



American Railway Engineering and
Maintenance-of-Way Association

CHAPTER 11

COMMUTER AND INTERCITY RAIL SYSTEMS¹

FOREWORD

(UNDER DEVELOPMENT)

NOTE: This chapter is being developed by Committee 11, which was formed in 1998. Additional material will appear in future Manual Revisions.

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¹ The material in this and other chapters in the AREMA Manual for Railway Engineering is published as recommended practice to railroads and others concerned with the engineering, design and construction of railroad fixed properties (except signals and communications), and allied services and facilities. For the purpose of this Manual, RECOMMENDED PRACTICE is defined as a material, device, design, plan, specification, principle or practice recommended to the railways for use as required, either exactly as presented or with such modifications as may be necessary or desirable to meet the needs of individual railways, but in either event, with a view to promoting efficiency and economy in the location, construction, operation or maintenance of railways. It is not intended to imply that other practices may not be equally acceptable.

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INTRODUCTION

The chapters of the AREMA Manual are divided into numbered Parts, each comprised of related documents (specifications, recommended practices, plans, etc.). Individual Parts are divided into Sections by centered headings set in capital letters and identified by a Section number. These Sections are subdivided into Articles designated by numbered side headings.



Page Numbers – In the page numbering of the Manual (11-2-1, for example) the first numeral designates the Chapter number, the second denotes the Part number in the Chapter, and the third numeral designates the page number in the Part. Thus, 11-2-1 means Chapter 11, Part 2, page 1.

In the Glossary and References, the Part number is replaced by either a “G” for Glossary or “R” for References.



Document Dates – The bold type date (Document Date) at the beginning of each document (Part) applies to the document as a whole and designates the year in which revisions were last made somewhere in the document, unless an attached footnote indicates that the document was adopted, reapproved, or rewritten in that year.

Article Dates – Each Article shows the date (in parenthesis) of the last time that Article was modified.



Revision Marks – All current year revisions (changes and additions) which have been incorporated into the document are identified by a vertical line along the outside margin of the page, directly beside the modified information.

Proceedings Footnote – The Proceedings footnote on the first page of each document gives references to all Association action with respect to the document.



Annual Updates – New manuals, as well as revision sets, will be printed and issued yearly.

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Part 1



Introduction

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SECTION 1.2 SAFETY/SECURITY

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Part 2



Corridor Planning Considerations

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SECTION 2.1 GENERAL INFORMATION

2.1.1 UNDER DEVELOPMENT

2.1.2 UNDER DEVELOPMENT

2.1.3 ENVIRONMENTAL (2009)

2.1.3.1 The Environmental Process

Commuter and Inter-City rail transportation supports the economic vitality of the nation's urban centers and is therefore generally considered to be environmentally desirable. Over the years numerous laws have been enacted to

protect communities and their natural resources during major rail construction projects. Chief among these laws is the National Environmental Policy Act of 1969 (NEPA) which established a national policy of preserving and enhancing the human environment for future generations while meeting the transportation needs of the present generation.

NEPA regulations direct Federal agencies, planners and designers to integrate into their planning and decision making the natural and social sciences, environmental amenities and values, and the design arts along with the necessary engineering and economic considerations. In addition to NEPA, and where federal funding is not involved, the provisions of other statutes, regulations and executive orders affect the decision making on transportation projects. These mandates and considerations cover such concerns as air and water quality, historic preservation, parklands, protection, habitat preservation, civil rights and social burdens of transportation investments. It is important to note that NEPA is a significant environmental law but is only one of many laws that may be applicable and govern the environmental process. It is suggested that an environmental professional be consulted regarding environmental issues that affect planning, construction and operation.

SAFETEA-LU permits States that "re-engineered" their environmental review process to streamline transportation decision making under the provisions of §1309 of the Transportation Equity Act for the 21st Century (TEA-21) to request a grandfathering exemption to continue operating their program under those processes.

The Federal Transit Administration in cooperation with the operating agency (applicant) will perform the work necessary to complete a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS) and comply with related environmental laws and regulations to the maximum extent possible during the NEPA process. This work included environmental and related engineering studies, agency coordination and public involvement.

In accordance with 23 CFR, typically final design activities, property acquisition, purchase of construction materials or rolling stock, or construction will not proceed until the following have been completed:

- a. The action has been classified as a categorical exclusion (CE), or
- b. A FONSI has been approved, or
- c. A final EIS has been approved and available for the prescribed time period and a record of decision (ROD) has been signed.

2.1.3.2 Air Quality

Commuter and Inter-City rail projects that are funded with federal funding must meet the requirements of the Clean Air Act in addition to NEPA. The Clean Air Act contains detailed transportation conformity requirements to ensure that federally funded rail projects conform to the applicable State (air quality) Implementation Plan which documents the measures taken to attain the national air quality standards. The conformity is governed by a regulation issued by the Environmental Protection Agency 40 CFR Part 93.

Mass transit or rail projects that are federally funded must meet the requirements of the Clean Air Act in addition to those required as part of the NEPA process. This act contains "conformity" requirements the purpose of which is to ensure that the projects conform to the applicable State (air quality) Implementation Plan (SIP) to attain national air quality standards.

2.1.3.3 Endangered Species

U.S. federal law protects critical rare animal and plant species and their habitats. The Endangered Species Act of 1973 (16 U.S.C. 1531) provides for the protection of species that are at risk of extinction throughout all, or a significant portion of their range, and for the protection of ecosystems on which they depend.

The Federal Transit Administration (FTA), in consultation with Fish and Wildlife Service (FWS) or National Fisheries Service (NMFS) ensure that no federally funded commuter rail projects will jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. Agencies,



planners and designers should contact the FWS and NMFS during project scoping for information about listed species that may be present.



2.1.3.4 Environmental Justice

Under Executive Order 12898 (EO 12898) and the U.S. Department of Transportation's order, consideration of environmental justice issues must be considered during preparation of alignment alternatives and Environmental Impact Statements (EIS). Some principles are as follows:

- a. The composition of affected areas to determine whether minority populations, low-income populations, or Indian tribes are present should be considered as to whether there may be a disproportionately high and adverse human health or environmental effects on these populations.
- b. Develop effective public participation strategies that assure meaningful community representation.
- c. Where a disproportionate and adverse environmental impact is identified, consideration should be given to relevant demographic, public health and industry data concerning the potential for exposure to human health or environmental hazards in the affected population to the extent that this information is readily available.
- d. The relative impact of alternatives should be considered, and measured to avoid, minimize, and mitigate impacts should be evaluated.



2.1.3.5 Floodplains

A floodplain is the lowland adjacent to a river, lake or ocean and is likely to be designated by the rarity of the flood that is large enough to inundate them, i.e. 10-year or 100-year. Executive order 11988, "Floodplain Management" places special importance on floodplains and avoids conducting, allowing or supporting actions on a floodplain. When planning a rail project, maps of the Federal Insurance Administration should be consulted to determine if the proposed project site is located within the 100-year floodplain. Flood Insurance Rate Maps (FIRMs) are usually available for review at local zoning or planning commission office and if they are not available for a particular area, a flood hazard boundary map should be reviewed. If the proposed project is located within a floodplain, a detailed analysis should be included in the environmental assessment document as specified in the US Department of Transportation Order 5650.2. "Floodplain Management and Protection", April 23, 1979.



2.1.3.6 Hazardous Materials & Brownfields

The uncontrolled disposal of industrial waste creates adverse impacts on public health and the environment. Materials that may constitute hazardous waste include petroleum products, pesticides, organic compounds, heavy metals, or other compounds injurious to human health and the environment. The nature and extent of contamination can vary widely, and early detection, evaluation, and remediation of hazardous waste is essential to minimize project delays.

Brownfields are abandoned, idled, or underused industrial and commercial properties where improvement or redevelopment is complicated by real or perceived contamination.

Generally, every project that includes the purchase of new right-of-way, excavation, and/or structure demolition or modification will at least require an initial or preliminary site assessment to determine if any potential hazardous waste is within the project limits as part of the FTA process.

Several federal laws have been established to ensure remediation of contaminated sites including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund"). The Resource Conservation Recovery Act (RCRA), the Oil Pollution Act (OPA), the Underground Storage Tank (UST) program and the Federal Highway Administration (FHWA) and FTA Policy on Brownfields Economic Redevelopment Initiative.

2.1.3.7 Historic, Archeological, and Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 requires projects that include federal participation to take into account the effects on any properties listed, or eligible for listing, on the National Register of Historic Places. Historic properties may include districts, sites, buildings, structures, or objects older than 49 years old. Archeological sites are also protected under this Act and the process is applied in a similar fashion when excavation for a transit project is required. Properties impacted by a project are also subject to Section 4(f), see “2.1.3.10 Parklands”.

2.1.3.8 Navigable Waterways and Coastal Zones

Navigable waterways are those waters of the U.S. that are subject to the ebb and flow of the tide shoreward to the means high water mark, and that are presently used, have been used in the past, or may be susceptible to use for transport of interstate or foreign commerce. Commuter rail projects that affect navigable waterways are subject to permitting and review. The River and Harbor Act of 1899 requires that the Secretary of the Army issue permits for various activities. Section 9 of the Act requires authorization from the US Army Corp of Engineers (USACE) prior to construction of a dam or dike across a navigable waterway. Section 10 of the Act requires USACE authorization prior to construction of any structure over, excavation from, or disposal of materials into navigable waters.

Coordination with the US Fish and Wildlife Service and the appropriate state wildlife agency is required when a project impounds, diverts, channelizes, or otherwise controls or modifies the waters of any stream or body of water.

If a project will directly affect the coastal zone of any state, the environmental assessment document must show whether the project will be consistent with the Coastal Zone Management (CZM) Plan.

2.1.3.9 Noise and Vibration

The Federal Transit Administration recently published updated guidance on how to assess noise and vibration impacts of proposed mass transit projects, “Transit Noise and Vibration Impact Assessment, May 2006”. Project sponsors seeking funding from the FTA must address these impacts during the environmental review process and this guidance sets out the procedures for accurately predicting and assessing the magnitude of these impacts. For speeds over 90 mph refer to the Federal Railroad Administration (FRA) “High Speed Ground Transportation Noise and Vibration Impact Assessment”, October 2005.

2.1.3.10 Parklands

The Section 4(f) compliance process as described in 49 U.S.C. 303 states that a special effort must be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. A transportation project or program requiring the use of such land will be approved only if there is no prudent and feasible alternative to using that land and if the project or program includes planning to minimize harm to the land and resources.

2.1.3.11 Social & Economic Impacts

If land is to be acquired for a rail project, the project’s environmental assessment documentation should contain a description of the land to be acquired. Where the acquisition displaces businesses or individuals, there is a social impact that must be analyzed as part of the process. The analysis identifies the characteristics and needs of persons and businesses to be displaced, describes inventory available of comparable replacement dwellings and sites, discusses potential relocation problems, and describes methods to mitigate adverse impacts. Federal regulations implementing “the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970” are contained in 49 CFR Part 24.

Rail projects affect the social environment and may change the physical layout, demographics, and sense of neighborhood in local communities. As part of the NEPA process, project sponsors and engineers should work with local planning agencies and conduct public outreach to determine the impacts of a proposed project on communities and identify methods to avoid, minimize and mitigate impacts such as creating physical and



psychological barriers; changes in land use patterns; circulation patterns; access to services; changes in population densities; and effects on neighborhood cohesiveness.



Sections 3 and 5 of the Urban Mass Transportation Act require that federally funded transit projects be consistent with official plans for the development of an area as well as the community's goals and objectives.

2.1.3.12 Transportation Impacts



Construction of new rail facilities and/or expansion of services may affect existing rail operations. The impacts should be analyzed and discussed as part of the environmental assessment documentation. Rail considerations include: changes in geographical areas of service; travel times and reliability; frequency and hours of service; changes in patronage and demand; changes in transit mode; changes in station access and circulation; and increased traffic around stations and depots.



2.1.3.13 Water Quality

Wastewater generated by rail system maintenance and storage facilities can contain a number of pollutants that through improper handling and treatment, can be released into stormwater systems. The project environmental documents should discuss any activities that could generate wastewater (e.g. vehicle washing and floor wash-downs) and the provisions for containing possible pollutants. Stormwater runoff from parking areas may contain pollutants and if a project changes the existing runoff pattern and analysis should evaluate the magnitude of any impacts.



Mitigation measures should be used to control chemical and detergent use and to remove oil grease, and solid materials at the source. A National Pollutant Discharge Elimination System (NPDES) permit issued under Section 402 of the Clean Water Act may be required if wastewater is discharged into the stormwater system.



2.1.3.14 Wetlands

Wetlands are lowland areas that are inundated or saturated by surface or ground water at a frequency that, under normal circumstances, supports a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas that tend to be highly productive in providing habitat for many species of plants, fish or waterfowl. The USDOT "Order on Preservation of the Nation's Wetlands" and the planning process require that an analysis of potential wetland impacts be performed and included in the environmental assessment documents. If the analysis shows significant impacts on wetlands, an Environmental Impact Statement will usually be required.

Any mass transportation or rail project that involves discharge of dredged or fill material to waters of the US, including wetlands, is subject to the "Section 404" permitting process, established under the Clean Water Act and jointly run by the USACE and the US Environmental Protection Agency (USEPA).

2.1.3.15 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires consideration of impacts to Essential Fish Habitat (EFH). The consultation generally applies to anadromous or salt water species. It requires consultation with the National Marine Fisheries Service whenever a project impacts waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

SECTION 2.2 PLANNING

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SECTION 2.3 DATA COLLECTION

UNDER DEVELOPMENT



SECTION 2.4 CORRIDOR IDENTIFICATION

UNDER DEVELOPMENT



SECTION 2.5 CORRIDOR EVALUATION

UNDER DEVELOPMENT



SECTION 2.6 IDENTIFICATION OF TECHNOLOGY

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SECTION 2.7 MULTI-MODAL INTERFACES

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SECTION 2.8 CORRIDOR IMPLEMENTATION CONSIDERATIONS

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Part 3

Track and Roadway Considerations

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SECTION 3.1 GENERAL INFORMATION

UNDER DEVELOPMENT

SECTION 3.2 SYSTEM DESIGN CRITERIA

3.2.1 GENERAL (2006)

The design of the track and roadway is a fundamental part of the entire rail system. It is seldom possible to design a track system in isolation, therefore the designer must optimize an existing or proposed corridor using design criteria that meet the service objectives with reasonable economy. Several of the track design criteria interact strongly with the overall system design and the designers must maintain contact with all stakeholders so that expectations of the planners, funding agencies, regulatory agencies, governing boards, and operating departments are met.

Design criteria and specific standards should never be regarded as a completed work, but rather a set of guidelines that are open to refinement from knowledge gained by actual operating experience, from peers, from suppliers, or due to regulatory change.

For further discussion of corridor planning considerations, see [Part 2](#) of this Chapter.

3.2.2 SAFETY/SECURITY (2006)

To be Developed

3.2.3 MIXED PASSENGER AND FREIGHT (2006)

Track design considerations on mixed use passenger and freight lines will be dependant to a large degree on the ownership of the corridor. Where the commuter agency owns the corridor and operates the majority of the trains, the track design can be optimized more for the passenger operations.