30-16. This chapter discusses only those elements concerned directly with transportation intelligence. Organization within a theater of operations is shown in figure 1. The chain of command follows a similar pattern in noncombat oversea commands.

### 7. TRANSPORTATION SPECIAL STAFF SECTIONS

The transportation element of special staffs in oversea commands normally includes a plans and intelligence division. This division contains an intelligence branch which is organized to carry out the intelligence duties and responsibilities of the transportation officer (par. 5c).

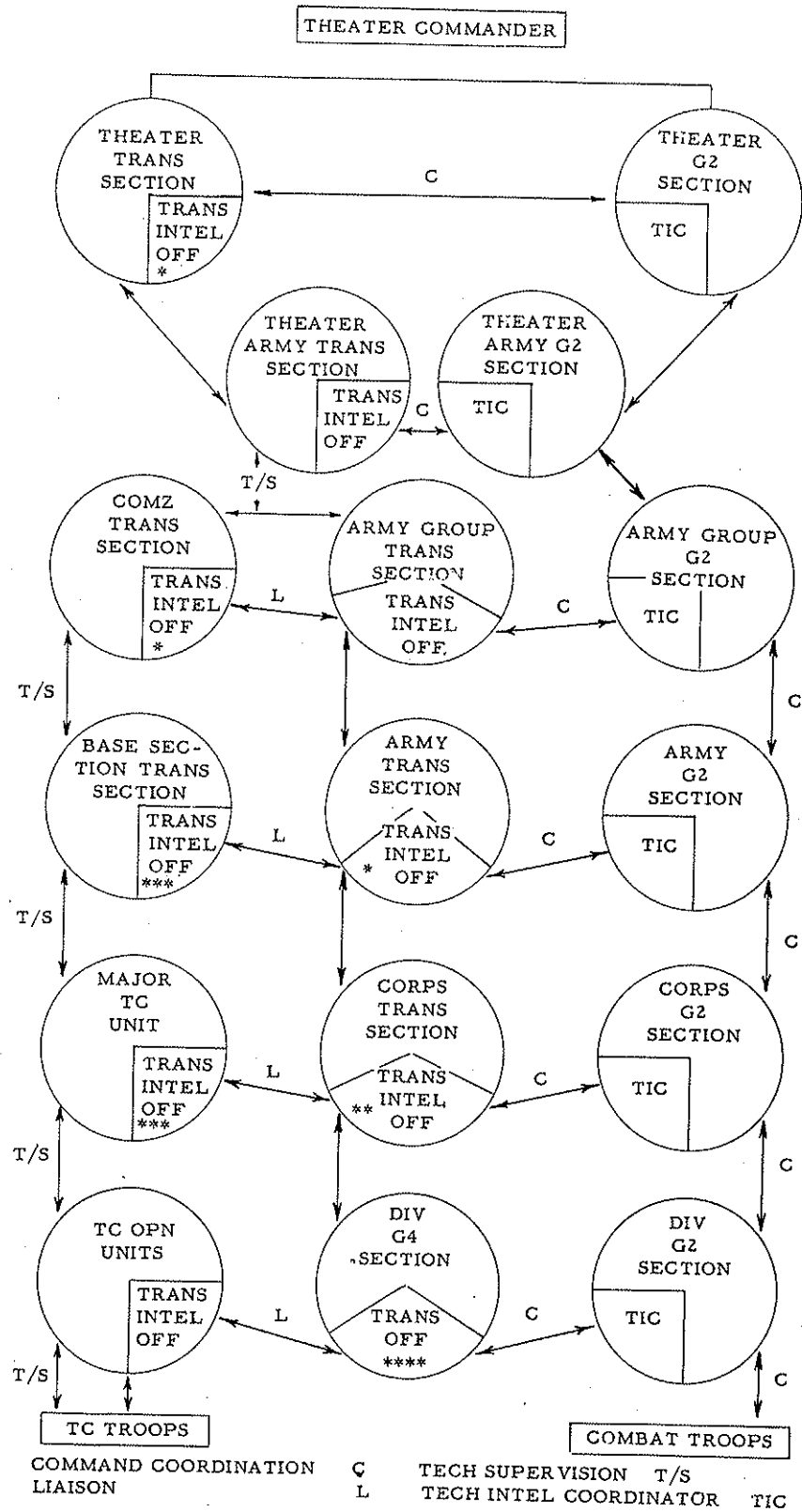
### 8. DIVISION TRANSPORTATION OFFICER

The assistant G4 for transportation in the infantry, armored, and airborne divisions has the same intelligence functions as transportation officers of higher echelons (par. 5c), subject to such modifications as may be directed by the division commander.

### 9. TRANSPORTATION INTELLIGENCE DETACHMENTS

a. There are two types of transportation intelligence detachments: transportation intelligence detachment (combat), team HA, consisting of two officers and four enlisted men, assigned to each corps as required; and transportation intelligence detachment (strategic), team HB, consisting of four officers and four enlisted men, one or more teams allotted to theater, army, and communications zone headquarters. Team HA is organized to provide a sub-team of one officer and two enlisted men per front line division when desired. Detachments of either type may be attached to subordinate Transportation Corps units or staffs when required.

b. Detachments are under the operational control of the transportation officer of the headquarters to which assigned or attached. In some instances these detachments may be the only source of intelligence personnel available to the transportation officer. These personnel are capable of assisting the transportation officer in all phases of his intelligence responsibilities. They may comprise his intelligence staff or may be used primarily in the collection of transportation information. Both type detachments are capable of collecting, processing, and disseminating technical information and intelligence concerning foreign transportation systems, facilities, and operations--including



\*HB Detachment (Strategic)  
 \*\*HA Detachment (Combat)  
 \*\*\*HA or HB may be attached.  
 \*\*\*\*Subdetachment from HA detachment may be attached.

Figure 1. Transportation intelligence organization within a theater of operations.

routes, materiel, logistics, and installations--for transportation intelligence and logistical planning purposes; and of selecting, processing, and expediting the flow of foreign transportation materiel (fig. 2).



# CHAPTER 4

## OPERATIONS

### Section I. COORDINATION AND LIAISON

#### 10. GENERAL

At all echelons, coordination and liaison are vital to successful intelligence operations. Transportation intelligence liaison between transportation personnel and G2 or any other agency will be coordinated with the transportation officer or his designated representative.

#### 11. COORDINATION AND LIAISON AT VARIOUS ECHELONS

a. Coordination must be maintained between the intelligence branch, planning and intelligence division, and other elements of the transportation section to insure the systematic collection and processing of transportation information obtained through operational channels.

b. Continuing liaison must be maintained with the intelligence elements of transportation staff sections of higher and subordinate headquarters. This will help to establish clearly defined objectives, eliminate duplication, and determine the best methods of implementation so that adequate transportation intelligence will be available.

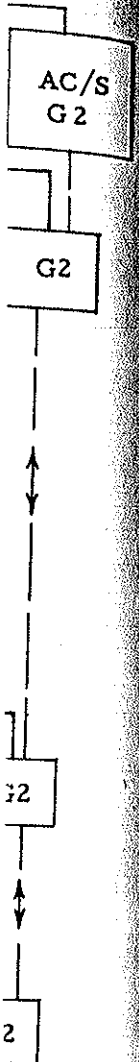
c. Continuing liaison for the purposes outlined in subparagraphs a and b above should be established between appropriate communications zone transportation sections, between their counterparts in army commands, and between adjacent commands.

d. Close liaison will be established with other special staff sections, particularly engineer and ordnance sections. This will insure full exchange and utilization of available information and minimize duplication of reconnaissance effort.

e. Systematic and continuing liaison and coordination will be established with the intelligence elements of the Navy, Air Force, and allied forces through, or as directed by, G2 (FM 30-16).

f. Transportation intelligence activities at each level of command will be coordinated with G2 in accordance with prescribed policies and procedures.

g. Transportation officers of theater headquarters and oversea commands will maintain appropriate intelligence coordination and liaison with the Chief of Transportation through technical channels.



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## Section II. DIRECTION OF THE COLLECTION EFFORT

### 12. GENERAL

Direction of the collection effort involves four important procedures--determination of requirements for information; issuance of orders and requests for the collection of required information; follow-up of orders issued to collecting agencies; and guidance. Guidance must be provided collecting agencies as to type and quantity of transportation information needed; time limitations, when applicable; priorities of requirements; and means by which agencies may increase their transportation intelligence collection effort. G2 and transportation collection agencies will be informed of changing priorities and completion of specific requirements to preclude unnecessary collection effort.

### 13. DETERMINATION OF REQUIREMENTS

a. Specific requirements. Specific guidance in the collection of transportation intelligence information is furnished through the following mediums:

- (1) The transportation sections of chapter 3, National Intelligence Survey, contain the available data on major transportation facilities and principal routes in foreign areas. Transportation information requirements are also indicated. This publication is available at theater and oversea command headquarters.
- (2) Area analyses and special transportation studies prepared at various levels of command also furnish guidance for determining requirements. During the preparation of such studies, a listing of intelligence information deficiencies is submitted to the transportation intelligence officer, who initiates appropriate collection effort.

b. General requirements. Specific requirements will not indicate all the transportation information necessary for the completion of transportation planning. There must be continuing effort by transportation personnel in all headquarters and units to collect and report all types of transportation information of intelligence value within their areas of operations (pars. 5e-g). Standing Transportation Information Requirements provide a guide for personnel collecting transportation information not covered by specific requirements. Standing Transportation Information Requirements for information of a general nature applicable to all modes of transportation, and for detailed information pertaining to highways, railways, ports, and inland waterways are included in appendixes II through VI.

c. Implementation and guidance. The transportation intelligence officer at each level of command will assemble the transportation intelligence



requirements of his own, higher, lower, and adjacent headquarters; analyze them; and incorporate them into his collection plan (par. 15). Requests will be made to appropriate collecting agencies. The transportation intelligence officer will furnish continuous guidance to the collecting agencies as required.

### Section III. TRANSPORTATION INFORMATION COLLECTION

#### 14. SCOPE

The scope of collection embraces all pertinent information concerning the various modes of transportation (apps. II through VI). It includes areas under the control of our own or other military forces as well as those under enemy control. Collection continues throughout peacetime and periods of hostilities. Sources of information which are easily exploited during peacetime become difficult to exploit during hostilities. Therefore, every effort must be made by all agencies, units, and individuals to collect basic transportation information whenever opportunity exists.

#### 15. COLLECTION PLAN

After requirements have been determined (pars. 12, 13), each transportation intelligence officer and each transportation intelligence detachment commander will prepare a collection plan for the use of their staffs. Its purpose is to insure a systematic exploitation of all sources, by all means, within the time specified to fulfill requirements. The plan may be in any convenient form--usually tabular (FM 30-5).

#### 16. COLLECTION AGENCIES

Collection agencies include the intelligence branch of the transportation special staff section, transportation intelligence detachments, and other transportation units. Transportation units or personnel may be assigned special collection tasks. However, all transportation personnel are potential collectors of transportation information (par. 5f). Transportation information is also collected by the agencies listed in FM 30-5 and FM 30-16.

#### 17. SOURCES OF INFORMATION

A source is the person, thing, action, or condition from which desired information is obtained. Sources listed in this paragraph are those used by the transportation intelligence officer or his assistants, and include agencies or persons which themselves may be collecting agencies. (See FM 30-16 for further discussion of information sources.) Principal sources are--

a. Documents, including written, printed, engraved, and photographic material. Documents may be acquired individually or from our own, other, or captured libraries or depositories. All documents pertaining to

transportation subjects are important. Appendixes II through VI list those documents pertinent to each field of transportation interest.

- b. Transportation equipment and materiel and component parts (trucks, rail cars, barges).
- c. Transportation facilities (railways, highways, ports).
- d. Personnel of the following categories:
  - (1) Civil authorities.
  - (2) Representatives of contracting and engineering firms, export-import firms, manufacturers, suppliers, air and steamship lines, public utilities, and other agencies concerned with transportation.
  - (3) Transportation personnel.
  - (4) Captured enemy personnel, deserters, defectors, and repatriates.

#### 18. PROCEDURE FOR EXPLOITATION OF TRANSPORTATION FACILITIES

Exploitation of transportation facilities requires detailed prior planning. Such planning must be coordinated with G2, and must insure exploitation of the pertinent items listed in appendixes II through VI. It is particularly important that transportation facilities which are overrun during combat be exploited without delay. In order to do this, sufficient trained transportation intelligence personnel and/or technically qualified transportation specialists should be made available to the combat unit (division or corps) operating in the area of the facility. Such augmentation should be made sufficiently in advance to permit complete orientation about the facility and the desired exploitation. At least one complete copy of all resultant basic documents, maps, and diagrams should be studied, analyzed, annotated, and forwarded through intelligence channels to the Office of the Chief of Transportation.

#### 19. METHODS OF COLLECTION

There are three general methods of collecting transportation intelligence information--research, observation, and interrogation of a source. Prior to the initiation of collection by any of these methods, all related files should be examined to prevent unnecessary collection effort.

- a. Transportation personnel must be continually alert to observe and report everything of intelligence value. In addition to this informal observation, the transportation information collector plans field and reconnaissance trips, coordinating them with other agencies when appropriate.

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b. Maximum use should be made of photographs. Collectors should plan photographs to insure that full transportation intelligence value will be obtained. Whenever possible, all scenes and objects should be photographed from several angles, and photographs annotated and amply referenced. Figures 3 through 8 are examples of photographs taken from locations and angles calculated to show the most important features of the object photographed. It should be noted that distances and dimensions may be indicated by comparison with people, vehicles, and objects of known size.

c. Techniques of interrogating sources and examining documents are discussed in FM 30-15. Procedures for examining materiel are described in FM 30-16.

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## 20. REPORTING

Reporting is a vital step in the collection process. It is imperative that reports be accurate, clear, concise, and timely. Reports must contain all useful information. Sample reports are included in appendixes II through VI. Reports should conform to the examples illustrated in the appendixes whenever practicable and should be supplemented by written reports based on the outlined Standing Transportation Information Requirements. All available documents (par. 17) will be appended to each report.

ILITIES

## 21. EVALUATION RATING

Each intelligence report and each piece of reported information must be given an evaluation rating (FM 30-5) by the collecting agency. This evaluation indicates to the next user of the information or intelligence the credibility and reliability of the source and of the information itself.

### Section IV. PROCESSING TRANSPORTATION INTELLIGENCE

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## 22. GENERAL

Processing is the transformation of information into intelligence by recording, evaluation, analysis, integration, and interpretation. A transportation officer produces and maintains transportation intelligence required for use within his headquarters. He also prepares and maintains such additional transportation intelligence as may be directed by higher headquarters. Such intelligence will include special transportation studies, and transportation sections of the National Intelligence Survey concerning the transportation officer's area of operation.

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## 23. STEPS IN PROCESSING

a. Recording. Recording is the systematic selection, sorting, grouping, cataloging, and filing of information so that items of particular categories

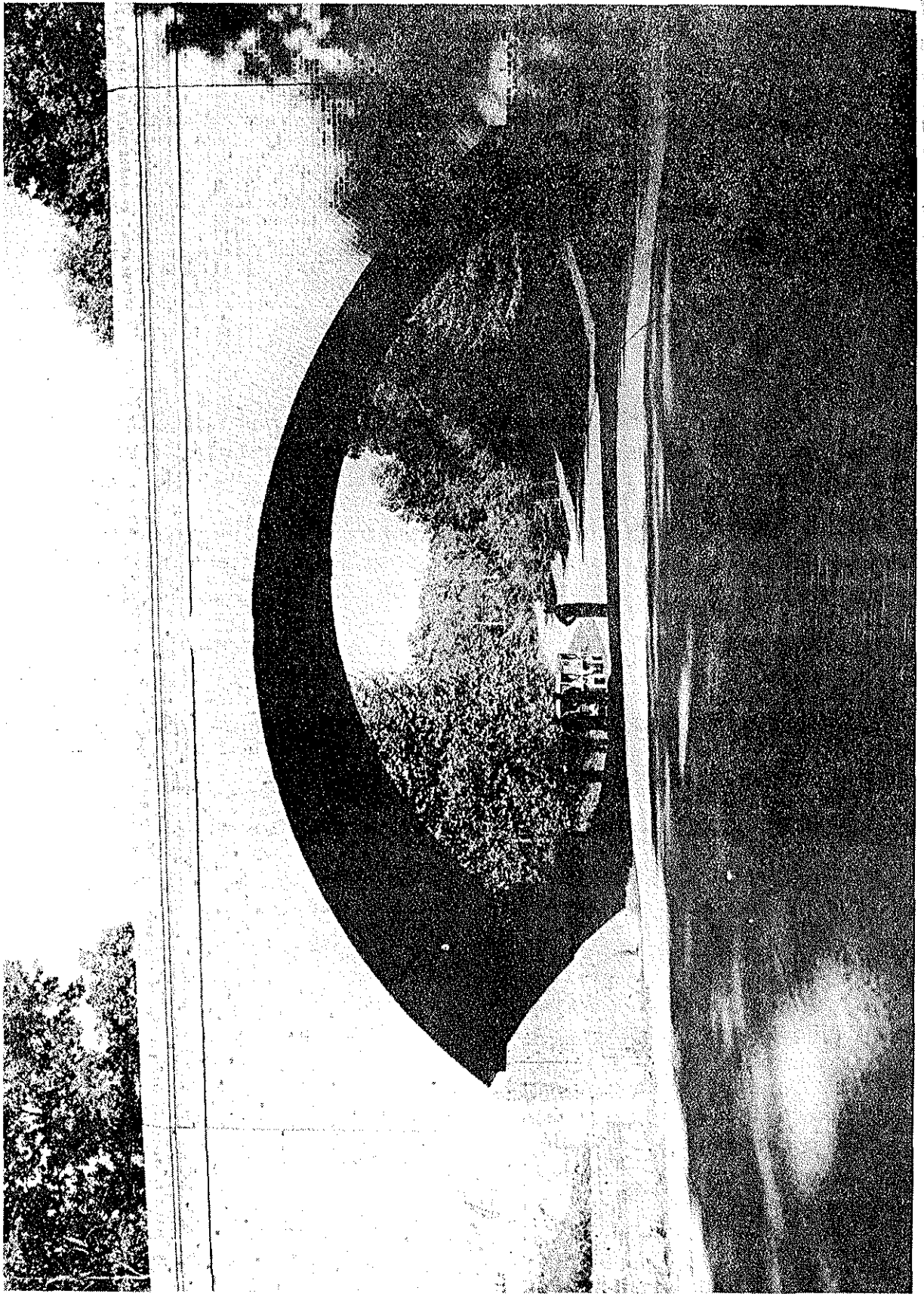


Figure 3 Sample intelligence photo

Figure 3. Sample intelligence photograph



Figure 4. Sample intelligence photograph--rail and highway.

may be grouped conveniently for study and reporting. Recording methods are discussed in FM 30-5.

b. Evaluation. Each processor will evaluate items of information to determine their pertinence, inherent meaning, probably accuracy, and credibility of source. Such evaluation is essential because in many instances the processing agency will have information affecting credibility and reliability which is not available to the collection agency which made the previous evaluation. The processor will assign his own evaluation rating (par. 21) to each item of intelligence prior to its dissemination.

c. Analysis. Analysis is the separation of information concerning the same or related subjects into basic elements and the critical comparison of these elements in order to establish the relationship of each.

d. Integration. Integration is the combination of basic elements into a logical and reasonable pattern.

e. Interpretation. Interpretation is the act of judging the results of integration in the light of previously acquired knowledge and experience and indicating the significance of such results in terms of capabilities, limitations, and courses of action.

#### 24. MAINTENANCE

Maintenance of intelligence involves continuing liaison with all pertinent agencies; reconnaissance and field trips; collection of new documents; re-examination of personnel and materiel; and examination of other personnel and materiel necessary to insure that the intelligence is current in all respects.

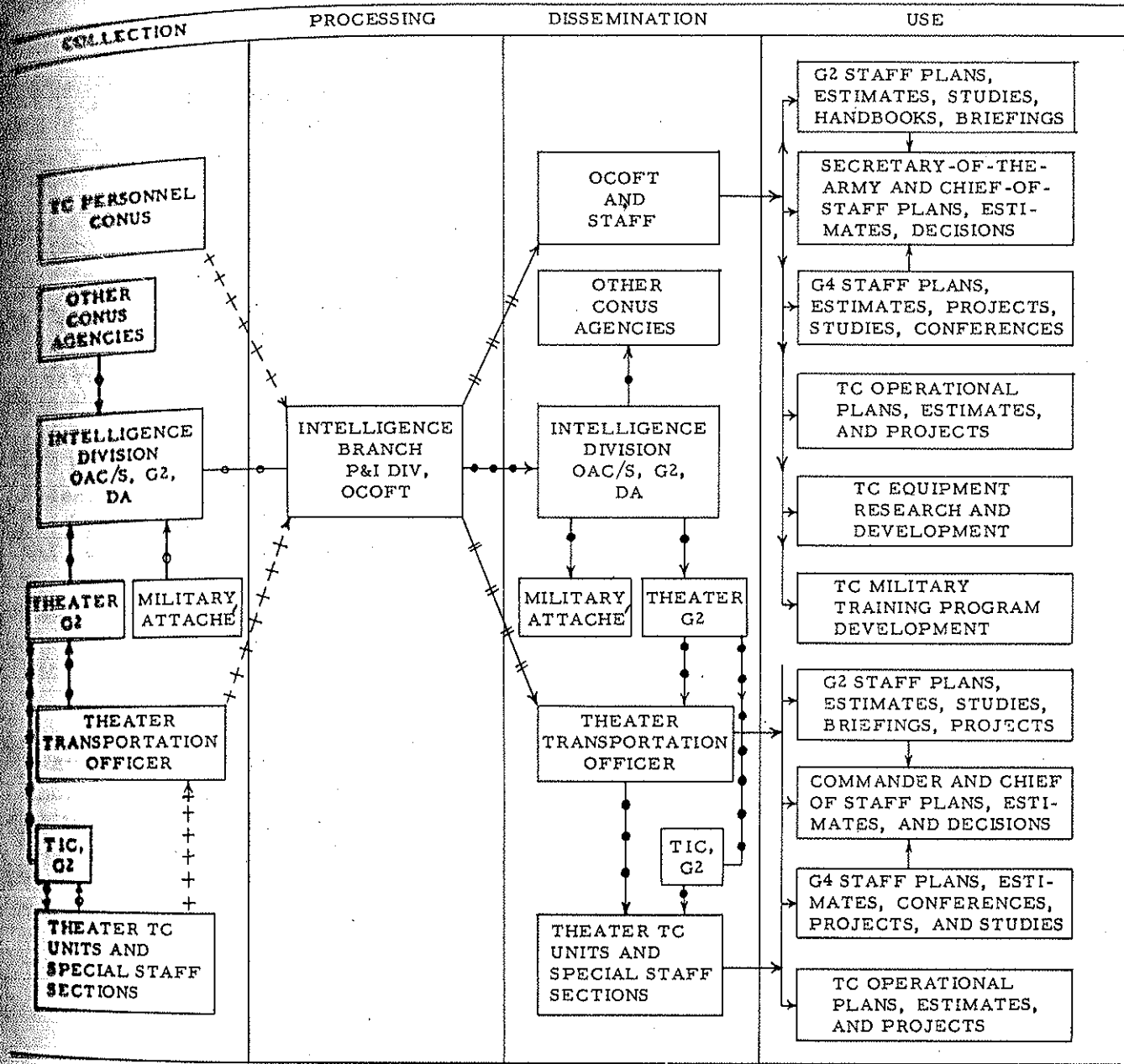
### Section V. DISSEMINATION OF TRANSPORTATION INTELLIGENCE

#### 25. OBJECTIVES

The primary objective of dissemination is to place intelligence in the hands of the ultimate user early enough to permit timely formulation of estimates and plans. Only that intelligence required by particular units or agencies is disseminated to them. Intelligence is prepared in the form most convenient to the recipient so that he can readily locate those details of interest to him.

#### 26. METHODS

Transportation intelligence may be disseminated by any of the means outlined in FM 30-5, FM 30-16, and FM 101-5. Figure 9 illustrates some of



KEY----FLOW OF:  
 INTELLIGENCE CHANNELS      INFORMATION      INTELLIGENCE  
 TECHNICAL CHANNELS      —○—○—→      —●—●—→  
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Figure 9. Dissemination and use of transportation intelligence produced by the Office of the Chief of Transportation.

the common agencies of dissemination and important uses of transportation intelligence. Three other principal means of dissemination are--

a. National Intelligence Survey. Transportation sections of the National Intelligence Survey contain intelligence concerning railways, highways, ports, and inland waterways. Intelligence concerning pipelines, beaches, airfields, and other items of transportation interest--but for which collection responsibility is assigned to other Department of the Army agencies--is also included in the survey.

b. Special transportation studies. Special transportation studies concerning railways, highways, ports, and inland waterways are prepared by the Chief of Transportation for limited distribution. They contain greater detail than the transportation sections of the National Intelligence Survey and are intended primarily for transportation planning use.

c. Transportation intelligence summary. Periodic summaries of current developments in transportation intelligence are prepared by transportation special staff sections. Such summaries are disseminated to G2 and higher, lower, and adjacent transportation headquarters and to other interested technical services.

## Section VI. INTELLIGENCE UTILIZATION

### 27. STRATEGIC PLANNING

Intelligence concerning transportation modes, systems, facilities, and materiel is an essential element in the formulation of strategic plans. Personnel concerned with transportation planning and intelligence utilize transportation intelligence to determine the capabilities, vulnerabilities, and probable uses by the enemy of transportation facilities, and also the capabilities and vulnerabilities which may affect our own use of transportation facilities within territory held by United States or other military forces.

### 28. TACTICAL PLANNING

Transportation intelligence developed in peacetime is essential to the commander who must plan tactical operations. During hostilities, the production of transportation intelligence is of vital importance in assisting the commander to fulfill his combat mission.

### 29. RESEARCH AND DEVELOPMENT

Transportation intelligence provides data on facilities and materiel necessary in transportation research and development.



ANNEX. I.

REFERENCES

FIELD MANUALS

FM 5-10	Routes of Communications
FM 21-25	Elementary Map and Aerial Photograph Reading
FM 21-26	Advanced Map and Aerial Photograph Reading
FM 30-5	Classified
FM 30-15	Examination of Personnel and Documents
FM 30-16	Classified
FM 30-19	Order of Battle Intelligence
FM 30-21	Aerial Photography, Military Applications
FM 30-101	The Maneuver Enemy
FM 30-102	Handbook on Aggressor Military Forces
FM 30-103	Aggressor Order of Battle
FM 30-104	Aggressor Representation
FM 55-26	Transportation Inland Waterways Service
FM 100-5	Operations
FM 100-10	Administration
FM 100-15	Larger Units
FM 101-5	Staff Organization and Procedure
FM 101-10	Organization, Technical, and Logistical Data

TECHNICAL MANUALS

TM 5-231	Mapping Functions of the Corps of Engineers
TM 5-240	Aerial Phototopography
TM 5-246	Interpretation of Aerial Photographs
TM 5-248	Foreign Maps
TM 5-627	Railway Track Maintenance; Repairs and Utilities
TM 9-2800	Military Vehicles
TM 21-250	Army Instruction

ARMY REGULATIONS

AR 45-80	Ordnance Property
AR 380-5	Safeguarding Security Information

SPECIAL REGULATIONS

SR 10-5-1	Department of the Army
SR 10-120-1	Department of the Army; Office of the Assistant Chief of Staff, G-2, Intelligence
SR 10-355-1	Department of the Army; Office of the Chief of Transportation

TABLES OF ORGANIZATION AND EQUIPMENT

T/O&E 5-500	Engineer Service Organization
T/O&E 30-600	Military Intelligence Service Organization
T/O&E 55-500A	Transportation Corps Service Organization

USMC AMPHIBIOUS MANUALS

AM-2	Terrain, Hydrography, and Weather
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STANDING TRANSPORTATION INFORMATION REQUIREMENTS--  
GENERAL 1/

I. DEVELOPMENTAL STATUS

- a. General state of development.
  - (1) Nature and extent.
  - (2) Age, condition, and standard of maintenance.
  - (3) Importance in national economy.
- b. Factors influencing development.
  - (1) Climatic and geographic.
  - (2) Political and economic.
  - (3) Other.
- c. Historical aspects.
  - (1) Developmental background.
  - (2) War damage.
  - (3) Major rehabilitation and improvements (dated).
- d. Development plans, programs, and policy.
- e. Legislation affecting operations or development.
- f. Government subsidies and other assistance.
- g. Potentialities for expansion and improvement.

1/ The information listed in this appendix is required for all modes of transportation.

## 2. POSITION IN ECONOMIC STRUCTURE

- a. Relative importance of various modes.
- b. Interrelationship and integration of the means of transportation.
- c. Current condition, capabilities, and critical features.
- d. Adequacy for commercial, industrial, and military needs in peace and wartime.
- e. Support provided by domestic research and development.
- f. Domestic production of transportation materiel.

## 3. PATTERN OF CONTROL AND ADMINISTRATION

- a. Ownership.
  - (1) Public and/or private.
  - (2) Foreign.
  - (3) Joint.
- b. Organization.
  - (1) Administrative structure.
  - (2) Functions and staffing.
  - (3) Managerial and other key personnel.
- c. Control and regulatory measures.
  - (1) Government.
  - (2) Foreign elements.

## 4. PERSONNEL AND ORGANIZATIONS

- a. Labor-management relations.
  - (1) Problems, differences, and agreements.
  - (2) Bargaining agencies, methods, and procedures.

- tation.
- in peace
- (3) Work stoppage incidence, causes, and effects.
  - (4) Key personalities, their influence, and affiliations.
  - (5) Government control measures.

b. Indigenous labor.

- (1) Labor force normally employed--skilled, unskilled, and supervisory--by areas and job categories.

- (a) Indigenous.

- (b) Foreign (imported).

- (2) Degree of technical skill, training, and experience.
- (3) Efficiency, cooperativeness, and dependability.
- (4) Dissident elements, their sympathies, and influence.
- (5) Working conditions and wage scales.
- (6) Replacement training programs.

- (a) Type and scope.

- (b) Effectiveness.

c. Major commercial transport agencies.

- (1) Nature, scope of activity, and capabilities.
- (2) Operating equipment and facilities.
- (3) Efficiency of operation and maintenance.
- (4) Key personnel.

5. OPERATIONS

a. Operational factors.

- (1) Classification, numbering, and route marking systems employed.

- (2) Principal routes, mileages, and traffic densities.
  - (3) Operating methods, practices, and procedures.
  - (4) Operating conditions and problems.
  - (5) Traffic interruption factors and incidence.
  - (6) Movement control and traffic regulation.
  - (7) Cargo handling methods, techniques, and problems.
  - (8) Distribution and adequacy of servicing facilities and supplies.
  - (9) Operating revenues and expenses.
  - (10) Unconventional aspects and other notable features of operation.
- b. Traffic statistics (by stated periods and modes).
- (1) Freight ton-miles hauled.
  - (2) Total freight hauled, by commodity.
  - (3) Average length of freight haul.
  - (4) Average turn-around time for equipment.
  - (5) Average freight net tons per unit.
  - (6) Passenger-miles traveled.
  - (7) Total passengers carried.
  - (8) Average length of long distance passenger haul.
  - (9) Nature, volume, and density of traffic by routes.
6. MAINTENANCE, REPAIR, AND CONSTRUCTION
- a. Inventory of maintenance, repair, and servicing facilities.
- (1) Location.
  - (2) Type service rendered or available.

- (3) Capacity and operating condition.
- (4) Special features and equipment.
- (5) Availability and adequacy of spare parts.
- (6) Adequacy for operational needs.

b. Status of major facilities, installations, and equipment.

- (1) Construction, rehabilitation, and repairs or improvements completed, under way, or planned.
- (2) Facilities, etc, relocated, reinstalled, abandoned, dismantled, or cannibalized.
- (3) Operating condition.
  - (a) Poor or virtually unusable or unserviceable.
  - (b) Good with excellent maintenance.
  - (c) Other.

c. Notable features of construction and maintenance standards and practices as they relate to transport planning and operations.

d. Special problems.

- (1) Incidence.
- (2) Methods of handling.
- (3) Remedial measures.

## 7. FOREIGN AGREEMENTS AND INTERCHANGE

- a. Transit and transport agreements.
- b. Nature, volume, and scope of traffic.
- c. Foreign-owned equipment and foreign operating personnel normally in the country or area (by periods).
- d. Domestic equipment and operating personnel normally abroad (by periods).

e. Other aspects.

## 8. RESEARCH AND DEVELOPMENT PROGRAM

a. Nature and scope of activities.

b. Development policy, trends, objectives, and capabilities.

c. Testing and development centers, facilities, equipment, and key personnel.

d. Notable achievements.

e. Current projects and progress.

f. International technical and scientific associations or societies in which the government or key individuals participate.

## 9. EQUIPMENT AND SUPPLIES

a. Production.

(1) Amounts of equipment and supplies produced, imported, and exported annually (by types and by countries of origin and destination).

(2) Component parts, semimanufactured products, and raw materials used for manufacture of equipment:

(a) Produced locally.

(b) Imported.

(c) Exported.

(3) Equipment manufacturing and assembly plants.

(a) Location and products.

(b) Manufacturing rate and unit cost.

(c) Ownership, management, and employees.

(d) Importance and vulnerability.

(e) Capability and expansion potentials.



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- (4) Supply of fuels and lubricants.
  - (a) Kinds and quantities available.
  - (b) Source of supply.
  - (c) Location and capacity of fuel storage facilities (tank farms).
  - (d) Location, size, terminals, decanting points, and operating capacity of petroleum pipelines.
- (5) Evidence of unconventional design, use of materials, manufacturing methods, or concepts.

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b. Inventory--number or amounts available by types and categories:

- (1) In service, out of service for repairs, other.
- (2) Age range, condition, capacity, and use.
- (3) Spare parts and supply position.
- (4) Outstanding features, including unconventional aspects and differences with respect to design and performance of US equipment and materiel.

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c. Description--detailed individual description of each major item or unit and its components, accessories, and attachments, including--

materials

- (1) Nomenclature.
- (2) Purpose, use, and capabilities.
- (3) Characteristics, including all essential operational planning and development data.
- (4) Fuels and lubricants.
- (5) Maintenance and repair aspects.
- (6) Material and design features, including reference to unconventional aspects.
- (7) Number available.

- (8) Reference data such as operating instructions, service manuals, working drawings, manufacturers' publications, and photographs.

## 10. WEATHER AND CLIMATE

- a. Nature and characteristics.
- b. Incidence and effect on transport operations of--
  - (1) Rain, snow, and ice.
  - (2) Cold, freezing, and thawing.
  - (3) Heat, drought, and dust.
  - (4) Tornados, hurricanes, and monsoons.
  - (5) Earthquakes and tidal waves.
  - (6) Other.
- c. Local and national means and methods of coping with natural phenomena as they affect transport operations.
- d. Historical record of climatic and weather data bearing on transport operations.

## 11. TERRAIN

- a. Nature and characteristics.
  - (1) Flat, rolling, or mountainous.
  - (2) Desert, tundra, or swampy.
  - (3) Other.
- b. Influence with respect to--
  - (1) Transportation construction and maintenance.
  - (2) Type and characteristics of transportation equipment required.
  - (3) Fuels and lubricants.

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- (4) Personnel.
- (5) Scope and efficiency of transport operations.

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quired.

STANDING TRANSPORTATION INFORMATION REQUIREMENTS--  
RAILWAY

NOTE: Figures shown in this appendix indicate the types of information desired in reports concerning the requirements here listed, and suggested methods of recording such information.

1. GENERAL INFORMATION

a. A critical estimate of railway transportation in the country: its position in the economic structure, relationship to other means of transport and its adequacy for peacetime requirements.

b. Charted general characteristics of each rail line (fig. 10).

2. CHARACTERISTICS OF THE RAILWAY NETWORK

a. Total mileage by gage and number of tracks.

b. Pattern and geographical distribution.

c. Density and nature of traffic.

d. Rails, ties, and ballast (type, size, spacing).

e. Bridges and tunnels (location, description).

f. Rail ferries (location, type, capacity).

g. Fuel and water facilities (location, type, capacity).

h. Signals and communications (location, type).

i. Electrification (location, type).

j. Yards and terminals (location, type, capacity).

k. Passing sidings (location, length).

l. Loading and clearance diagrams (fig. 11).

m. Location and percent of maximum and ruling grades, and location and radius of sharpest curve (fig. 12).

n. Construction and maintenance of way machinery (type, size, capacity, inventory).

## OPERATING FACTORS

- a. Number of cars per train (passenger and freight).
- b. Average speed of passenger and freight trains.
- c. Frequency (number of trains each way per day).

## 4. EQUIPMENT (figs. 13, 14)

- a. Present condition, and interchangeability with equipment of neighboring countries.
- b. Motive power (type, number, size, weight, tractive effort, wheel arrangement, type and height of coupling)(figs. 15-18).
- c. Rolling stock (type, number, car dimension, capacity, weight)(figs. 19-21).
- d. Rail cars (type, size, capacity).
- e. Work cranes (type, size, capacity).
- f. Snow plows (type, size).
- g. Armored equipment (type, size).
- h. Repair shops (location, size).

## 5. SUGGESTED SOURCES

- a. Track charts and profiles.
- b. Bridge and tunnel lists.
- c. Clearance diagrams.
- d. Signaling book.
- e. Standard plans for way and structures.
- f. Rule book.
- g. Rail map.
- h. Station diagrams.

- i. Equipment register.
- j. Train sheets.
- k. Operating timetables.
- l. Passenger timetables.
- m. Railroad's annual report.
- n. Commercial publications.
- o. Observation.

## STANDING TRANSPORTATION INFORMATION REQUIREMENTS--HIGHWAY

NOTE: Figures shown in this appendix indicate the types of information desired in reports concerning the requirements here listed, and suggested methods of recording such information.

## 1. GENERAL INFORMATION

- a. A critical estimate of highway transportation in the country: place of highway transport in the national economy; its relationship to other modes of transportation.
- b. Brief history of highway transport and the development of the highway system.
- c. Location of the area's industry and agriculture; their influence on highway transport activity.
- d. General characteristics of the highway system.
- (1) Total highway mileage by surface types.
  - (2) Totals of each surface type subdivided according to categories of the official highway classification system.
  - (3) General condition of the highway system.
  - (4) Status of highway network development; proposed plans for development of the highway system.
- e. Adequacy of repair and fueling facilities; location of major repair and storage facilities and capacities of each.
- f. Construction and maintenance policies and procedures; comments on general efficiency of maintenance activities.
- g. Government agencies responsible for control and organization:
- (1) Highway transport agencies (for instance, an interstate commerce commission, motor vehicle agency, etc).
  - (2) Highway departments.
- h. Highway transport organizations.

Road trucks, 30" x 60" x 1 1/2" plywood, 48" panels  
 Road sleighing, 1 1/4" tongued and grooved  
 Road, 3/4" plywood, 48 panels  
 Truck side frame, cast steel (integral journal box)  
 Side bearing, friction type

40 tons, 10' x 14' x 10' x 10' x 10' x 10'  
 40 tons, 10' x 14' x 10' x 10' x 10' x 10'  
 Number of axles, 4  
 Wheels, 525 lb, 30", cast iron

Figure 21 Sample Intelligence Information

- (1) Those government-owned and operated.
- (2) Those privately owned and operated.
- (3) Size of transport organizations ((1) and (2) above).
  - (a) Number of vehicles.
  - (b) Total personnel employed.
- (4) Bus and truck routes used and frequency of operations ((1) and (2) above).
- (5) Efficiency of operations in terms of percent of vehicles deadlined, prevailing rates, etc ((1) and (2) above).
  - i. Main commodities hauled listed by truck route, if available.
  - j. Flow charts or traffic statistics indicating traffic movement over area highways--by vehicle types, if possible.
  - k. Operating factors--any known restrictions imposed upon highway transport by government decree (limiting axle loads, limiting vehicle length and widths, limiting vertical clearances, speed limits, seasonal operating restrictions, length of haul limitation, etc).
1. Vehicle inventories (fig. 22).
  - (1) Passenger cars.
  - (2) Trucks, by make, horsepower, carrying capacity, and dimensions of truck bed.
  - (3) Buses, by make, horsepower, and carrying capacity.
  - (4) Animal-drawn vehicles or beasts of burden, if applicable.
- m. Major items of road repair and maintenance equipment and their condition.
- n. Current highway map (fig. 23) indicating route numbering system and highways by surface types.

## 2. TECHNICAL DATA ON INDIVIDUAL ROUTES

- a. Pavement information (figs. 24-28).



(1) Origin and destination.

(2) Length in miles.

(3) Base types, width, thickness, and condition.

(4) Surface type, width, thickness, and condition.

(5) Roadway--width, shoulder type, and condition of shoulders.

(6) Remarks on adequacy of drainage; number of minor bridges on route with restricting width, capacity, etc.

**Principal bridges (fig. 29).**

(1) Location.

(2) Type. (See appendix VII.)

(3) Length in feet.

(4) Roadway width in feet.

(5) Capacity--by bridge class number, if possible. (See current training circular on vehicle and bridge classification systems.)

(6) Vertical clearance in feet.

(7) Clearance height of span above normal water level, in feet.

(8) Number and length of spans.

(9) Restrictions.

(10) Detours available.

**Traffic bottlenecks (fig. 30).**

(1) Location.

(2) Type--steep grade, sharp curve, ford, ferry, narrow bridge, low-capacity bridge, high water creating flooded section of road, restricting vertical clearance, etc.

(3) Length in feet.

- (4) Detours available.
- (5) Roadway width in feet (if applicable).
- (6) Vertical clearance in feet (if applicable).
- (7) Maximum grade (expressed as percent) (if applicable).
- (8) Maximum curve radius in feet (if applicable).

### 3. SUGGESTED SOURCES

Material required in paragraph 1, General Information, will be obtained from many sources; however, most information probably is obtainable from a public works office and the agency responsible for transport--for example, a ministry of transport. Material required in paragraph 2, Technical Data on Individual Routes, probably is obtainable from local highway department offices in the form of highway planning surveys, flow charts, etc, where the economic level of the region is high; if the economic level of the region is low, such information will usually not be available and will have to be obtained by route reconnaissance made with the aid of local maintenance crews. Possible sources of required information are--

- a. Public works office.
- b. Highway department central office.
- c. Resident or field offices of highway department.
- d. Road maintenance crews.
- e. Ministry of transportation, or its equivalent.
- f. Highway transport control organizations.
- g. Truckers' associations.
- h. Trucking and transit firms.
- i. Tourist bureaus.
- j. Major oil companies.
- k. Route reconnaissance.
- l. Statistical bureaus.

m. Bookstores (for yearbooks, transportation statistics, city maps, travel folders, postcards, etc).

n. State department, or its equivalent.

o. Census bureau.

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STANDING TRANSPORTATION INFORMATION REQUIREMENTS--PORTS

NOTE: Figures shown in this appendix indicate the types of information desired in reports concerning the requirements here listed, and suggested methods of recording such information.

1. GENERAL INFORMATION

- a. A critical estimate of the port: its economic importance, industries, and potential for military use.
- b. Charted general characteristics of each principal, secondary, and minor port and landing (fig. 31).

2. PHYSICAL CHARACTERISTICS

- a. Location, map references, and geographic coordinates.
- b. Entrance and approach channels.
  - (1) Controlling depth.
  - (2) Length.
  - (3) Width.
- c. Breakwaters.
  - (1) Position.
  - (2) Length.
  - (3) Construction.
- d. Description of harbor (fig. 32).
  - (1) Type.
  - (2) Harbor and channel depths.
  - (3) Extent of silting.
  - (4) Nature and frequency of maintenance dredging.

Road subject to snow blocks for 1-1/2 to 2-1/2 miles per day  
 2  
 parallel route, 30 miles west  
 NA  
 NA  
 . . . .  
 LA  
 NA  
 aprx 2,500  
 mountain pass  
 Flood waters  
 (17 miles N of Flaggen)  
 Mile 46.5 to Mile 47 (46.5 miles N of Flaggen)  
 D  
 39

- (5) Location and nature of anchorages. 1/
- (6) Underwater obstructions.
- (7) Pilotage information.
- e. Bridges regarded as shipping obstructions.
  - (1) Location.
  - (2) Type.
  - (3) Horizontal and vertical clearances at mean low water.
- f. Largest ship entering port.
  - (1) Name and date of entry.
  - (2) Length, beam, and draft.
- g. Hydrographic and weather conditions (spring and neap tidal range and intervals, currents, sea and swell, icé, winds, rainfall, storms, floods, fog, and other conditions affecting ship handling and port operations).

1/ Table I. Standard Classification System for Anchorage Berths.

CLASS I	Minimum dimensions--800-yard diameter 38-foot depth Capital naval ship or large passenger ship
CLASS II	Minimum dimensions--500-yard diameter 30-foot depth Standard oceangoing cargo vessel
CLASS III	Minimum dimensions--300-yard diameter 20-foot depth Destroyer or small cargo vessel

Increased diameters are required for depths exceeding the minimum for each class. Each anchorage should be evaluated in terms of protection from sea and weather.

h. Adjacent beaches usable by landing craft (fig. 33).

(1) Location.

(2) Length.

(3) Type.

(4) Gradient and accessibility.

## 1. TECHNICAL FACILITIES

a. Wharves, piers, and quays. (See appendix VII.)

(1) Layout and construction.

(2) General methods of operation.

(3) Details concerning principal wharves and piers, tabulated (fig. 34):

(a) Name; location, including reference number on port plan; use; type; 2/ and construction.

2/ Table II. Berth Classifications.

Class of berth	Size vessel accommodated	
	Length (ft)	Draft (ft)
General:		
A	500	30
B	460	28-24
C	350	21-17
D	250	16
E	200	12
F	100	11-6
Tanker:		
T-A	600	33
T-B	525	30
T-C	450	25
T-D	250	13
T-E	175	8

Unless otherwise indicated, berths B and C are assumed to have sufficient depth to accommodate the appropriate vessel at full draft.

- (b) Length, width, depth alongside at mean low water, usable berthing space, width of apron, height of deck above mean high water, and number and class of berths.
  - (c) Covered storage--type of construction, dimensions, number of floors, height between floors, and total floor area.
  - (d) Mechanical handling equipment--cranes, conveyors, trucks, etc.
  - (e) Rail and road connections.
  - (f) Utilities.
- b. Wet docks and semitidal basins.
- (1) Name and location.
  - (2) Length.
  - (3) Width.
  - (4) Type of gate.
  - (5) Depth over sill of locked basin.
- c. Mechanical handling facilities--cranes (fig. 35), stevedore gear, and specialized equipment.
- (1) Type.
  - (2) Uses.
  - (3) Capacities and characteristics.
- d. Harbor service craft.
- (1) Type.
  - (2) Dimensions.
  - (3) Capacity.
  - (4) Use.

(5) Power, if any.

#### STORAGE FACILITIES

a. Warehouses and transit sheds (fig. 36).

(1) Location.

(2) Owner or operator.

(3) Commodities stored.

(4) Type of construction.

(5) Dimensions.

(6) Number of floors, height between floors, total floor area (sq ft).

(7) Capacity, cubic feet or measurements tons.

(8) Rail and road connections.

(9) Fire protection.

(10) Special handling equipment.

b. Cold storage facilities.

(1) (1)-(10) above.

(2) Temperatures.

(3) Daily ice capacity.

c. Grain storage facilities.

(1) (1)-(10), subparagraph a above.

(2) Rate and method of handling grain to and from vessels.

d. Bulk liquid storage--(1)-(10), subparagraph a above, capacities expressed in barrels.



- e. Open storage areas.
  - (1) Location of suitable areas.
  - (2) Size.
  - (3) Rail and road connections.
  - (4) Approximate capacity.
  - (5) Distance from ship berths.

## 5. CLEARANCE FACILITIES

- a. Rail lines.
  - (1) Connecting points.
  - (2) Number of tracks, and gage.
  - (3) Trackage in waterfront area.
  - (4) Location and size of classification yards.
- b. Highways.
  - (1) Location, width, type, and condition.
  - (2) Connecting points.
- c. Inland waterways.
  - (1) Connecting points.
  - (2) Width and depth.
  - (3) Number, type, and capacities of craft in service.
- d. Pipelines.
  - (1) Location.
  - (2) Size and capacity.

## 6. PORT ACTIVITIES

- a. Average monthly cargo tonnage handled.
- b. Methods of cargo handling and transfer.
- c. Bottlenecks.
- d. Availability and efficiency of labor supply.

## 7. SUPPLIES

- a. Petroleum and coal storage.
  - (1) Location, owner, type, and capacity.
  - (2) Description of bunkering facilities.
  - (3) Amount of stocks normally maintained in the port.
- b. Water.
  - (1) Availability.
  - (2) Quality.
  - (3) Method and rate of supply.
- c. Electric power and lighting.
  - (1) Availability in port and on wharves.
  - (2) Source and characteristics of current.
- d. Provisions and supplies on hand and their quality.

## 8. REPAIR FACILITIES

- a. Repair yards.
  - (1) Name, location, layout, activities, and capabilities.
  - (2) Summary of drydocks, marine railways, fitting-out and repair berths, mechanical facilities, and utilities.
  - (3) Size, construction, and layout of shops and foundries.

- (4) Number, categories, and quality of personnel.
- b. Graving docks.
- (1) Name, location, and construction.
  - (2) Dimensions--width of entrance at coping, width of entrance at mean high water level, depth over entrance sill at mean high water, length on top of dock, length on floor of dock, depth over keel blocks at mean high water.
  - (3) Type, and mechanism, of gate.
  - (4) Dewatering and flooding rates.
  - (5) Lift facilities.
  - (6) Capacity of dock.
  - (7) Age and condition of dock.
  - (8) Availability of water, steam, electricity, and compressed air.
- c. Floating docks.
- (1) Name, location, and construction.
  - (2) Dimensions--over-all length, maximum length on keel blocks, over-all width, width between side walls, maximum depth over keel blocks, maximum draft of dock.
  - (3) Pumping plant rates.
  - (4) Lift facilities and capacity.
  - (5) Capacity of dock.
  - (6) Age and condition of dock.
  - (7) Availability of water, steam, electricity, and compressed air.
- d. Marine railways.
- (1) Name, location, type, and construction.

- (2) Cradle dimensions.
- (3) Depth over blocks.
- (4) Declivity.
- (5) Hauling machinery.
- (6) Hauling capacity.
- (7) Capacity by vessel type and size.

f. Statist  
g. C  
h.

## 9. PORT ADMINISTRATION

- a. Ownership, authority, and operation of the port.
- b. Quarantine, customs, immigration and police service.
- c. Security organization.
- d. Free-port organization.
- e. Summary of port regulations and practices.

## 10. PORT TRADE

Statistics on volume of shipping, imports, and exports; ratio of port's trade to the national total.

## 11. PLANNED DEVELOPMENT AND IMPROVEMENTS

Plans, if any, for new harbor works or expansion of port facilities.

## 12. SUGGESTED SOURCES

- a. Harbormaster or port engineer.
- b. Port authority (similar to New York Port Authority).
- c. Weather bureau.
- d. Hydrographic office.
- e. Chamber of commerce.

- f. Statistical bureau.
- g. City hall.
- h. Department of labor.
- i. Maritime administration.
- j. Ministry of transport.
- k. Construction and engineering contractors.
- l. Commercial steamship lines.

## DEFINITIONS OF TERMS AND ILLUSTRATIONS OF EQUIPMENT AND FACILITIES

## 1. GENERAL

It is imperative that transportation intelligence personnel have knowledge of technical terms used in describing the capabilities and capacities of the various modes of transportation. Standardization of such terms results in accurate and uniform reports, in adequate comparisons, and in more complete assistance to the logistical planner. Department of the Army technical and field manuals and other publications should be referred to, when necessary, to ascertain that the terms used in reporting will be properly interpreted by those utilizing the transportation information or intelligence. Some of the more common terms used in connection with the various modes of transportation and related facilities are defined, and equipment and facilities pictured, below (FM 101-10, FM 5-10, TM 5-627, TM 9-2800).

## 2. RAILROADS AND TERMINALS

Ballast. Selected materials placed on the roadbed to hold track in line and surface. Usually consists of hard particles, easily handled in tamping, which distribute the load, drain well, and resist plant growth.

Block. A length of track of defined limits, the use of which is governed by block signals.

Clearances. A specified distance measured horizontally from the center line of a track and vertically from the top of rail to fixed objects adjacent to and above the track.

Curve resistance. The resistance offered at the drawbar to motion along a curved track over and above that offered by a straight track. (For military railway planning figures, the curve resistance is converted to, and expressed in terms of, grade resistance.)

Fastenings, rail. Splice bars (also called joint bars), bolts, and spikes. Splice bars, joined together by bolts and bolt-securing devices, are the main parts of the rail joint, although other features are sometimes present.

Gage of track. The distance in feet and inches between the heads of the running rails, measured at right angles thereto at a point five-eighths inch below the top of the rail. Gage of track is referred to as standard, broad, narrow, and meter. Standard gage is 4 feet 8 1/2 inches.

Grade resistance. Resistance to the progress of a train, caused by an incline, due to the action of gravity which tends to pull the train downhill.

Grade, ruling. Any grade on a division or length of line which limits the tonnage a locomotive may haul. Grade lines are expressed in percent. The rate of grade--that is, inclination of the track from the horizontal--is the vertical rise in feet divided by the horizontal distance expressed in 100-foot stations.

Gross trailing load. The maximum total weight or load a locomotive may pull behind it on a grade or level track.

Line, length of. The mileage of the right-of-way which makes up an operating railroad between defined locations. A mile of railroad may consist of a single track, or two, three, and sometimes four tracks, and will include sidings and spur and yard tracks.

Profile. A longitudinal section through a track which shows elevation and depression. Also, a drawing showing grade line of a railroad, usually obtained from levels taken on top of the rail.

Railroad, serving. A common carrier connecting its tracks to government-owned tracks for delivery or receipt of freight.

Rail, running. The rail or surface on which the wheel bears, as distinguished from a wing rail or guard rail.

Right-of-way. Land or water rights necessary for the roadbed and its accessories.

Roadbed. The finished surface of roadway upon which track and ballast rest.

Rolling stock. Boxcars, gondolas, flatcars, tank cars, and refrigerator cars.

Ruling curvature. Any curve which, due to its degree of curvature and maximum safe superelevation, limits the timetable average speed of trains over a division or length of line.

Station, regulating. Assemblage of facilities provided on communications lines between ports or terminals and railheads to direct and control supply and personnel movements to and from the combat zone, and, when necessary, from the zone of the interior to the theater of operations.

Surface. When used with respect to track, condition of the track as to vertical evenness or smoothness over short distances.

Terminal, engine. Includes engine storage, shelter, and repair facilities, coaling station, cinder pit, and water and oil station.

Track, length of. The length of track or track mileage used as the actual measurement of single, multiple, spur, or yard tracks between defined locations. Thus, 1 mile of railroad may embrace several miles of track.

Track, spur. A stub track diverging from a main or other track.

Train density. Number of trains per 24-hour day which can be operated in each direction over a railway line. Work trains are not included in computing train density.

Train load, net. The pay load, or the actual weight of the commodities carried in the cars of a train.

Wye. Triangular arrangement of tracks used for turning engines, cars, or trains.

Yard. A system of tracks within defined limits, provided for making up trains, storing cars, and other purposes, over which movements not authorized by a timetable or train order may be made subject to prescribed signals and rules or special instructions.

Yard, classification. A yard in which cars are classified or grouped in accordance with freight-movement requirements.

Yard, departure. Yard in which cars are assembled in trains for forwarding.

Yard, receiving. A system of tracks within defined limits, used for temporary storage of cars.

Yard, storage. Yard in which cars are held awaiting disposition.

### 3. HIGHWAYS, ROADS, STREETS, AND TRAILS

#### Bridges (fig. 43<sup>(1)</sup>-<sup>(4)</sup>).

a. Abutment. The ground support at the end of a bridge. It may consist of a concrete abutment, masonry abutment, pile bent, or crib type support with the necessary backwall or end dam.

b. Crib. A type of wall or understructure consisting of wooden crib-work filled with stone.



c. End dam. A wall of planks at the end of a bridge to keep the approach road from caving in between stringers.

d. Footing. That part of any bridge support which rests directly on the ground. It distributes the load over an area sufficient to keep the support from sinking into the ground.

e. Load, dead. Weight of the bridge itself.

f. Load, impact. The added burden that results from the movement of live loads--the bouncing effect on rough surface of bridge, acceleration and braking of vehicles, etc.

g. Load, live. The weight of anything that moves on the bridge--troops, animals, or vehicles.

h. Pile bent. Vertical member, called a pile, which is driven into the ground; a top horizontal member, called a cap; and bracing.

i. Stringers. Longitudinal members resting on, and spanning the distance between, transverse supports (transoms), intermediate supports, or abutments.

#### Highways and roads.

a. Aggregate. Natural or man-made material with rocklike particles ranging from 1/4 to 2 1/2 inches in diameter, with or without artificial binder, used as a subgrade, base, or surface for a road. It usually refers to gravel or crushed rock and is sometimes called road metal.

b. Base course. The material between the surface course and the subgrade.

c. Bottleneck. An unintentional obstacle that impedes traffic--for instance, narrow bridge, narrow tunnel, or narrow section of road.

d. Crown. The difference in elevation between the center of the road-bed and its edges, expressed in inches.

e. Culvert. Any structure not classified as a bridge which provides an opening for drainage across a road.

f. Foundation. The ground over which a road is built. It may be the natural ground or it may be fill material plus natural ground.