PART 1

Project Design Development

Published January 2013

NOTE: Revisions to these chapters occurring after January 1, 2013 are not included in this document, but will be included in the 2014 *Indiana Design Manual*. Users should consult Design Memoranda issued during 2013 for details related to revisions to this manual between January 1, 2013 and January 1, 2014.

CHAPTER 102

Project Development

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CHAPTER ONE

INDOT Organization

This Chapter discusses the organization and functions of those entities within the Indiana Department of Transportation which interact with the Production Management Division. The Chapter provides the following:

1. a brief discussion of each division operating under its respective deputy commissioner; and

2. a brief discussion of field operations.

1-1.0 ORGANIZATIONAL CHART

Figure 1-1A, INDOT Organization, shows the organization of the Indiana Department of Transportation as of July 2007.

1-2.0 COMMISSIONER

The commissioner has been appointed by the Governor to oversee all aspects and work of the Department.

1-3.0 BUSINESS AND ASSETS MANAGEMENT DEPUTY COMMISIONER

This deputy commissioner oversees the Office of Research and Development.

The office conducts research and administers the INDOT research program. To fulfill this responsibility, the research program coordinates, on behalf of the Department, with the State's universities and associations, the State's industry and national affiliations for expertise and technical assistance in solving INDOT's transportation problems.

The office is also responsible for performing specialized pavement and research testing for various programs and needs within INDOT. This includes friction testing, deflection testing, accelerated pavement testing, etc. The office also tracks implementation and reports on savings achieved. The office also assists the Department in information transfer and new technology introduction through its Technology Transfer Program.

The office includes the Transportation Systems, Pavement Materials, and Structures and Construction Research teams.

1. Transportation Systems Team. The team's responsibilities are as follows:

   a. conducts research in pavement management, bridge management, congestion management, safety management, pavement performance modeling, traffic engineering, intelligent transportation systems, highway safety, system modeling, and overall transportation management systems;

   b. provides statistical, roadway data processing, and analysis support for INDOT;

   c. coordinates research results and new proven technologies implementations;

   d. oversees pavement-friction testing, the skid-accident-reduction program, and identifies potential wet-weather accident sites for INDOT;

   e. oversees pavement evaluation using ground penetrating radar which determines thickness of pavement layers and identifies deficient pavement joints;

   f. conducts and oversees policy related research studies; and

   g. provides truck weigh-in-motion data analyses for pavement design and transportation analyses.

2. Pavement Materials Team. The team's responsibilities are as follows:

   a. conduct and/or oversee research into the structural performance of pavements and the materials used in their construction, rehabilitation, and maintenance;

   b. provide deflection testing and analysis for undersealing, cracking and seating, and overlay design;

   c. direct operation of the Falling Weight Deflectometer Calibration Center for pavement deflection testing;

   d. direct operation of the Accelerated Pavement Testing Facility;

   e. direct operation of the Research Laboratory ;

   f. conduct field and forensic investigations of pavements; and

g. facilitate technology transfer within and outside the Department.

3. Structures and Construction Research Team. The team's responsibilities are as follows:

a. provide electronic and electrical support to INDOT's specialized testing systems and various research projects;

b. design, develop, and upgrade electronic computer-controlled test systems, which collect data that supports contracts, resurfacing priorities, safety programs, and various State and Federal programs;

c. conduct and oversee research and testing associated with structures, construction, contracts, hydraulics, and environmental issues including the reuse of waste materials;

d. provide technical support to research projects in regards to field evaluations and laboratory testing; and

e. provide support in planning and operation of the INDOT / JTRP research program.

1-4.0 CHIEF OF STAFF

The Chief of Staff oversees the overall operations of the Contract Administration, Communications, Employee Safety, and Local Programs divisions.

1-4.01 Contract Administration Division

The division includes the offices of Office Administration, Estimating, Contracting, and Prequalification Engineering.

1-4.01(01) Office Administration

The office serves as a clearinghouse for all information supplied to media outlets. It provides uniformity and control over the content of such information.

1-4.01(02) Office of Estimating

The office includes the Construction Cost, and Bid Review and Estimating teams.

1. Construction Cost Team. The team's responsibilities are as follows:

    a. properly identifying the Department and FHWA codes, funding splits, etc., for all contract items;

    b. performing all necessary administrative work for contract bid letting.

2. Bid Review and Estimating Team. The team's responsibilities are as follows:

    a. preparing the Engineer's Estimates;

    b. conducting contract lettings;

    c. reviewing bids to determine a low bidder for each contract;

    d. determining that the low bidder is in accordance with the Department's contracting requirements; and

    e. awarding contracts to such lo bidders.

1-4-01(03) Office of Contracting

The office includes the Consulting Services, Document Control, and Local Program Assistance teams.

1. Consulting Services Team. The team coordinates scheduling and plan submittal distribution for in-house and consultant plan development activities and negotiates and administers consultant design contracts. The team performs the activities as follows:

    a. reviews and updates schedules for in-house and consultant plan development activities;

    b. prepares project lists for advertisement in Professional Services Bulletins;

    c. accumulates, summarizes, and distributes consultant evaluation data;

    d. prepares consultant data reports for use in consultant selection;

e. estimates and negotiates fees and schedules for plan-development contracts;

f. initiates Purchase Orders and reviews and approves consultant invoices; and

g. receives, logs, and distributes submittals to and from the Production Management Division's Roadway Review and Bridge Engineering teams, and consultants, for all INDOT projects.

2. Document Control Team. The team prepares the contract documents, prepares the engineer's estimate and administers the highway contract lettings. More specifically, the team is responsible for the following:

a. preparing the Proposal for each contract identifying the location, scope and requirements of the contract;

b. receiving orders and shipping documents for lettings and other manuals to INDOT customers;

3. Local Program Assistance Team. BRUNO CANZIAN

1-4.01(04) Office of Prequalification Engineering

The office is responsible for the prequalification of contractors desiring to bid on contracts for the construction and maintenance of State-maintained routes and bridges.

1-4.02 Communications Division

The division oversees the work of the offices of Public Information, Graphic Arts, and Local Service.

1-4.02(01) Public Information Office

The office represents public information and public relations. Most of the personnel are located in the Central Office. A communications officer is assigned to Northwest Indiana, working out of the Governor's satellite office in Gary.

The office's primary responsibility is media relations. Secondary responsibilities include public inquiries and correspondence for the Governor and state legislators with regard to INDOT issues.

A stills photographer is assigned to the unit to document major events such as groundbreakings, road openings, or bridge dedications.

The office handles internal communications and certain special events such as INDOT's booth at the State Fair.

1-4.02(02) Graphic Arts Office
JOHN JACKSON

1-4.02(03) Local Service Office
LYLE SADLER

The office includes the General Public and Service Providers teams.

1-4.03 Employee Safety Division
CALVIN LEE

1-4.04 Local Programs Division

The division develops policy, procedures, and guidelines regarding its offices of Aviation, Rails, Transit, and Local Programs. The division is responsible for managing the state's aviation, rails, public transportation, and includes teams responsible for each program. The division provides technical assistance to elected officials and entities which provide public transportation and operate airports. The division inspects and regulates the aviation and rail modes.

1-4.04(01) Office of Aviation
KEVIN RECTOR

1-4.04(02) Office of Rails
MICHAEL RILEY

1-4.04(03) Office of Transit
LARRY BUCKEL

1-4.04(04) Office of Local Programs

RICK WHITNEY

1-5.0 DISTRICT OPERATIONS AND TRAFFIC MANAGEMENT DEPUTY COMMISSIONER

This deputy commissioner oversees the work of the Traffic Management Centers, Technology Deployment, Traffic Control Systems, and Public Safety Operations divisions.

1-5.01 Traffic Management Centers Division

The division is responsible for all activities associated with INDOT's two Traffic Management Centers (TMC) in Gary and Indianapolis, utilizing the devices deployed by the Technology Deployment Division and operating the Hoosier Helper Freeway Service Patrol. Each TMC includes a Communications Team and an Operations Team.

1-5.02 Technology Deployment Division

The division is responsible for the design, maintenance, and successful operation of ITS field devices.

1-5.03 Traffic Control Systems Division

The division is responsible for coordinating with the districts to maximize the efficiency of traffic signal systems on INDOT's non-freeway arterials.

1-5.04 Public Safety Operations Division

The division is responsible for incident management as it relates to public-safety agencies outside of INDOT, most notably law enforcement, fire departments, emergency medical services, and the Indiana Department of Homeland Security, as well as partnering with law enforcement to ensure that commercial vehicle weight laws are enforced, thus protecting INDOT's investment in infrastructure.

1-6.0 DISTRICT DEPUTY COMMISSIONERS

Each such deputy commissioner coordinates the activities of one of the six districts in the State, identified as follows:

1. Crawfordsville, west central;
2. Fort Wayne, northeast;
3. Greenfield, east central;
4. LaPorte, northwest;
5. Seymour, southeast; and
6. Vincennes, southwest.

1-6.01 Districts

The districts are further divided into a total of 37 subdistricts which oversee general maintenance such as snow and ice removal, pothole patching, sealing, mowing, and minor paving. Each subdistrict has three or four maintenance units which are responsible for maintenance of a specific geographic area. Each subdistrict employs mechanics who maintain INDOT's vehicle and equipment fleet.

The basic function of each district office is to provide the necessary field services for the Department within that district's geographic boundaries. Each district office develops and oversees construction projects; addresses traffic control issues such as traffic signals, signs, and speed limits; and tests the materials used in construction projects to ensure that quality materials are used. Each district office also resolves environmental concerns and maintenance operations in its area. More specifically, the responsibilities of each district office include the following:

1. operating and maintaining the State highway system;

2. providing construction inspection for Department construction projects;

3. nominating projects for capital improvements and identifying the preliminary project scope of work;

4. reviewing requests for private access onto the State highway system;

5. serving as liaison between the local governments and the Department's Central Office;

6. performing field surveys;

7. performing field tests for highway construction projects;

8. participating in public hearings and public information meetings;

9. reviewing and commenting on the proposed traffic control plan during construction; and

10. responding to public inquiries.

1-6.02 Typical District Organization

Each district office is organized as outlined below.

1. Business and Human Resources Division
    a. Finance Accounting Office
    b. Personnel Office
    c. Business Consulting Office
    d. Facilities and Environment Program Office
2. Planning and Programming Division
    a. Program Management Office
    b. Environmental Scoping Office
    c. System Assessment Office
        (1) Permits Team
        (2) Traffic Team
        (3) Bridge Inspection Team
3. Public Information Division
4. Safety and Health Program Division
5. Production Division
    a. Surveying Office
    b. Real Estate and Right of Way Office
    c. Design Office
        (1) Two Design Teams
        (2) Central Office Virtual Design Team
        (3) Consultant Services Office
6. Highway Management Division
    a. Construction Office
    b. Testing Office
    c. Traffic Office
    d. Roadway Services Office

1-7.0 FINANCE DEPUTY COMMISSIONER

This deputy commissioner oversees the work of the Project Accounting, Budgeting, and Procurement; Accounting; Cost Accounting and Audits; and Business Information and Technical Systems divisions.

1-7.01 Project Accounting, Budgeting, and Procurement Division

The division is responsible for maintaining the financial record for INDOT, controlling the financial activities of all other divisions, and providing financial services to INDOT employees, customers, and vendors. The division's activities include issuance of paychecks, reimbursement of employees' travel expenses, and paying INDOT vendors.

The division is responsible for developing and implementing a fiscal plan which maximizes the financial resources of INDOT to enable the effective operations of the State's transportation facilities while ensuring that optimal resources are devoted to State and local transportation infrastructure investment. This is accomplished by providing financial information and fiscal planning guidance and services.

The responsibilities of the division also include developing the construction and operating budgets, monitoring and administering the overall agency budget, scheduling Federal-aid construction projects, managing the allocation of obligation authority for projects, developing revenue forecasts, and developing recommendations for Departmental positions on fiscal matters.

The division performs the activities as follows:

1. developing and monitoring the Department's operating budget;

2. continually monitoring the Department's goals and ensuring that budgets are in place to meet the goals;

3. maintaining liaison with the State Budget Agency;

4. assisting in all cost/benefit analyses;

5. preparing revenue forecasts;

6. prepares statistical studies on critical funding issues;

7. develops models to determine the availability of highway funding in the future; and

8. assists in preparing cost-benefit analyses of proposal expenditures.

The division includes the offices of Project Accounting, Budget, and Procurement.

1-7.01(01) Office of Project Accounting

The office performs the activities as follows:

1. developing and monitors the construction budget;

2. programming the allocation of obligation authority for Federal-aid highway projects;

3. scheduling highway projects for construction;

4. coordinating lettings;

5. coordinating FMIS;

6. analyzing and improving TRNS • PORT; and

7. maintaining the production scheduling system.

1-7.01(02) Office of Budget

The office is responsible for the development of the Department's annual and biennium budgets. It provides fiscal assistance, constraints, and guidelines to all business units and programs within the Department.

1-7.01(03) Office of Procurement

The office annually acquires approximately $70 million in goods or services for INDOT customers as follows:

1. ensuring that procurements are conducted in accordance with 105 IAC 12;

2. developing a productive and motivated procurement team;

3. improving procurement processes on a continuous basis;

4. educating procurement agents on all facets surrounding procurement policies;

5. optimizing all resources to timely acquire goods and/or services for INDOT customers; and

6. employing innovative technologies throughout the Department.

The office works with each of the district and sub district locations, the Toll Road, and all Central Office divisions.

1-7.02 Accounting Division

This division includes the offices of Accounts Payable, and Fiscal Analysis and Reporting.

1-7.02(01) Office of Accounts Payable

The office serves all employees and those organizations significant to addressing payroll and insurance concerns. The office coordinates and performs activities of primary interest to all INDOT employees, including the following:

1. maintaining procedures and assisting local office personnel with processes from recording attendance to distributing payroll as issued by the Auditor of State;

2. coordinating with the Human Resources Division to guide local payroll clerks in assisting INDOT employees with their rights and responsibilities related to insurance and other benefits;

3. working closely with benefit (insurance) companies and employees to resolve related problems;

4. implementing and enforcing policy related to routine leave time (vacation, sick, personal) and coordinating special leave considerations as approved by the Human Resources Division or State Personnel Department; and

5. coordinating and facilitating the allocation of labor costs to various activities and projects to document and qualify eligible costs for reimbursement.

1-7.02(02) Office of Fiscal Analysis and Reporting

The office performs the activities as follows:

1. developing and recommending new fiscal policies and policy changes;

2. analyzing and interpreting existing and proposed Federal and State legislation;

3. coordinating INDOT's response to national transportation surveys and requests for comments on vital issues;

4. monitoring sanctionable programs and taking necessary actions to avoid penalties;

5. coordinating activities related to AASHTO; and

6. monitoring media resources to identify critical information pertaining to transportation, and apprising management as appropriate.

1-7.03 Cost Accounting and Audits Division

The division serves external vendors or customers in conjunction with assisting INDOT operating divisions and other State agencies or elected officials with financial concerns and processes.

The division includes the offices of Cost Accounting and Financial Auditing.

1-7.03(01) Office of Cost Accounting

The office coordinates its activities as follows:

1. receiving and recording all revenue due the Department, which includes billing and collection for services or products, provided by various INDOT locations;

2. maintaining procedures and coordinating all processes from the reservation of INDOT's budget to payment of amounts due vendors for services or materials received by district and division staffs; and

3. performing and coordinating with all program managers the activities related to the financial aspects of project control from project authorization through final closeout, including those projects funded by FHWA, Bond, or LPA sources;

1-7.03(02) Office of Financial Accounting

The office primarily serves the financial information needs of INDOT staff and other entities primarily within the governmental environment. The office is responsible for the activities as follows:

1. maintaining and operating the Department's accounting system which records all financial activity, controls the districts' or divisions' spending, and addresses the reporting needs of both management and operational staff;

2. performing audits of railroad, utility, and consulting invoices to ensure adherence to agreement provisions and FHWA regulations; and

3. performing various financial management activities related to financial statements, overhead rates, financial analyses, and special reports to meet the needs of INDOT, including its divisions, districts, and various other entities with financial interest.

1-7.04 Business Information and Technical Systems Division

The division manages the collection, security, and delivery of electronic data. It serves the business and support units and districts by providing information solutions that enable timely delivery of data-driven decisions.

1-8.0 BUSINESS INFORMATION TECHNOLOGY SYSTEMS DEPUTY COMMISSIONER

This deputy commissioner oversees the work of the District Information Technical Support, Business Operations, Application Development, I. T. Architecture and Data, M I. S. Planning Projects, and Network/Communications DataVoice Communications divisions.

1-8.01 District Information Technical Support Division

MIKE WOOD

1-8.02 Business Operations Division

The division provides the technical resources needed to assist the Department in planning, budgeting, and implementing approved information technology projects. Typical projects include procurement and installation of personal computers and associated software. Additional PC-related activities include installation and support for Local Area Networks.

Larger-scale projects, where data processing is mainframe based, include Outlook, Land Acquisition Management System, Road Inventory, and Scheduling. These applications are supported by division staff. Resources are provided to allow customers to interact with the division to identify their needs and solve problems that occur while using computer applications.

1-8.03 Application Development Division

The division includes the offices of Enterprise and Web Applications, CADD Development and Support, GIS Development and Support, and Highway Management Applications.

1-8.03(01) Office of Enterprise and Web Applications

The office performs the activities as follows:

a. develop/implement/support mainframe-based applications (Land Acquisition System, Physical Feature Inventory System, Permit Sales Systems, etc.);

b. provide resources to assist INDOT customers in defining application requirements (primarily mainframe applications); and

c. provide analyst resources to the Department to assist in defining their information technology requirements.

1-8.03(02) Office of CADD Development and Support

The duties of the office include the installation and support of INDOT's selected CAD, Bridge, and Road Design software and applications to any users within INDOT divisions. This office also develops custom training material and trains those same users in the use of the CAD and Design software. This office is responsible for the development of many custom tools within the CAD and Design software environment. The office is also tasked with communicating with Central Office and district users to help with the development of a unified set of CAD standards. The office is then responsible for implementing those CAD-related standards into the CAD environment to ensure that those standards are followed throughout INDOT. The office also provides access to all of the INDOT CAD Standards to the ACEC community. The office must also stay up to date on the latest versions of the CAD and Design software to guarantee that INDOT is near the leading edge in the CAD and design worlds.

1-8.03(03) Office of GIS Development and Support

JOEL BUMP

1-8.03(04) Office of Highway Management Applications

The office's duties include the following:

1. providing resources to interact with accounting, payroll, procurement, human resources, and legal functions;

2. providing general clerical support for the division.

3. providing the technical and operational resources to support the mainframe computing utility. This includes data entry, computer operations, mainframe network support, systems software, and production scheduling functions;

4. providing support for electronic connections to the Federal Highway Administration, ADVANTIS, CompuServe, the Internet, and other State agencies;

5. providing resources for Computer Security, Business Recovery, and the Help Desk;

6. providing support for the bid analysis and management system, TRNS • PORT (formerly BAMS), and coordinating responsibilities for the Construction Management and Resource Management Systems;

7. leading a work group to develop new-applications development strategies to take advantage of new methods of developing and deploying business systems with the client/server; and

8. providing Business Process Reengineering Skills.

1-8.04 I. T. Architecture and Data Division

IRFAN ALVI

1-8.05 M. I. S. Planning Projects Division

GEORGE BRASHEAR

1-8.06 Network/Communications, DataVoice Communications Division

STEVEN SWINFORD

1-9.0 HIGHWAY MANAGEMENT DEPUTY COMMISSIONER

This deputy commissioner oversees the work of the Construction Management, Facilities and Equipment Management, Highway Operations, and Production Management divisions.

1-9.01 Construction Management Division

The division includes the offices of State Construction, Construction Technical Support, and Materials Management.

1-9.01(01) Office of State Construction

The office's responsibilities are to establish construction specifications, standards, policies, and procedures, including those related to materials management.

1-9.01(02) Office of Construction Technical Support

The office's responsibilities are as follows:

1. review application of established policies and procedures in the districts;

2. provide support to the districts for issues involving contract claims, change orders, and time extension; and

3. support district construction operations and other divisions with technical expertise.

1-9.01(03) Office of Materials Management

The office works to develop, inspect, and test materials used in the construction and maintenance of highways to ensures that INDOT uses the most efficient and effective products. Specifically, the office provides the direction for engineering, inspection, and testing of construction and maintenance materials.

More specifically, the services that are provided are as follows:

1. ensuring Statewide uniformity and quality of materials;

2. providing direction to district testing engineers;

3. providing engineering advice and service to INDOT on inspection testing and materials issues;

4. providing engineering advice to INDOT on issues relating to suitability, quality, and strength of materials for transportation purposes (including special field investigations to determine the cause of poor performance); and

5. developing the specifications and special provisions for experimental materials or procedures used on each Department contract.

The office includes the Administration and Building Services Administrative Support, Aggregate Geology, Asphalt, Chemical Laboratory, Computer Support, Concrete, and Miscellaneous Materials teams.

1. Administrative and Building Services Administrative Support Team. The team is responsible for support to the division in the areas of budgeting, purchasing, accounts payable, personnel payroll, inventory, forms management, supplies, mailing and shipping, telecommunications, reproduction, safety/security coordination, clerical assistance, property management, motor pool, and related activities. The team acts as a liaison and compliance unit between other divisions, other organizations, private contractors, and the general public regarding the above-listed areas of administrative activity.

2. Aggregate Geology Team. ROBERT REES

3. Asphalt Team. MICHEAL PRATHER

4. Chemical Laboratory Team. DHIREN THAKRAR

5. Computer Support Team. RAETTE WILSON

6. Concrete Team. TONY ZANDER

7. Miscellaneous Materials Team. KENNY ANDERSON

1-9.02 Facilities and Equipment Management Division

The division includes the offices of Facilities and Equipment.

1-9.02(01) Office of Facilities

STEVE MC AVOY

1-9.02(02) Office of Equipment

LARRY GOODE

The office includes the EMS System, Equipment Support, and Motor Pool teams.

1-9.03 Highway Operations Division

The division includes the offices of Logistical Support, Traffic Engineering, and Maintenance Administration.

1-9.03(01) Office of Logistical Support

The office is responsible for the following:

1. supporting and assisting the districts and other divisions with materials, supplies, and equipment;

2. supporting the Division and the districts in administrative, business, and contract support functions;

3. supporting the districts in maintenance and traffic functions;

4. supporting the districts in maintenance management, traffic management, facilities management, equipment management, and communications functions;

5. operating the Department motor pool; and

6. being responsible for all fixed asset inventory;

The office includes the Sign Fabrication and Warehouse Stores teams.

1-9.03(02) Office of Traffic Engineering

The office is responsible for the following:

1. establishing traffic policies and procedures;

2. monitoring compliance with these policies in the districts;

3. guiding the districts' traffic operations; and

4. supporting the districts with signs, signal equipment, and snow plow parts;

5. developing and implementing the Intelligent Transportation System (ITS). The basic objective of ITS is to effectively use existing transportation infrastructure through the use of state-of-the-art equipment and transportation technologies.

The office includes the Work Zone Safety and Traffic Control teams.

1-9.03(03) Office of Maintenance Administration

This office is responsible for the following:

1. establishing maintenance policies and procedures;

2. monitoring compliance with these policies in the districts; and

3. guiding the districts' maintenance operations.

The office includes the Snow and Ice Program, Emergency Operations Program, Work Management, and Permits teams.

1-9.04 Production Management Division

The division is responsible for detailed project design up to project advertisement. This is accomplished either through in-house design personnel or through a consultant.

The division includes the offices of Aerial Engineering, Environmental Services, Geotechnical Services, Project Management, Public Hearings, Real Estate, Roadway Services, and Structural Services.

1-9.04(01) Office of Aerial Engineering

The office includes the Survey and Photogrammetry teams.

1. Survey Team. The team performs the route survey work needed for plan development of highway improvement projects that are administered by the Production Management Division. The team's responsibilities include the following:

    a. developing policies and practices for INDOT-route surveying work;

    b. performing route survey work using its own staff or consultants for in-house design work and some consultant projects that are administered by the Design Teams. In general, the unit does not perform survey work for district-designed projects or for local public agency projects, does not review survey work performed by consultants, and does not perform right-of-way staking for construction;

    c. performing control traverse surveys to establish the existing centerline or survey baseline for a specific project, and providing that information in electronic format to the project designer in a Design Team;

    d. locating all physical evidence of property in the field and, in conjunction with other field survey information, preparing a route survey plat;

    e. optionally, providing ground control work and other ground survey work needed to complement aerial survey data. The team does not perform aerial survey work, which is available instead from aerial survey consultants and/or the Photogrammetry Team;

    f. maintaining INDOT survey data and coordinate systems for a reference or base for the surveys conducted for each highway project;

    g. maintaining records of field survey work performed by the team;

    h. coordinating with the National Geodetic Survey office and with the Indiana Office of the State Geodetic Advisor on general issues for INDOT and on items specific to work performed by the team;

    i. purchasing and maintaining equipment used by the team, and, where feasible, coordinating the purchase of equipment for other divisions and the districts to

foster uniformity of equipment among all users and obtain group volume discounts on purchases; and

j. providing technical assistance on surveying as needed to other divisions and districts, and to local public agencies where feasible.

2. Photogrammetry Team. STEPHEN ASHBY

1-9.04(02) Office of Environmental Services

The office is responsible for assessing the environmental impact of a proposed project and ensuring that INDOT operates in compliance with all relevant environmental laws and regulations as well as waterway permitting.

The office includes the Environmental Policy, Ecology and Permits, and Cultural Resources teams.

1. Environmental Policy Team. The multi-disciplinary team of scientists, biologists, archaeologists, historians, geologists, and landscape architects provides the expertise necessary for the development of an INDOT project. The functions of the team include the following:

a. ensuring compliance with the National Environmental Policy Act for each Department project that is Federally funded and compliant with relevant State environmental regulations;

b. securing Section 4(f) and Section 6(f) approvals;

c. developing a plan to mitigate environmental impacts;

d. determining the need for early coordination with other State and Federal agencies and initiating contacts;

e. identifying contaminated sites and determining the need for special provisions;

f. ensuring Department compliance with Section 106 for historical and archaeological sites;

g. conducting the necessary technical analyses for air, noise, water, and biological impacts for each Department project;

h. obtaining waterway permits; and

i. developing landscaping for each INDOT project.

These responsibilities are fulfilled either by performing the work in-house or by reviewing and evaluating the work of a consultant.

The team provides a variety of services to the Division and other INDOT divisions and districts in the development of a highway project.

2. Ecology and Permits Team. The team is responsible for all landscaping and environmental mitigation activities for each project. The team's activities include the following:

a. preparing the landscaping design for each in-house project;

b. reviewing consultant-designed landscaping projects;

c. providing technical support for erosion control issues;

d. conducting construction field reviews for landscaping work;

e. monitoring contractor warranties for landscaping work;

f. preparing specifications and special provisions for landscaping work;

g. preparing wetland mitigation design for each in-house project; and

h. securing those permits and certifications related to the State's waterways and water resources (e.g., U.S. Coast Guard Section 9, U.S. Corps of Engineers Section 404).

3. Cultural Resources Team. CHRIS KOEPPEL

1-9.04(03) Office of Geotechnical Services

ATHAR KHAN

The office includes the Geotechnical Operations Team, and three Design teams.

1-9.04(04) Office of Project Management

The office is responsible for providing oversight and coordination services for special types of projects such as Design-Build projects. In addition, the office is responsible for evaluating the Project Management System (PMS) to identify potential improvements to the System.

The office includes the Major Projects and Project Management teams.

1. Major Projects Team. The team's responsibilities include the following:

    a. developing an education curriculum for design, development, and construction personnel;

    b. determining the causes for INDOT change orders;

    c. implementing a new automated project evaluation system;

    d. building and maintaining the INDOT constructability program;

    e. supervising riverboat sites' transportation requirements;

    f. administering the Central Office employee incentive program.

2. Project Management Team. LOUIS FEAGANS

1-9.04(05) Office of Public Hearings

The primary duties and responsibilities of the office are to coordinate, facilitate, and document project-specific public involvement activities for each INDOT project. As a stipulation, each transportation project receiving federal funding must undergo formal public involvement activities, such as formal public hearings, paid legal advertising, impacted-area property-owner notification, and solicitation of public comment. Also, timely public meetings, small focus group meetings, electronic notification, and announcement-posting and other activities may be required as needed depending on the level of project being developed. The documentation of these activities is certified by the office and forwarded to FHWA for review and further documentation to ensure that both federal and State requirements have been met for each project in INDOT's production schedule.

The office also has staff whose job responsibilities require them to provide proactive engagement of the stakeholders for a number of select projects which require a more intensive approach due to project scope and complexity. The office has four project facilitators who are responsible for stakeholder engagement for each IPOC-level project. Their duties include the production and

development of project newsletters, small group presentations, and timely correspondence with project stakeholders.

1-9.04(06) Office of Real Estate

The office coordinates all activities to obtain the right of way necessary for each INDOT project. This may be necessary for the construction of a new highway or widening an existing highway. The office determines the quantity and value of all land, and the improvements and damages for each piece of property according to established laws and procedures. Each acquired property is obtained by purchase or through the court process by right of eminent domain. The office also provides assistance to cities, towns, and counties in their land-acquisition efforts for local-agency road and street projects.

The office includes the Utilities, Railroads, Property Management, Administrative Services, Acquisition teams, and Region teams for the North, Central, and South regions.

1. Utilities Team. The team performs utility coordination work required for plan development of each highway-improvement project administered by the division. The team is responsible for the following:

    a. developing policies and practices for the accommodation of utilities and telecommunication facilities within INDOT right of way;

    b. coordinating each highway-improvement project with affected utilities. In general, this does not include district-designed projects, local public agency projects, or stand-alone traffic projects for signs, signals, or lighting. However, the team will provide expertise and review for such projects with reimbursable utility expenses as necessary;

    c. reviewing, evaluating, and approving utility relocation plans submitted by utility companies;

    d. obtaining cost estimates and securing agreements with reimbursable utilities, for the relocation and adjustment of their facilities as required to accommodate highway construction; and

    e. receiving and processing bills from utility companies for reimbursable utility work.

2. Railroads Team. The team is responsible for the following:

a. coordinating each project with affected railroads, including each INDOT project or local agency project administered by INDOT, and administering each INDOT stand-alone rail crossing safety improvement project;

b. reviewing, evaluating, and approving plans and estimates submitted by railroad companies;

c. obtaining cost estimates and preparing agreements with railroads for construction and/or adjustment of railroad facilities for each highway project;

d. preparing agreements with local agencies and with railroads for each stand-alone rail crossing safety improvement project;

e. receiving and processing bills from railroad companies for reimbursable railroad work;

f. obtaining rail crossing inventory and accident data from the Federal Railroad Administration, and assisting in the update of the inventory data;

g. performing predicted accident calculations for rail crossings, and identifying and prioritizing potential rail crossing safety improvement projects; and

h. providing engineering and technical expertise on rail crossings to the Intermodal Rail Section, other divisions, districts, and local public agencies.

3. Property Management Team. The team is responsible for the following:

a. obtaining title and encumbrance evidence for properties to be purchased by the Department;

b. securing right-of-way cost estimates and other information for route studies, program funding, environmental studies, etc.;

c. in coordination with the Design Teams, preparing the detailed right-of-way plans and special provisions related to right of way;

d. providing coordination among the organizational units of the Office of Real Estate, the Division, and Federal Highway Administration on the preparation and approval of right-of-way plans;

e. issuing authorizations for initiating the various phases of right-of-way acquisition work;

f. preparing legal descriptions, plats, and exhibits for use in property deeds and other documents and agreements used in the purchase or disposal of real property; and

g. obtaining information for and preparing access control plans and access control resolutions for Department approval.

The team is also responsible for the valuation of interests in real property to be acquired by the Department, including the following:

a. developing appraisal policies, procedures, and guidelines;

b. providing technical education for training staff appraisers;

c. arranging services for outside fee appraisers when needed;

d. providing technical assistance to staff and fee appraisers;

e. attending field checks and preparing cost estimates for future projects;

f. appraising excess land parcels for land being sold by the Department;

g. reviewing appraisals and appraisal reviews prepared for Department and local public agency projects;

h. reviewing all appraisals prepared for the Department; and

i. determining the compensation that should be paid for each parcel of real property to be acquired.

Appraisals and reviews are prepared following the Uniform Appraisal Standards for Federal Land Acquisitions, Uniform Standards of Professional Appraisal Practice, and Indiana Statutes.

4. Administrative Services Team. The team is responsible for providing the administrative support services necessary for the Office of Real Estate. Its responsibilities include the following:

a. maintaining the official files and records of the Office of Real Estate and to provide right-of-way information as requested;

b. filing deeds and other recordable documents with the applicable public offices;

c. monitoring attendance, payroll, employee benefits, and travel reimbursement;

d. arranging for microfilming of files, plans, maps, etc.;

e. maintaining statistical records and preparing necessary reports;

f. providing assistance to local governments on land acquisition if State or Federal funds are involved;

g. processing right-of-way claim vouchers and coordinating land acquisition schedules; and

h. coordinating inventory, office equipment, and expendable supplies.

5. Acquisition Team. The team is responsible for the acquisition phase of acquiring property for the Department. It is responsible for the following:

a. developing negotiation policies, procedures, and guidelines;

b. providing education and training for staff negotiators;

c. reviewing and approving negotiated settlements for right-of-way parcels;

d. coordinating the processing of right-of-way parcels for condemnation; and

e. implementing the process for special property acquisition by the Department.

In addition, the team provides liaison and coordination among the organizational units of the Office of Real Estate, the division, and Federal Highway Administration on right-of-way negotiations. The team coordinates actions to resolve damage claims from landowners.

The team is also responsible for providing relocation assistance to displaced property owners. In addition, the section is responsible for the management of property acquired for highway construction, which involves the following:

a. developing policies, procedures, and guidelines for property management;

b. processing claims for payment of right-of-way settlements;

c. obtaining mortgage releases;

d. administering surplus property inventory; and

e. processing reimbursement of tax payments.

6. Region Teams. The North Region Team is responsible for the Fort Wayne and LaPorte districts. The Central Region Team is responsible for the Crawfordsville and Greenfield districts. The South Region Team is responsible for the Seymour and Vincennes districts.

1-9.04(07) Office of Roadway Services

The office includes the Roadway Engineering Standards Team, three Roadway In-House Design teams, two Roadway Review teams, and the Traffic Review Team.

1. Roadway Engineering Standards Team. The team is responsible for revising, adding and/or deleting standard documents for project development, plan design, surveying, and road design as required. Such documents include the appropriate portions of the following:

   a. INDOT *Standard Specifications*,
   b. Supplemental Specifications,
   c. Recurring Special Provisions,
   d. INDOT *Standard Drawings*, and
   e. *Indiana Design Manual*.

   The team coordinates with other Department entities when changes to these standard documents are required, and it annually distributes revised or new standard documents. The team also periodically issues Design Memoranda on design issues until the *Indiana Design Manual* can be revised.

2. Roadway In-House Design Teams. The teams are responsible for all capital improvement projects for which the teams serve as the lead for in-house-designed project development. This includes roadway and combination roadway-bridge projects. The functions of each team include the following:

   a. designing and preparing the detailed design plans, quantities, special provisions, etc., to advance each project to advertisement;

b. coordinating all activities necessary for the design of each in-house-designed project (e.g., surveying, environmental evaluation, geotechnical, right-of-way, traffic engineering);

c. providing design support as required on each project for which another team is lead (e.g., roadway approaches for a bridge rehabilitation project, traffic engineering project); and

d. providing technical assistance to local jurisdictions on roadway issues.

3. Roadway Review Teams. The teams are responsible for all capital improvement projects for which the teams serve as the lead for consultant-designed-project development. This includes roadway and combination roadway-bridge projects. The functions of each team include the following:

a. reviewing each consultant-designed project including the technical review of each local public agency project;

b. coordinating all activities necessary for the design of a consultant-designed project (e.g., surveying, environmental evaluation, geotechnical, right-of-way, traffic engineering);

c. providing design support as required on each project for which another team is lead (e.g., roadway approaches for a bridge rehabilitation project, traffic engineering project); and

d. providing technical assistance to local jurisdictions on roadway issues.

4. Traffic Review Team. The team is primarily responsible for the review and design of traffic engineering projects, e.g., intersections, interchanges, signals, signs, lighting, and Intelligent Transportation System projects. The team is responsible for all capital improvement projects for which the section serves as the lead unit, and provides a variety of traffic engineering to other Department teams. The functions of the team include the following:

a. developing signing and pavement marking practices and their standard designs for each Department project;

b. developing traffic signals and highway lighting practices and their standard designs for each Department project;

c. preparing/reviewing consultant-designed plans, quantities, special provisions, etc., to advance each traffic engineering or ITS project to advertisement;

d. providing traffic engineering support as required on each projects for which another Division team is lead; and

e. providing support on major issues related to maintenance of traffic during construction and serving as a partner in the traffic-maintenance-plan process.

1-9.04(08) Office of Structural Services

The office includes the Hydraulics Team, Design Resources Team, three Bridge Engineering teams, and the Bridge Rehabilitation and Ratings Team.

1. Hydraulics Team. The team is responsible for the hydrologic and hydraulic analyses for roadway drainage appurtenances and bridge waterway openings. The team's responsibilities include the following:

   a. developing INDOT policies and procedures on hydraulics (e.g., hydrologic methods, bridge and culvert hydraulics, design of closed drainage systems);

   b. providing hydraulics input to the project lead units (Roadway Design, Roadway Review, or Bridge Engineering teams) as needed during project development;

   c. working with district offices to respond to public inquiries on drainage problems;

   d. working with local jurisdictions and the Federal Emergency Management Administration (FEMA) on the administration of the National Flood Insurance Program (NFIP);

   e. determining field surveying needs for hydraulic analyses and working with the district offices to secure the field information;

   f. coordinating as necessary with State and Federal agencies responsible for hydraulic-related activities (e.g., the Indiana Department of Natural Resources); and

   g. providing technical assistance on hydraulics as needed to other Department units and local jurisdictions (e.g., for local public agency projects).

2. Design Resources Team. The team is responsible for revising, adding, or deleting standard documents for hydraulics and structural design as required. Such documents include appropriate portions of the following:

   a. INDOT *Standard Specifications*,
   b. Supplemental Specifications,
   c. Recurring Special Provisions,
   d. INDOT *Standard Drawings*, and
   e. *Indiana Design Manual*.

   The team coordinates with other Department units when changes to these standard documents are required, and it annually distributes revised or new standard documents. The team also periodically issues Design Memoranda on design issues until the *Indiana Design Manual* can be revised.

3. Bridge Engineering Teams. The teams are responsible for each capital improvement project for which the teams serve as the lead for project development. The functions of each team include the following:

   a. designing and preparing the detailed design plans, quantities, special provisions, etc., to advance each project to advertisement;

   b. reviewing each consultant-designed project including the technical review of each local public agency project;

   c. coordinating all activities necessary for the design of an in-house project (e.g., surveying, environmental evaluation, geotechnical, right-of-way, hydraulics, traffic engineering);

   d. providing design support as needed on each project for which another team is lead (e.g., road project, traffic engineering project); and

   e. providing technical assistance to local jurisdictions on bridge issues.

4. Bridge Rehabilitation and Ratings Team. The team is responsible for the review and design of each bridge-rehabilitation project (e.g., repair, widening). The team is responsible for each capital improvement project for which the team serves as the lead unit. The team provides a variety of bridge-rehabilitation services to other Department entities. The team is responsible for all bridge-loading services. The functions of the team include the following:

a. developing bridge-rehabilitation practices and standard designs for each applicable Department project;

b. preparing/reviewing consultant-designed plans, quantities, special provisions, etc., to advance each project to advertisement;

c. providing bridge-rehabilitation support as needed on each project for which another Department entity is lead; and

d. preparing and providing load rating information as needed.

1-10.0 HUMAN RESOURCES DEPUTY COMMISSIONER

This deputy commissioner oversees the work of the Human Resources Division.

The Human Resources Division is responsible for compensation, training, employment, affirmative action (internal complaints), and labor relations for INDOT. The activities undertaken by the division include coordination of employee recruitment and hiring and the direction of training activities for INDOT employees.

The division includes the Office of Payroll and Benefits and the Office of Internal Affairs.

1-10.01 Office of Payroll and Benefits

The office's duties include the following:

1. reviewing employee classifications;

2. reviewing recruitment differentials and providing salary computations;

3. answering technical questions regarding classification and staffing concerns;

4. maintaining active and inactive employee files;

5. verifying employment records; and

6. maintaining staffing reports for INDOT.

1-10.02 Office of Employee Development

The office includes the Training, Employment/Affirmative Action, and Labor Relations teams.

1. Training Team. The team administers, coordinates, and facilitates INDOT's training and employee development programs such as the following:

    a. leadership training;

    b. Graduate Engineer Development Program;

    c. cooperative education/internships;

    d. educational assistance;

    e. Indiana Higher Education Telecommunications Systems (IHETS);

    f. Certified Technician Program; and

    g. National Highway Institute courses.

2. Employment/Affirmative Action Team. The team's duties include the following:

    a. enforcing the employment policy;

    b. overseeing recruitment and hiring practices;

    c. assisting applicants during the employment process;

    d. coordinating the community outreach process;

    e. investigating internal complaints on discrimination; and

    f. administering the Americans with Disabilities Act program.

3. Labor Relations Team. The team's duties include the following:

    a. offering guidance to managers and employees on various human-resource policies and procedures (e.g., Employee Manual, work rules, union settlement, work leaves, discipline); and

b. responding to employee complaints and union grievances at the third step of the complaint process.

1-11.0 LEGAL DEPUTY COMMISSIONER AND CHIEF LEGAL COUNSEL

This deputy commissioner oversees the work of the Internal Affairs, Legal Services, and Economic Opportunity Divisions, and is the Department's Chief Legal Counsel.

1-11.01 Internal Affairs Division

The division is responsible for developing and managing programs designed to ensure compliance with INDOT policies, procedures, and regulatory standards. The division provides professional internal audits, investigations, and other security-related services to ensure responsible management control of INDOT assets. The division also operates and manages the Department Employee Safety program.

Through its offices of Audits and Investigations, the division maintains an effective monitoring and reporting system. It prevents, detects, and identifies trends, improprieties, and irregularities throughout the Department, by promoting loss control and improved operational efficiency thus enhancing the public trust.

1-11.02 Legal Services Division

The division is responsible for serving as legal counsel for the Department. Specifically, the division's responsibilities include, but are not limited to, the following:

1. providing legal advice and assistance to all divisions and districts;

2. investigating the legality of Department actions and validity of public complaints;

3. drafting proposed legislation and administrative rules;

4. researching and interpreting the law;

5. preparing legal opinions;

6. attending and testifying at legislative committee hearings;

7. providing litigation support; and

8. conducting administrative hearings.

1-11.03 Economic Opportunity Division

The division manages the internal and external Title VI (Civil Rights), Title VII, Title VIII (Land Acquisition), and Americans with Disabilities Act (ADA) issues. The division includes the offices of DBE Certification and Contract Compliance.

1-11.03(01) Office of DBE Certification

The office serves as a resource for Disadvantaged Business Enterprises (DBE), by conducting trade shows, seminars, and workshops. It directs the activities of each consultant that works one on one with each DBE to provide technical, managerial, and financial assistance. There are also programs that assist youths in construction- and highway-related work. It is responsible for Minority Business Development/Participation, and Equal Employment Opportunity/On-the-Job Training.

1-11.03(02) Office of Contract Compliance

The office ensures the compliance of contractors related to State and Federal laws.

1-12.0 PLANNING OPERATIONS DEPUTY COMMISSIONER

This deputy commissioner oversees the work of the Freight Mobility, Planning, and Public-Private Partnership divisions.

1-12.01 Freight Mobility Division

The division partners with freight providers and distribution-logistics centers to enhance the State's role as a logistics and transportation hub for not only the Midwest, but for the United States as whole, while reinforcing the State's position as a leading manufacturing center and supporting overall economic development efforts as related to transportation.

1-12.02 Planning Division

The division is responsible for the collection, analysis and reporting of traffic statistical data and for traffic projections, crash data, bridge inspection data, roadway physical feature inventory (including local road inventory), roadway functional classification, Highway Performance Monitoring System (HPMS) and road life history. It also oversees the development and implementation of Statewide management systems of pavement, bridge, congestion, safety and traffic monitoring.

The division is responsible for developing and establishing the Department's Transportation Construction Programs (TCP) by soliciting the various project nominations and evaluating each project for program eligibility and fundability. The division proposes the three-year Indiana Statewide Transportation Improvement Program (INSTIP) and project directory. This involves coordination with the local governments, the district offices, and the Metropolitan Planning Organizations.

The division includes the offices of Pavement Engineering, Roadway Safety and Mobility, Systems Analysis and Planning, Technical Services, and Urban and Corridor Planning.

1-12.01(01) Office of Pavement Engineering

The office performs the following:

1. develops and implements pavement management systems for INDOT;

2. collects pavement condition information on State highways;

3. makes decisions on pavement performance;

4. maintains the Roadway Reference Post System;

5. produces the Road Reference Physical Feature Inventory Books; and

6. provides ride and condition data for pavements.

1-12.01(02) Office of Roadway Safety and Mobility

The office summarizes crash data to determine crash rates by road systems and functional classification.

It includes the Safety and Mobility teams.

1. Safety Team. The team performs the following:

    a. provides crash summaries by location for projects under study by the Production Management Division's Office of Environmental Services and for use by the districts and the Planning Division to aid in project selection and prioritization; and

    b. provides collision diagrams for high-frequency crash locations and Statewide maps showing fatal crash locations.

2. Mobility Team. PAUL SCHMIDT

1-12.01(03) Office of Systems Analysis and Planning

The office includes the Bridge Management Team. It performs the following:

1. develops and implements a bridge-management system for all publicly owned bridges (INDOT and local);

2. serves as a decision support tool that supplies data analysis;

3. uses mathematical models to make predictions and recommendations; and

4. proposes schedules for bridge programs within policy and budget constraints.

1-12.01(04) Office of Technical Services

The office includes the Research and Documents Library, Bridge Inventory, GIS / Mapping Cartography Operations, Roadway Inventory, Technology Services, and Traffic Monitoring teams.

1. Research and Documents Library Team. The team's members are available to all personnel within INDOT, plus consulting engineering firms, law firms, outside agencies, and the general public, to serve as a customer-service team providing information from various plans and files. The team is responsible for the following:

    a. maintaining a variety of Department files including project files, design computation files, survey files, etc.;

b. storing as-designed plans (original and microfilm) and reproducing plans for distribution;

c. processing plans and paperwork to be transmitted from the Production Management Division to the Contract Administration Division for the letting process;

d. processing construction changes, field checks, and final right-of-way plans during the project development phase;

e. processing all printing requests and plans between various divisions and the Department of Administration's print shop;

f. researching plans, files, and survey books in response to requests for information from outside agencies, INDOT personnel, law firms, consulting engineering firms, the general public, etc.;

g. processing outgoing mail; and

h. performing miscellaneous errands as required.

2. Bridge Inventory Team. The team performs the following:

a. collects, reviews, maintains and files the Bridge Inspection/Inventory data for all State and county bridges;

b. analyzes the bridge data and makes necessary recommendations to the districts and other divisions;

c. monitors the bridge inspection frequencies for all public bridges and for bridges that require special inspection;

d. provides guidance to the district bridge inspection engineers, and consultants;

e. furnishes the National Bridge Inventory data and other bridge information to other INDOT divisions, FHWA, universities, and the public;

f. generates the annual bridge inspection/inventory report to FHWA; and

g. provides assistance and guidance to understand the bridge inspection/inventory codes and terminologies.

3. GIS / Mapping Cartography Operations Team. KEMBERLY WALLACE

4. Roadway Inventory Team. The team is responsible for the following:

a. Road Inventory.

(1) Updates maps showing the State highway system and local road inventories;

(2) Periodically physically inventories road miles or kilometers and monitors usages of the local roads; and

(3) Provides updated maps to various customers and local government agencies.

b. Functional Classification.

(1) Classifies and keeps INDOT highways, roads and streets inventories current according to the character of service they are intended to provide;

(2) Makes recommendations to the Federal Highway Administration (FHWA) on how roads should be classified based on the data provided;

(3) Defines usage that any particular road or street should provide in servicing the flow of traffic through a highway network;

(4) Maintains urban-area-boundary limits for the thirteen urbanized areas and sixty-eight small urban areas; and

(5) Provides vital information for both tort claims and crash records.

c. Highway Performance Monitoring System (HPMS).

(1) Analyzes data submitted to, or collected by, Highway Inventory and Metropolitan Planning Organizations (MPOs);

(2) Validates various HPMS elements through on-site inspections; and

(3) Enters data into edit files that enable revisions or additions into the HPMS master file.

This information is incorporated into the annual HPMS submittal before forwarding to the FHWA.

d. Roadlife. This part of the team records and maintains a comprehensive chronological record of all State-highway construction improvements and provides historical pavement cross section data.

5. Technology Services Team. ERIK KRAG

6. Traffic Monitoring Team. The team does the following:

a. collects and analyzes traffic counts on all INDOT routes on a regular basis;

b. develops county and interstate traffic flow maps and annually publishes an AADT County Flow book;

c. provides data collection and analysis of vehicular characteristics and usage associated with specific highway segments through the use of telemetry and weigh-in-motion stations;

d. develops seasonal adjustment and growth factors;

e. provides special traffic projections to support other INDOT divisions and the State's MPOs; and

f. cooperates with the Roadway Inventory Team to facilitate timely FHWA documentation requirements.

The team is also responsible for processing the permits as follows:

a. oversized or overweight superload permits;

b. right-of-way permits; and

c. outdoor-advertising-sign permits.

1-12.01(05) Office of Urban and Corridor Planning

The office includes the Urban and MPO, Corridor and Long Range, Feasibility Engineering, and Modeling and Forecasting teams.

1. Urban and MPO Team. (vacant)

2. Corridor and Long Range Team. STEPHEN SMITH

3. Feasibility Engineering Team. The team performs the following:

   a. defines what congestion is, where it occurs and where it potentially might occur in the future; and

   b. investigates demand management and operational movements before adding lanes and incorporates these ideas into each added-lane project to preserve its efficiency.

4. Modeling and Forecasting Team. The team provides technical planning support and service for various INDOT offices and teams. The team is responsible for the following:

   a. providing certified traffic forecasts such as Traffic Forecasting ESALs, Minors, and Specials;

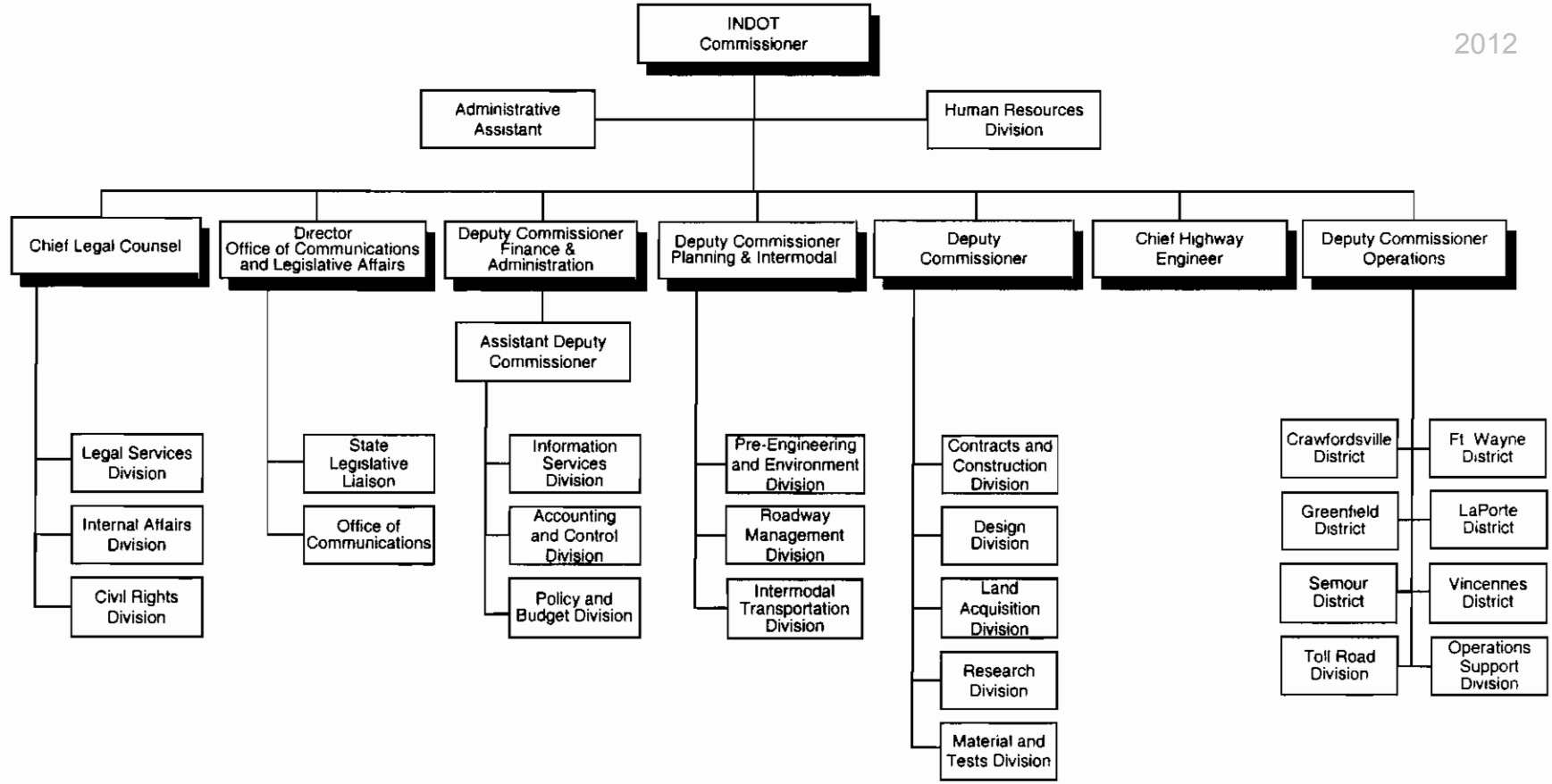
   b. Travel Demand Modeling activities, including testing proposed added-travel-capacity improvements alternatives, evaluating new highway alignments, bypasses, and new interchange locations;

   c. system-wide evaluation of project benefit and cost; and

   d. emissions modeling for identified non-conforming air quality areas not under the jurisdiction of a MPO.

1-12.03 Public-Private Partnerships Division

RICK SMUTZER



INDOT ORGANIZATION

Figure 1-1A

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CHAPTER TWO

PROJECT DEVELOPMENT PROCESS

2.01 INTRODUCTION

This Chapter documents the basic approach used by INDOT in its project-development process. It provides four flow charts, each of which graphically illustrates the development of a typical project.

1. Highway design project, as shown in Figure 2A, Project Development Process (Highway Design Project), which may be one of the following:

    a. road design project;
    b. new bridge or bridge replacement project;
    c. Interstate-route rehabilitation project (not a minor project); or
    d. intersection improvement project.

2. Bridge rehabilitation project, as shown in Figure 2B, Project Development Process (Bridge Rehabilitation Project.

3. Roadway lighting project, as shown in Figure 2C, Project Development Process (Roadway Lighting Project.

4. Roadway signing project, as shown in Figure 2D, Project Development Process (Roadway Signing Project).

2.02 PROJECT DEVELOPMENT CONSIDERATIONS

In using this Chapter, the following should be considered.

1. Precedence Activity Network. Each flow chart is a precedence activity network. An activity occurs when a significant, discrete event occurs, or when the responsibility for the project (activity) is transferred from one entity to another. The precedence nature of the network implies that an activity may not occur until all activities preceding that one have been completed. However, some flexibility is necessary to apply this network to project development.

2. Project Application. Each flow chart represents an approximate process for a relatively complicated project for each project type. Not every activity will be applicable to every

project. Some activities will represent zero time on a relatively minor project. However, a project which is developed according to these processes will have fewer management problems.

The flow chart assumes that a project is designed in-house. The process for a consultant-designed project will be similar, except that communication lines exist between INDOT and the consultant for INDOT review and approval.

As indicated above, Figure 2A, Project Development Process (Highway Design Project), applies to an Interstate-route rehabilitation project. However, the modifications apply as follows:

a. the public-information meeting occurs immediately after the Field Check Review. A formal Public Hearing is not required prior to Design Approval;

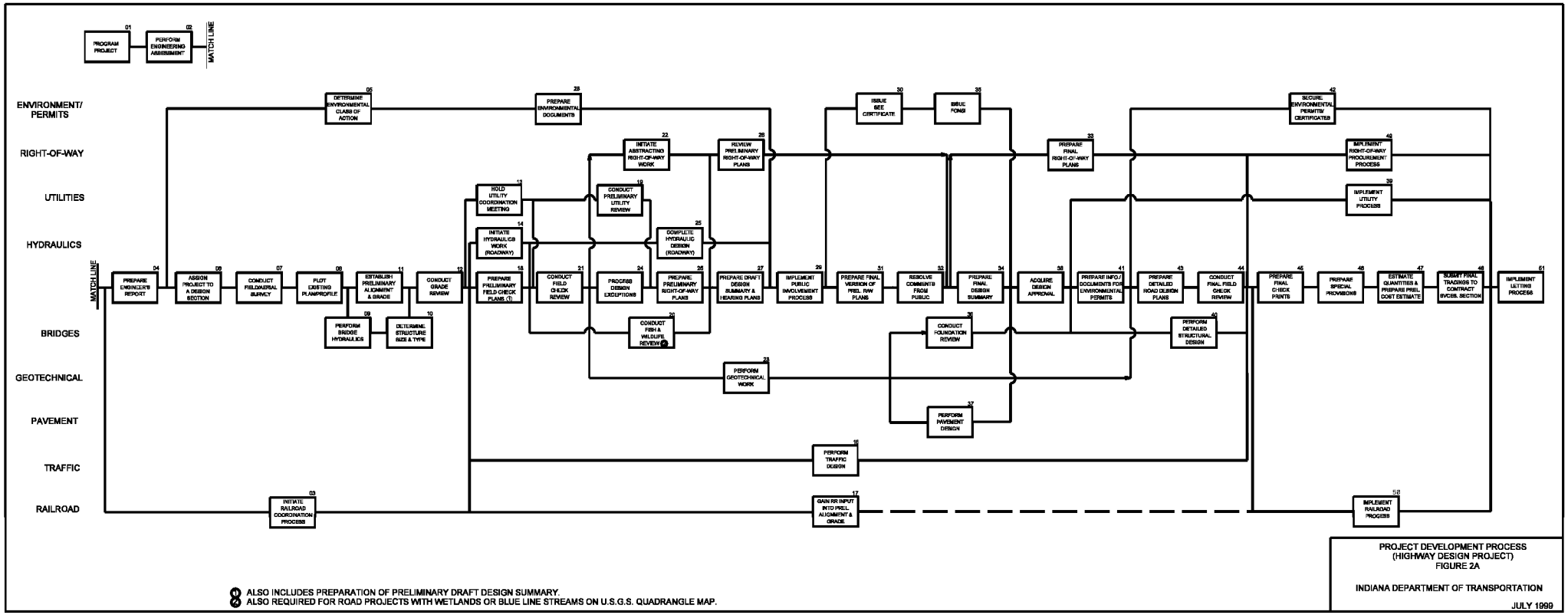
b. there is no Grade Review nor Final Field Check Review; and

c. rarely will right of way be required.

3. Lines of Communication. The rigid application of the flow chart would lead to predetermined, precise points at which communication occurs between entities. This is neither realistic nor desirable. Communication between entities must be continuous. This will result in fewer problems and fewer surprises in project development.

4. Emphasis. The objective of the flow chart is to illustrate the significant activities for the primary design elements of a project (e.g., road design, bridge rehabilitation). Other project development elements (e.g., geotechnical, hydraulics) are illustrated as supplementary activities which diverge from and converge with the primary design process (i.e., the main spine of the flow chart).

5. Other *Design Manual* Chapters. Part I includes other chapters which provide complementary information to this Chapter. The designer should review these chapters for more information on the project-development process.

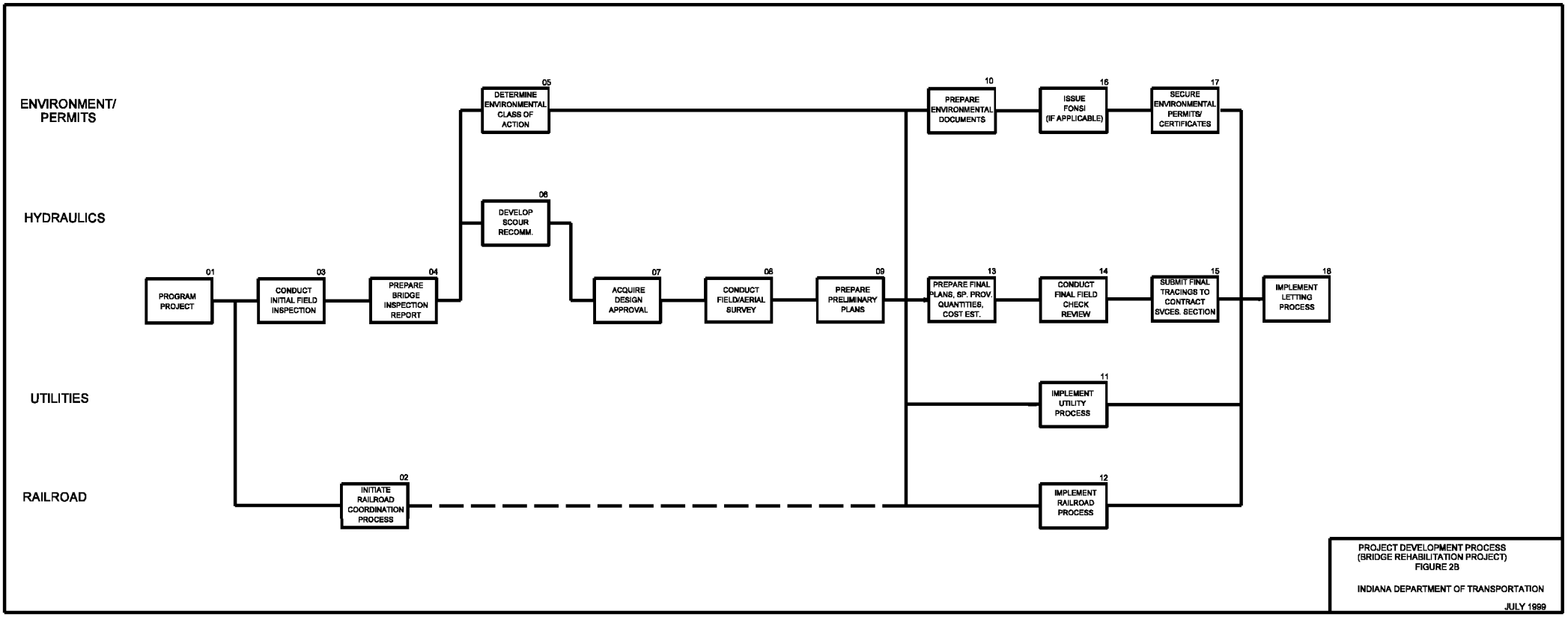


PROJECT DEVELOPMENT PROCESS
(HIGHWAY DESIGN PROJECT)
FIGURE 2A

INDIANA DEPARTMENT OF TRANSPORTATION

JULY 1999

8 ALSO INCLUDES PREPARATION OF PRELIMINARY DRAFT DESIGN SUMMARY.
8 ALSO REQUIRED FOR ROAD PROJECTS WITH WETLANDS OR BLUE LINE STREAMS ON U.S.G.S. QUADRANGLE MAP.



PROJECT DEVELOPMENT PROCESS
(BRIDGE REHABILITATION PROJECT)
FIGURE 2B

INDIANA DEPARTMENT OF TRANSPORTATION

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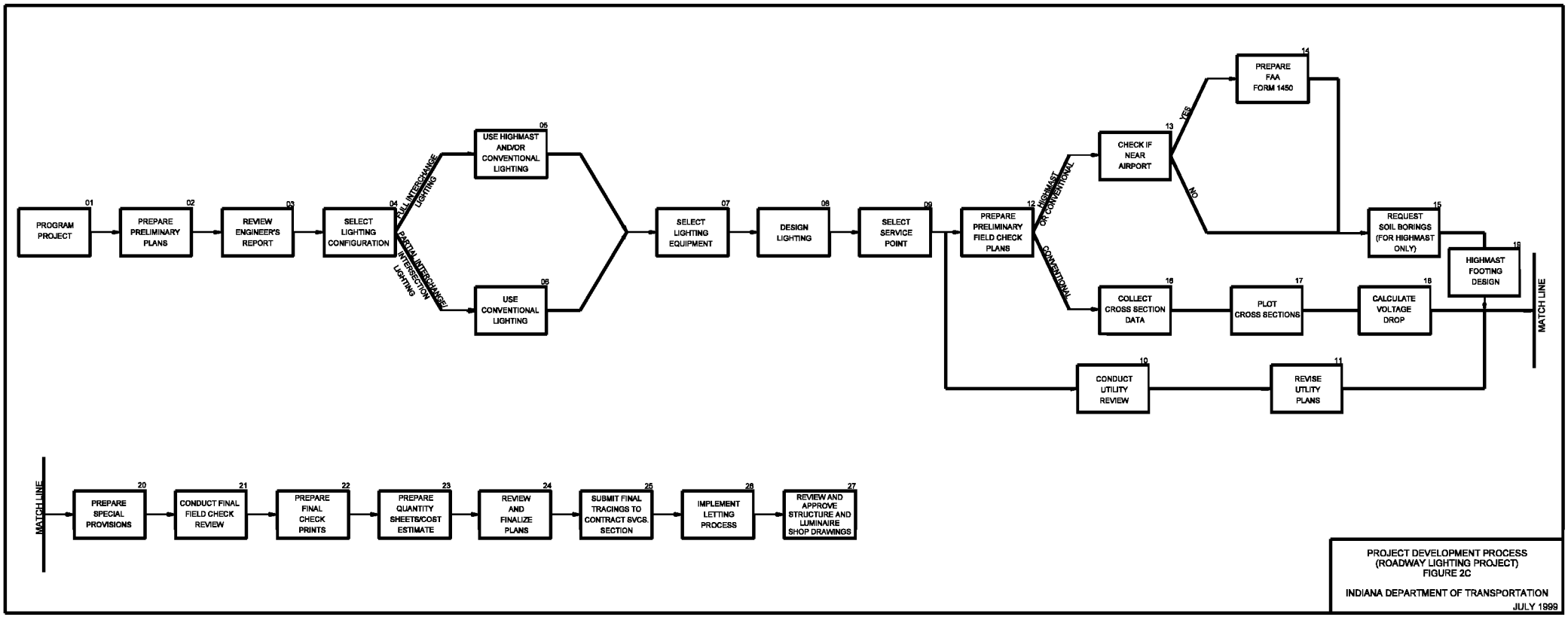
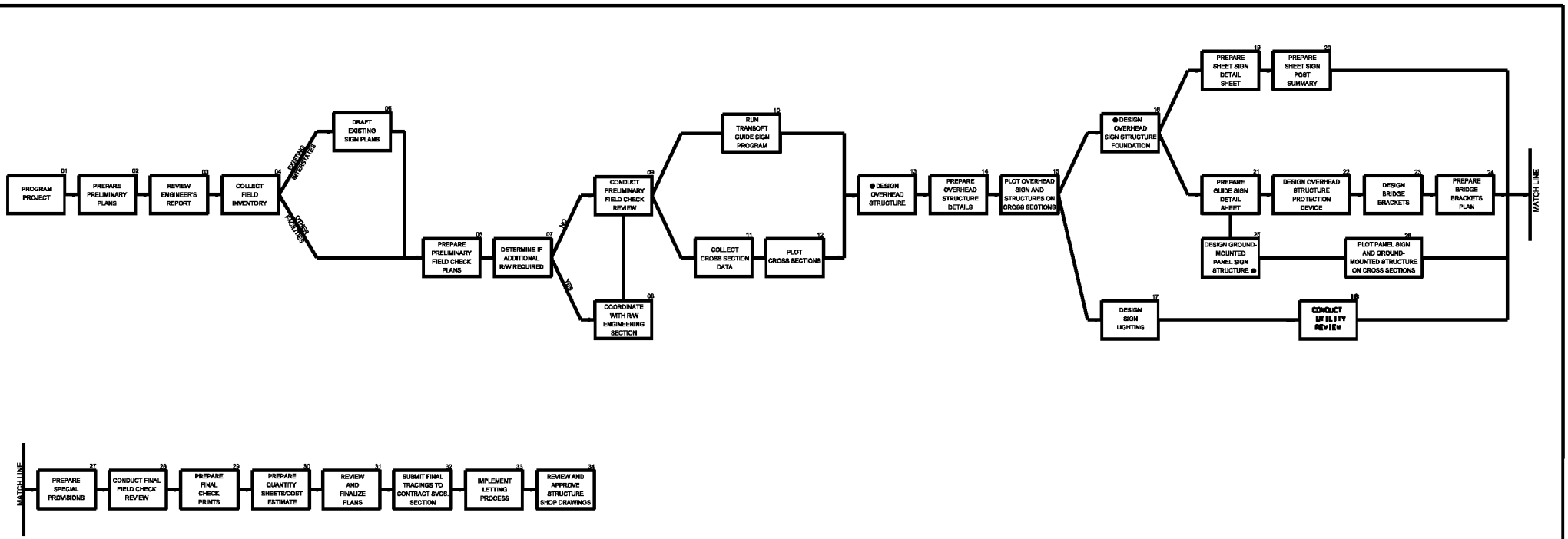


PROJECT DEVELOPMENT PROCESS
(ROADWAY LIGHTING PROJECT)
FIGURE 2C

INDIANA DEPARTMENT OF TRANSPORTATION
JULY 1999



● USE INDOT SIGN DESIGN GUIDE.

PROJECT DEVELOPMENT PROCESS
(ROADWAY SIGNING PROJECT)
FIGURE 2D

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3-3A Legal Speed Limits

CHAPTER THREE

PROJECT DESIGN COORDINATION

During the development of a road or bridge design project, the designer must coordinate with many entities which are both internal and external to the Production Management Division. Chapter One discusses the functional responsibilities of the various entities within the Indiana Department of Transportation. Chapter Two provides a network which describes the project-development sequence for the design process. This Chapter discusses specific coordination responsibilities between the designer and other entities. Together, the three chapters will provide an understanding of the necessary interaction among the various entities in project development.

3-1.0 INTERNAL INDOT ENTITIES

This Section discusses the specific coordination responsibilities between the designer and other INDOT entities.

3-1.01 Production Management Division

3-1.01(01) Office of Environmental Services [Rev. Jan. 2011]

The Office of Environmental Services is responsible for a variety of activities related to project scoping, environmental impacts and environmental procedures. The following summarizes the coordination between the designer and the Office of Environmental Services:

1. Project Scope of Work. The Office of Environmental Services determines for all expansion and some preservation projects the overall Project Scope of Work; i.e., the basic highway improvement parameters (e.g., number of lanes, warrants for truck-climbing lanes, level of access control). The road or bridge designer is responsible for developing the detailed project design within the Scope of Work established by the Office of Environmental Services. In some cases, the designer may need to contact the division for clarification or if, for some reason, it is necessary to revisit the Project Scope of Work. The designer must secure concurrence from the division for fundamental, consequential changes to the scope of work.

2. NEPA/IDEM Requirements. The designer may work with the Office of Environmental Services to ensure that the project meets environmental requirements pursuant to the National Environmental Policy Act and Indiana Department of Environmental Management

regulations. This includes environmental documentation, water quality impacts, biological impacts, historical impacts, and archeological impacts. In general, the Office of Environmental Services makes its environmental determination of impacts based on the Engineer's Report or Scope of Work Report.

3. Section 4(f). A Section 4(f) approval is required from the Federal Highway Administration if a project will use land from a publicly owned park, recreational area, wildlife/waterfowl refuge, or from a significant historic site. An approval will be granted only if there is no feasible and prudent alternative to the use of land from the property. Where a Section 4(f) approval is required, the Office of Environmental Services will secure the approval. If a change in scope occurs in the design phase, the designer should notify the Office of Environmental Services so that a proper evaluation can be made.

4. Section 6(f). Federal law places restrictions on the use of land acquired with funds authorized by the Land and Water Conservation Fund Act of 1965 as administered by the U.S. Department of Interior, Section 6(f) of the 1965 Act. Where a Section 6(f) approval is required, the Office of Environmental Services will secure the approval.

5. Mitigation Features. The Office of Environmental Services and designer work together on the plan for mitigation of environmental impacts.

6. Early Coordination. The Office of Environmental Services determines the need for early coordination on environmental issues with other State, Federal, or public entities and makes all direct contacts. The designer receives copies of the early coordination results so that the designer is aware of the comments from the various entities, and that problems may be resolved early in the design process.

7. Contaminated Sites. The Office of Environmental Services identifies known contaminated sites. The Office will provide the Indiana Department of Environmental Management with information on each site with the intent that IDEM will remediate the site before INDOT purchase. The Office will provide the designer with any necessary special provisions. The designer is responsible for incorporating these special provisions into the contract documents if the contamination removal or site remediation is to be accomplished by the highway contractor.

8. Section 106. For each Federally-funded project, INDOT must identify archeological and historic sites in the project vicinity. The identified sites must be evaluated to determine if they are eligible for the National Register of Historic Places (NRHP). INDOT submits information to the State Historic Preservation Officer (SHPO) for review and comment. If a site is considered eligible by SHPO for the NRHP and if the project will affect the site, the Department is required to follow the proper Federal procedures. The Office of Environmental Services is responsible for the Section 106 process.

9. Stormwater Pollution Prevention Plan. The designer has the primary responsibility to develop the plan for Best Management Practices (BMPs) for temporary erosion and sediment control. The designer has the primary responsibility for specifying design elements of post-construction BMPs for stormwater-pollution prevention. The designer has the primary responsibility for preparing and submitting the Stormwater Pollution Prevention Plan to the Office of Environmental Services as soon as applicable, using the elements of the construction and post-construction stormwater-quality BMPs. Once approval is attained, INDOT will be responsible for submitting NOI and NOT.

3-1.01(02) Office of Aerial Engineering's Survey Team

The Survey Team is responsible for conducting route survey work for the Division, including all in-house design and some consultant-design work. The following summarizes the coordination with the road or bridge designer:

1. Field survey. The Survey Team performs the route survey work using its own field survey crews, typically after the Engineer's Report, or Scope of Work Report, is complete but occasionally sooner if the information is needed to adequately define the project scope. The Survey Team reviews and processes the raw data for transmittal to the designer in electronic format. If the designer determines that additional survey data is needed, the designer must make a request for and coordinate with the Survey Team as needed.

2. Route Plat. If the project requires purchase of right of way, the Survey Team will locate all physical evidence of property lines and corners in the field. The Team then prepares a route survey plat in electronic format suitable for inclusion in the project plans and for use by the Office of Real Estate for recording the route survey at the county courthouse.

3. Control Traverse Diagram. The Survey Team will perform the control traverse survey to establish the existing centerline or survey baseline for the project and will provide that information in electronic format to the designer for inclusion in the project plans.

4. Aerial Survey. The Survey Team does not perform an aerial survey. If the scope of the project or schedule is such that an aerial survey is needed, the designer must coordinate with the Public Information Division's Office of Graphic Arts as needed, or obtain the services of an aerial surveying consultant. The Survey Team may, if feasible, perform the ground control survey to provide the aerial targets and other needed ground survey information. However, the aerial surveyor will be responsible for integrating the ground survey data and the aerial data into a finished survey in an electronic format suitable for use by the designer.

3-1.01(03) Office of Structural Services [Rev. Jan. 2011]

1. Hydraulics Team. The Hydraulics Team is responsible for hydrologic and hydraulic analyses for both roadway drainage appurtenances and bridge waterway openings. The coordination between the designer and Hydraulics Team is summarized as follows:

   a. Bridge Waterway Openings. In coordination with the designer, the Hydraulics Team performs the hydrologic/hydraulic analyses for bridge waterway openings. This includes the following:

      (1) selecting the design storm frequency;

      (2) selecting the hydrologic method;

      (3) coordinating with agencies external to the Department (e.g., Indiana Department of Natural Resources);

      (4) performing all hydraulic analyses; and

      (5) determining the size of the bridge waterway opening subject to any structural constraints.

   b. Culvert. For a box culvert or pipe culverts, the Hydraulics Team will perform all hydraulics work on the culvert design for an in-house project or a small-structure replacement consultant project. This includes the following:

      (1) hydrological analysis to calculate design flow rate based on the drainage basin characteristics;

      (2) hydraulic analysis to select culvert dimensions and layout (e.g., longitudinal slope); and

      (3) selection of culvert options (e.g., smooth or corrugated) or material (e.g., reinforced concrete, corrugated metal) as appropriate.

   c. Roadway Drainage. The designer is responsible for the hydrologic/hydraulic analysis of an open channel and pavement surface drainage. This includes determining a design discharge, selecting a channel lining, determining allowable ponding on the roadway, determining inlet locations, etc.

   d. Closed Drainage System. The designer will provide the proposed roadway design to the Hydraulics Team, documenting, for example, pavement width, cross slopes,

longitudinal grades, location of intersecting roads and approaches, location of inlets, etc. Based on this information, the Hydraulics Team is responsible for the design of the closed drainage system for an in-house project only. This includes the following:

(1) flow calculations in the system;
(2) hydraulic grade line calculations;
(3) pipe size and material;
(4) pipe slopes; and
(5) outfall location and design.

e. Permanent BMPs. The designer has the primary responsibility to develop the permanent BMPs. Where necessary, the designer may seek technical guidance from the Hydraulics Team.

f. FEMA Regulations. The Hydraulics Team is responsible for determining that the project design is consistent with regulations promulgated by the Federal Emergency Management Agency (e.g., development within delineated floodplains).

g. Documentation. The following will apply to each drainage appurtenances or bridge waterway opening.

(1) The Hydraulics Team will submit the necessary information documenting its recommendations for the hydraulic design.

(2) The designer will incorporate all details into the road or bridge design plans.

(3) The designer will calculate all quantities for the roadway drainage appurtenances.

h. Coordination with County Surveyor Regarding Legal Drain. The Hydraulics Team will usually make initial contact during the hydraulic analysis, but the designer is responsible for coordination during the grade review stage of the design process.

See Chapter Twenty-eight for more information on the relative responsibilities of the designer and the Hydraulics Team.

2. Bridge Rehabilitation and Ratings Team. The Bridge Rehabilitation and Ratings Team is primarily responsible for the design of bridge-rehabilitation projects.

For a bridge rehabilitation project, the Bridge Rehabilitation and Ratings Team is typically the lead team. However, this group may coordinate with the Office of Roadway Services for any work on the roadway approaches (e.g., alignment, guardrail-to-bridge-railing transitions).

A project may require the development of a Transportation Management Plan (TMP). See Chapter Eighty-one. The designer and Bridge Rehabilitation and Ratings Team, among other entities, will coordinate in the preparation of a TMP.

3-1.01(04) Office of Real Estate

The Office of Real Estate is responsible for all activities related to the legal right of way for the State highway system. This includes appraisals, acquisitions, relocation, and property management.

1. Right-of-Way Acquisition Procedure. The following summarizes the coordination between the designer and Office of Real Estate.

   a. Coordination. The designer provides the Office with the needed design information to determine the right-of-way impacts.

   b. Plan Preparation. In coordination with the Office of Real Estate requirements in Chapter Eighty-five, the designer is responsible for initiating the right-of-way design. The designer prepares a separate set of right-of-way plans for each project where right-of-way impacts exist and submits the plans to the Office of Real Estate where the plans are modified to become Final Right-of-Way Plans. See Part IX for information on the preparation of right-of-way plans.

   c. Acquisition. The Office of Real Estate performs all right-of-way work and procures all takings and easements needed for the project. The division notifies the designer of any design considerations resulting from negotiations with the property owners.

2. Utilities and Railroads Teams.

   a. Utilities Team. The Utilities Team is the lead team for contacts with utility companies. The designer should place all utility topography on the plans. Coordination with utility companies typically begins at the preliminary field check stage. The designer sends field-check notification and plans to all affected utility companies and to the Utilities Team. If the utility conflicts are significant, the designer may choose to contact the Utilities Team at an earlier stage in the plan development process. After design approval is obtained, the Utilities Team will request plans from the designer for transmittal to the utility companies. Using these plans, the utility companies will develop their own relocation plans, which are then sent to the Utilities Team for approval. The designer, as needed, incorporates utility information into the design features, plans, and specifications. The Utilities Team

will obtain agreements and cost estimates as needed from the utility companies for reimbursable utility work and authorize them to proceed with design or construction activities as needed.

b. Railroads Team. The Railroads Team is the lead unit for contacts with railroad companies. The designer should place all railroad facilities (tracks, bridges, drainage structures, trackside equipment, communication and signal systems, warning devices, electrical/mechanical housings, etc.) and railroad right-of-way information on the plans. The Railroads Team must review each project that impacts railroad facilities, that encroaches on railroad-company right of way, or that potentially affects railroad operations (such as highway construction operations or traffic maintenance, etc.). The designer initiates the railroad-company coordination process by providing the Railroads Team with a set of plans denoting the project impacts on railroad facilities. Typically, this is done at the preliminary field check stage. However, a project that involves significant alteration of or encroachment upon railroad facilities (e.g., altering horizontal or vertical track profile, construction of an overpass or underpass) should be evaluated during the Scoping phase of the project. The designer, as needed, incorporates railroad information into the design features, plans, and specifications. The Railroads Team will obtain agreements, plans, and cost estimates as needed from the railroad company and authorize it to proceed with design or construction activities as needed.

Where a railroad crossing is located within the project limits, coordination between the designer and the Railroads Team will be necessary to ensure that an agreement with the railroad company for signing/signalization at the crossing is secured.

3-1.02 Contract Administration Division

3-1.02(01) Office of Contracting

The Office of Contracting is responsible for preparing the construction contract documents and administering the highway contract lettings. The designer will coordinate with the Office as follows.

1. Plans. After the plans have been finalized, the designer submits the final tracings to the project manager who then submits them to the Planning Division's Research and Documents Library Team. The Team will use the tracings for the printing of the contract plans. The prints are forwarded to the Office of Contracting by the Team for sale to interested potential contractors. The original final tracings are maintained permanently in the Research and Documents Library Team files.

2. Special Provisions. The designer is responsible for the development of any necessary special provisions. The Office ensures that these are included in the final contract document.

3. Engineer's Estimate. The designer is responsible for preparing the estimated construction cost for each pay item. The Office will review the designer's estimate and check it for errors or omissions. If significant discrepancies are noted, the two entities will resolve any differences. The Office will prepare the final Engineer's Estimate for the bid opening.

4. Contract Proposal Book Certification. Within one week after receipt, the designer should review the plans and proposal book for each contract for which the designer is signing and sealing some or all of the plan sheets. The designer should complete the Contract Proposal Book Certification form (see www.in.gov/dot/div/contracts/design/dmforms/ for an editable version), and transmit the original to the appropriate district construction engineer with copies to the Contract Administration Division's Office of Contracting and the Production Management Division's project manager. If errors are noted, the designer should also contact the appropriate district construction engineer to determine how the errors should be handled (revision before opening bids, construction change after bids opened, etc.). This determination should be documented in a memorandum to the appropriate district construction engineer with copies to the Office of Contracting and the project manager.

3-1.02(02) Office of Contracting Consulting Services Team

The Department may use a consultant for design work. If a consultant is used, the Consulting Services Team is the primary contact for scheduling plan submittals. The Production Management Division will be the primary contact for technical support, and will review the plans prepared by the consultant.

***** PRACTICE POINTER *****

A consultant with a question regarding the *Indiana Design Manual* or design policy in general should contact its INDOT reviewer and not the FHWA.

3-1.03 Construction Management Division's Office of Materials Management

The Office of Materials Management is responsible for testing and certifying all materials used in project work. This includes geotechnical analyses and materials for pavements and structures. The

district-office materials-management personnel perform the field sampling. The coordination between the designer and the Office of Materials Management is summarized as follows.

1. Geotechnical. The Office of Geotechnical Services prepares a Geotechnical Report for each road or bridge project when necessary. The Report provides the soil and rock types, recommended foundation type (e.g., pile type, spread footings), boring logs, bearing capacities, slope stability, rock-cut recommendations, peat excavation, subsurface drainage needs, waste products, etc. The designer comments on the Report and works with the Office of Geotechnical Services to resolve any conflicts. The designer incorporates the geotechnical recommendations into the plans.

2. Pavement Design. The Planning Division's Office of Pavement Engineering determines the pavement type (concrete or bituminous) and rehabilitation treatments (e.g., recycling, crack and seat) and designs the pavement structure and subsurface drainage. The designer incorporates the pavement design into the plans.

3. Walls. Where needed, the designer is responsible for preparing the design of cast-in-pace retaining walls, mechanically stabilized earth walls, binwalls, and gabions. The designer, if necessary, will seek technical assistance from the Office of Materials Management.

4. Special Provisions. For those special provisions related to material requirements, the designer should coordinate with the Office of Materials Management in their preparation.

5. New Material or Experimental Work. The use of any new material or experimental work may be initiated by several sources (e.g., the designer, the traffic engineer, the New Products Evaluation Committee). Depending upon the type of new material or experimental work, the Office of Materials Management may be responsible for monitoring the post-construction performance. Coordination is required between the designer and the Office.

3-1.04 Public Information Division

The Public Information Division is responsible for providing project-related CADD services. The designer must coordinate with the Division in the preparation of all CADD-generated project plan sheets.

3-1.05 District Offices

The Department's District Offices (Crawfordsville, Fort Wayne, Greenfield, LaPorte, Seymour, and Vincennes) provide the field services needed within each assigned geographic area. Their

responsibilities include maintenance of the State highway system, construction inspection services, and contacts with county and city governments.

The district Office of Design begins project oversight and guidance once the Preliminary Engineering/Environmental Phase begins. The project manager is responsible for ensuring that a schedule is agreed to and that project development maintains the schedule throughout the project development process. If, during the development phase, a scope or design change is required, any proposed corresponding schedule changes must be approved by the district Office of Design. Proposed schedule changes are not automatic.

Specifically for preconstruction activities, the coordination between the designer and appropriate district office is summarized as follows:

1. Coordination. The Central Office will maintain a steady contact with the district office. The district office, for example, will be invited to all field reviews and may receive some project-related correspondence.

2. Aerial Survey. If an aerial survey is conducted, the district office may provide the control traverse and pick-up field survey to locate items which may be missed by the aerial survey (e.g., underground utilities). The district office conveys this information to the Public Information Division's Office of Graphic Arts or to an aerial survey consultant for inclusion in the aerial survey.

3. Soils. The district office is responsible for testing soils and determining soil characteristics to be used in each embankment. Its report is submitted to the Construction Management Division's Office of Materials Management. The district office may also provide recommendations for shrink or swell factors. The designer must reflect this information in the project design.

4. Transportation Management Plan (TMP). If a TMP is prepared, the district's Traffic, Development, and Construction offices, and the designer, among other INDOT entities, may collaborate on the design and implementation of the TMP.

3-2.0 EXTERNAL ENTITIES

This Section discusses the specific coordination activities between the designer and entities which are external to INDOT.

3-2.01 Federal Agencies

3-2.01(01) Federal Highway Administration (FHWA)

The FHWA administers the Federal-aid program which funds eligible highway improvements. Its basic responsibility is to ensure that INDOT complies with all applicable Federal laws in the expenditure of Federal funds and to ensure that INDOT is in accordance with the applicable engineering requirements for each proposed highway project. FHWA maintains a Division Office within the State. This is the primary point of contact for INDOT.

The 1991 *Intermodal Surface Transportation Efficiency Act* (ISTEA), in addition to a realignment of the Federal-aid system, revised the role of FHWA for each individual project. The *Transportation Equity Act for the 21st Century* (TEA-21) of 1998 further revised such role. FHWA involvement is based on the following.

1. Highway System. FHWA involvement is only on the Interstate System.

2. Project Scope of Work. FHWA involvement is only an Interstate-System's new construction/ reconstruction (4R) or partial reconstruction (4R) project.

3. Project Cost. FHWA involvement is only on an Interstate-System project with an estimated construction cost exceeding $1 million. If the estimated construction cost at the beginning of scoping is under $1 million, but increases to over $1 million during the design process, the FHWA should be notified of their now-required involvement.

If a project is not subject to FHWA oversight, FHWA will not be involved with the normal day-to-day project activities, including field reviews, design approval, public-hearing certification, design exceptions, PS&E submittal, etc. However, each Federally-funded project should be in accordance with the appropriate criteria in this *Manual*, regardless of the need for FHWA review.

INDOT may request FHWA oversight on any Federal-aid project. In addition, FHWA is not precluded from reviewing or investigating any phase of the Federal-aid program including control documents or any Federal-aid project, especially that which includes unique features or that with unusual circumstances such as a special structure design, experimental feature, warranty work, Intelligent Transportation Systems (ITS) feature, design-build, etc., which would make it desirable to have FHWA oversight. The oversight determination for such special features will be made at the meeting discussed in Section 40-6.02, Item 3.

3-2.01(02) United States Forest Service (USFS)

The USFS is responsible for the management of all national forests. The USFS and INDOT currently have a Memorandum of Understanding (MOU) and approved procedures that describe the coordination between the two agencies for the planning and the development of each project having

USFS involvement. If a proposed project will impact a national forest, the designer must coordinate the project development with the USFS. The USFS should be invited to any field reviews and should receive copies of project reports. Some project actions will require USFS approval (e.g., right-of-way acquisition).

3-2.01(03) United States Postal Service (USPS)

Coordination with the USPS may be necessary to determine location of mail delivery points and mailbox turnouts and to ensure that crash-tested mailboxes are installed.

3-2.01(04) Federal Aviation Administration (FAA)

Coordination may be necessary with the FAA if a project is located in the vicinity of an airport. The anticipated development of the airport and existing traffic patterns which involve the airport should be considered during the design process.

3-2.01(05) National Park Service (NPS)

Coordination with the NPS will be necessary if a project is in the vicinity of land under the jurisdiction of the NPS. Although the Department has no formal agreement with the NPS, the level of involvement will be similar to that between INDOT and the USFS.

3-2.01(06) Department of Defense (DOD)

Coordination with the DOD and concurrence by the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) is required where the vertical clearance over Interstate roadways does not meet applicable standards.

3-2.02 Local Public Agency

The coordination between the designer and a local public agency is descried as follows.

1. Design. The designer, through the district office, solicits input from the affected local agency, and keeps it up-to-date on any current or planned activities regarding an INDOT-route project. For example, the decision on whether to provide open or closed drainage on an urban street is significantly influenced by input from the locality. In addition, a larger

municipality may have its own design criteria, which must be considered during the design process.

2. Coordination. The designer typically invites the local agency to any field reviews and provides it with copies of major project reports.

3. Local Transportation Project. The designer is usually a consultant under contract to the local public agency. Coordination with the local agency is administered by the Contract Administration Division's Local Program Assistance Team. An INDOT designer performs only limited review of local-transportation-project plans.

3-3.0 SPEED

3-3.01 Definitions

1. Design Speed. Design speed is the maximum safe speed that can be maintained over a specified section of highway if conditions are so favorable that the design features of the highway govern. A design speed is selected for each project which will establish criteria for several design elements including horizontal and vertical curvature, superelevation, and sight distance. Section 3-3.02 discusses the selection of design speed in general. Chapter Fifty-three discusses specific design-speed criteria for a new-construction or reconstruction project. Chapters Fifty-four through Fifty-six provide the design-speed criteria for a project on an existing highway.

2. Low Speed. For geometric design purposes, low speed is defined as 70 km/h or lower.

3. High Speed. For geometric design purposes, high speed is defined as 80 km/h or higher.

4. Average Running Speed. Running speed is the average speed of a vehicle over a specified section of highway. It is equal to the distance traveled divided by the running time (the time that the vehicle is in motion). The average running speed is the distance summation for all vehicles divided by the running time summation for all vehicles.

5. Average Travel Speed. Average travel speed is the distance summation for all vehicles divided by the total time summation for all vehicles. Average running speed only includes the time that the vehicle is in motion. Therefore, on an uninterrupted-flow facility which is not congested, average running speed and average travel speed are equal.

6. Operating Speed. Operating speed, as defined by AASHTO, is the highest overall speed at which a driver can safely travel a given highway under favorable weather conditions and prevailing traffic conditions while at no time exceeding the design speed. Therefore, for a

low-volume condition, operating speed equals design speed. This term has little or no usage in geometric design.

7. 85th-Percentile Speed. The 85th-percentile speed is the speed below which 85 percent of vehicles travel on a given highway. The most common application of the value is its use as one of the factors, and usually the most important factor, for determining the posted, regulatory speed limit of a highway section. Field measurements for the 85th-percentile speed will most often be conducted during off-peak hours when drivers are free to select their desired speed.

8. Posted Speed Limit. If needed, the INDOT district traffic office conducts the traffic engineering studies on a State route to select a posted speed limit. When a study is performed, on either a State or local route, the posted speed limit is based on the factors as follows:

   a. the 85th-percentile speed;

   b. the design speed used during project design;

   c. road surface characteristics, shoulder condition, grade, alignment, and sight distance;

   d. functional classification and type of area;

   e. type and density of roadside development;

   f. the accident experience during the previous 12 months; and

   g. parking practices and pedestrian activity.

   On a new-construction or reconstruction project, the posted speed limit will typically be equal to the design speed used in design, if this does not exceed the legal limit. A traffic engineering study may be conducted for various reasons to assist in the determination of the posted speed limit. This procedure applies to either a State or local facility.

9. Legal Speed Limit. A legal speed limit is that set by the Indiana Statutes which applies, in general, to each portion of a public road which does not have a posted speed limit. Section 3-3.02 describes specific legal speed limits adopted by the State.

3-3.02 Design Speed Selection

3-3.02(01) Geometric Design Considerations

From a geometric design perspective, the selected design speed is based on the road design elements as follows.

1. Functional Classification. A more-important facility should be designed with a higher design speed than a less-important facility.

2. Urban/Rural. The design speed in a rural area is generally higher than that in an urban area. This is consistent with the typically fewer constraints in a rural area (e.g., less development).

3. Terrain. The flatter the terrain, the higher the selected design speed will be. This is consistent with the typically higher construction costs as the terrain becomes more rugged.

4. Traffic Volume. Design speed may vary by traffic volume. As traffic volume increases, a higher design speed should be used. For example, the design speed on a rural collector will vary according to traffic volume.

5. Project Scope of Work. A higher design speed is more applicable to a new-construction or reconstruction project than to a 3R project.

For geometric design application, the relationship between these road design elements and the selected design speed reflects general cost-effective considerations. For example, the higher the traffic volume, the more benefits to the traveling public from a higher design speed.

3-3.02(02) Regulatory Speed vs. Design Speed

Each public road is controlled by a regulatory speed limit, either through posted speed-limit signs or with a legal speed limit shown in the *Indiana Code*; see Section 3-3.02(03). The relationship between the project design speed and the regulatory speed limit is summarized as follows:

1. General. The design speed should equal or should exceed the anticipated posted speed limit after construction, or the State legal speed limit on a non-posted highway.

2. Non-Posted Facility (Rural). The maximum legal speed limit is 55 mph. A project must be designed for 55 mph, or a traffic engineering study must be conducted to determine if a lower design speed is appropriate. If the project is designed for lower than 55mph, the road must be posted at the selected design speed between logical termini.

3. Non-Posted Facility (Urban). The maximum legal speed limit and corresponding minimum design speed are as follows:

a. State route: maximum legal speed limit 30 mph, with 30 mph minimum design speed; or

b. non-State route: maximum legal speed limit 55 mph, day, and 50 mph, night, with 55 mph minimum design speed.

As in a rural area, the minimum design speed must meet these criteria, unless a traffic engineering study indicates otherwise.

To avoid a potential conflict, the Office of Environmental Services should, early in project development, coordinate the design-speed selection with the district office to assist in establishing the anticipated posted speed limit of the completed facility. If the proposed design speed from the Geometric Design Tables included in this *Manual* is lower than the established posted speed limit, one of the methods must be selected as follows:

1. increase the design speed to equal or exceed the established or anticipated posted speed limit; or

2. seek a design exception for the individual geometric design element (e.g., a horizontal curve) which does not meet the established speed limit.

3-3.02(03) Legal Speed Limits

This Section summarizes the legal speed limits established by the *Indiana Code*. Figure 3-3A, Legal Speed Limits, Non-Interstate Facility, lists the legal limits for a rural or urban area and for a State or non-State facility.

1. Maximum Speed Limit. *Indiana Code* IC 9-21-5-2 and IC 9-21-5-6 set the maximum speed limit which applies to vehicular speeds on each public road in the State. This maximum limit does not establish the upper limit for geometric design speed. The speed limits are as follows:

   a. 70 mph on an Interstate route, except within an urbanized area;

   b. 65 mph for a vehicle (other than a bus) having a gross mass greater than 13,000 lb when operating on an Interstate route outside of an urbanized area;

   c. 60 mph on a rural divided facility with four or more lanes;

   d. 55 mph on a rural two-lane two-way facility;

e. 30 mph on a State highway in an urban area*;

f. 30 mph on a non-State highway in an urban area, with absolute maximum of 55 mph, day, and 50 mph, night*; and

g. 15 mph in an alley, with absolute maximum 30 mph*.

* Requires an engineering and traffic investigation study to establish a maximum speed limit that is different from the value shown.

2. Minimum Speed Limit. *Indiana Code* IC 9-21-5-6 sets the minimum speed limit for a facility which is not posted with a regulatory speed-limit sign. The minimum speed limits are as follows:

a. Rural Area. 30 mph, except as noted in Item c **.

b. Urban Area. 20 mph, except as noted in Items c and d **.

c. School Zone. A local authority may establish a school-zone speed limit, if the conditions are met as follows:

(1) the limit is not lower than 20 mph;

(2) the limit is imposed only in the immediate vicinity of the school;

(3) children are present;

(4) the speed zone is properly signed; and

(5) if on a State route, the Department has been notified by certified mail of the limit imposed.

d. Park or Playground. A local authority may establish a speed limit of not lower than 5 mph on an urban street, if the conditions exist as follows:

(1) the street is located within a park or playground established under IC 36-10. The board established under IC 36-10-3, the board established under IC 36-10-4, or the park authority established under IC 36-10-5, requests the local authority to decrease the limit; and

(2) the speed zone is properly signed.

e. Alley. The minimum speed limit is 5 mph **.

** Requires an engineering- and traffic-investigation study to establish a speed limit that is below the maximum. However, the lower limit cannot be below the minimum value shown.

Geographic Location	System	Maximum	Minimum
Rural	State Highway	60 mph	n/a
	Non-State Highway	55 mph	30 mph
Urban	State Highway	30 mph	n/a
	Non-State Highway	Day: 55 mph Night: 50 mph	20 mph

Note: See Section 3-3.02(03) for exceptions.

LEGAL SPEED LIMITS
NON-INTERSTATE FACILITY

Figure 3-3A

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CHAPTER FOUR

TRANSPORTATION MANAGEMENT

4-1.0 BACKGROUND

The *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA) requires the development and implementation by INDOT of six transportation management systems. The impetus for the mandate is the aging of the nation's highway and transit systems. Planning must therefore focus on how to use these systems more effectively and how to address the public's performance expectations.

Management systems are a key element in addressing these concerns and effectively managing existing transportation systems and resources. Therefore, Congress included the transportation management systems in ISTEA as follows:

1. Pavement Management System (PMS) Federal-aid highway only;
2. Bridge Management System (BMS);
3. Safety Management System (SMS);
4. Congestion Management System (CMS);
5. Public Transportation and Equipment Management System (PTMS); and
6. Intermodal Management System (IMS).

The FHWA/FTA regulations to implement ISTEA provide a common framework for all six management systems. Each management system should reflect a systematic process designed to assist decision makers in selecting cost-effective strategies and actions to improve the efficiency and safety of, and protect the investment in, the nation's transportation infrastructure. The results of the management systems should be incorporated into the Statewide and metropolitan planning processes and into the development of the State Transportation Improvement Program (STIP) and the metropolitan Transportation Improvement Program (TIP).

Each transportation management system should include the elements as follows:

1. identification of performance measures;
2. data collection and analysis;
3. determination of needs;
4. evaluation and selection of appropriate strategies and actions to address needs; and
5. evaluation of the effectiveness of the implemented strategies and actions.

The *National Highway System Designation Act of 1995* relaxed the requirements of ISTEA by making the management systems optional. However, INDOT has decided to develop and implement all six systems. A brief discussion of each system follows.

4-2.0 MANAGEMENT SYSTEMS

4-2.01 Pavement Management System

INDOT initiated the current Pavement Management System (PMS) in 1989 based on the Federal Highway Administration (FHWA) requirements. Subsequent regulation by Congress (ISTEA) and FHWA have further regulated the development and expansion of the PMS procedures.

The Planning Division's Roadway Inventory Team is responsible for the development of the PMS for use by INDOT. The Team is responsible for collecting pavement condition data for each State highway, generating information from the data for use in programming each preservation project, and monitoring the condition of each State highway. The information aids in informed decision-making for a programming project, pavement design, and pavement material selection.

A primary goal of the PMS is to provide the necessary engineering and economic tools to make decisions on preserving an INDOT pavement. One of these tools is gathering information to provide quantifiable pavement needs and data on other roadway items such as geometrics and roadside barriers. Cost-effective techniques are used to gather roughness, pavement condition, rutting, and video log data for each INDOT route in one pass for the PMS. At the same time, inventories have been constructed from the videos for other systems and INDOT divisions. These include speed limits, no-passing zones, guardrail and end treatments, limited GPS points and data on medians, shoulders, and geometrics.

The Roadway Reference System is another tool for INDOT developed and maintained by the Roadway Inventory Team. This system provides a unified-location reference system to link road location with road data. Each project location description must include the reference post start and end point on the plans and project description. Both printouts and live data base access are available from PMS to locate the correct reference post for a project.

The Roadway Reference System is used on each State highway. It consists of signposts placed at nominal 1 mi intervals. All PMS data is recorded by the reference-post-location method. The signpost numbering is continuous from the beginning of the route to the end. The zero point, or beginning, of the route is at its southern or western extremity, and the number increases in the northward or eastward direction. Each bridge is signed with its reference-post location. Each post is a benchmark for locating projects and features. The reference signs must be located for each construction project and be preserved in the end. A manual which explains the reference-post-location system is available from each district's Office of Design.

The Roadway Inventory Team can provide operations research analysis of pavement materials, building techniques, and overall pavement performance. This involves examining past and present performance information and projecting trends for the expected life of the pavement for various materials and techniques. This is part of a life-cycle cost analysis which can provide information on the effectiveness of pavement treatment. The Roadway Inventory Team provides this analysis for determining each project for programming. Contact the Roadway Inventory Team for details and additional information.

4-2.02 Bridge Management System

The Bridge Management System (BMS) will be used as a planning tool to identify each proposed project with a recommended action, cost, priority ranking, and optimized listing based on a set budget. Programming of a bridge project is based on recommended actions of the IBMS, district review and recommendations, and integration with other management systems.

The Planning Division is responsible for developing and maintaining the Bridge Management System in cooperation with Purdue University. An Indiana Bridge Management Advisory Committee (IBMAC), consisting of metropolitan planning organizations (MPOs), county engineers, county commissioners, the Indiana Local Technical Assistance Program (LTAP), Consulting Engineers of Indiana, and FHWA, was involved in preparing recommendations and developing processes for the IBMS. Currently, the BMS is in the development phase. The software will use data collected through the biennial National Bridge Inspection program as input data.

The Bridge Management System is a decision support tool that supplies analysis and summaries of data, uses mathematical models to make predictions and recommendations, and provides the means to efficiently evaluate alternative policies and programs. The System includes a database and an ongoing program for the collection and maintenance of the inventory, inspection, cost, and supplemental data needed to support it. The System also includes a rational and systematic procedure for applying network level analysis and optimization to the bridge inventory. The procedure has the capabilities as follows:

1. forecast a probable rate of deterioration of bridge elements;

2. identify feasible actions to improve bridge conditions, safety, and serviceability;

3. estimate the cost of recommended actions;

4. estimate expected user-cost savings for safety and serviceability improvements;

5. determine least-cost repair and rehabilitation strategies for bridge elements using life-cycle cost analysis;

6. perform multiperiod optimization; and

7. generate summaries and reports as needed for the planning and programming process.

4-2.03 Safety Management System

Since the passage of the *National Highway System Designation Act of 1995*, the Safety Management System (SMS) has been refocused to produce the tools that will select and prioritize Department projects and programs. This effort will aid in efficiently using Safety set-aside funds and aid in justifying other projects. SMS will also produce Statewide statistics for Highway Performance Monitoring System (HPMS) reporting and will help support and justify larger projects by predicting expected crash reductions due to proposed improvements.

The Safety Management System will continue to be based on the goal of reducing the number and severity of traffic accidents by ensuring that all opportunities to improve highway safety are identified, considered, implemented as appropriate, and evaluated in all phases of highway planning, design, construction, maintenance, and operation. The Department will continue the development of crash-reduction factors, improve the selection process for hazardous locations, and develop procedures for selecting and producing prioritized lists of safety projects and programs.

The primary responsibility of the Planning Division's Safety Team is to extract traffic crash data from Indiana State Police crash records, and compile summaries of traffic crash data on all State and local routes. This activity involves maintaining a road-name-to-pseudo-number listing. This listing is the basis for traffic crash locations within the State Police database.

The Safety Team provides, upon request, summaries of crash statistics for each intersection, or, Statewide, by route system. The summaries for each intersection are used to support the development of the SMS, and are used by Production Management Division's Office of Environmental Services for project scoping. The SMS uses the route-system summaries to determine high-hazard locations and to determine system-wide statistics used to support data requirements of the HPMS.

4-2.04 Congestion Management System

INDOT is developing a Statewide Congestion Management System (CMS). The CMS will identify present and future congestion levels. The CMS will also propose and evaluate congestion mitigation strategies and will provide recommendations for each project or program for consideration in the

development of Statewide and metropolitan transportation and improvement programs. In addition, each transportation management area (TMA), as part of its transportation planning process, is required to have an operational CMS. INDOT will continue supporting the TMAs in this effort.

A Statewide report that assesses the level of congestion for each State highway has been completed. Refinements to this assessment are continuing. The CMS recommends congestion management strategies and methods for their evaluation and selection. It includes a prototype on how to best simulate congested corridors to evaluate mitigation strategies. The CMS will also provide technical support for Indiana's involvement with building an Intelligent Transportation Infrastructure (ITI), which is the marriage of telecommunications, information, and computer technologies to relieve traffic congestion.

The CMS will be coordinated with the Public Transportation Management System (PTMS) and the Intermodal Management System (IMS), as discussed in the following Sections.

4-2.05 Public Transportation Management System

The Public Transportation Management System (PTMS) will serve as an informational tool to assist INDOT and the MPOs in making sound investment decisions on existing and future transit assets. The PTMS will establish a process for the collection of data on the age, condition, useful life, and replacement value of transit facilities and equipment to aid in the selection of the most cost-effective strategies for providing and maintaining transit assets. The overall intent of the PTMS is to facilitate an ongoing, Statewide assessment of the condition of transit assets to identify and prioritize investment needs.

The PTMS will function primarily as an asset management system, as opposed to other management systems that emphasize operational performance. It will be linked with the CMS and IMS. The PTMS will provide information on the condition and capacity of assets in a given region to support the evaluation of transit alternatives identified by the Congestion Management System. This portion of the Congestion Management System will then support the transit components of the Intermodal Management System.

The work elements for completion of the PTMS are as follows.

1. Definition of PTMS Elements. This task will determine which PTMS elements must be included to meet the needs of INDOT and the MPOs. Transit operators, INDOT, and the MPOs will assist in defining the PTMS elements.

2. Identification of Required Data. INDOT will work with the MPOs and transit operators to identify which types of data are readily available to support the defined elements of the PTMS.

3. Data Collection. INDOT will collect rolling stock data using the Annual Report Survey form. Facility and equipment information will be acquired through on-site visits with each transit system. INDOT already maintains operating and performance data for all transit systems.

4. Database Development. Separate databases will be structured and maintained for rolling stock and facilities/equipment. Each database will be compatible with all other management systems and with INDOT's Public Transit Annual Report database.

5. Condition Assessment Procedure. A consistent procedure for the assessment of the base-year condition of transit assets will be developed within the database. This procedure will follow a rating approach. This will enable the PTMS to identify current and future conditions of transit assets. Useful life, physical condition, and route-miles data will be part of this procedure.

6. Performance Assessment Procedure. A series of performance measures will also be built into the PTMS database. This process will identify deficiencies associated with the maintenance of transit assets, and prevent INDOT from investing in a project that resulted from poor maintenance practices.

7. Prioritization Procedure. A prioritization procedure will be established in cooperation with the MPOs and transit operators. The items that may be included are service maintenance performance, safety performance, financial performance, and compliance with regulatory and statutory requirements (e.g., ADA, Clean Air Act).

8. Modeling Framework of PTMS. This task will involve the integration of the PTMS database, condition assessment procedure, performance assessment procedure, and prioritization procedure to establish a functional management system. The modeling approach will allow these PTMS components to interact and generate output that identifies and prioritizes the capital needs associated with public transportation.

Operation of the PTMS will allow INDOT and transit operators to plan for transit capital investments in an integrated and cooperative manner. The PTMS will serve INDOT, MPOs, and transit operators with a valuable decision-making tool and, concurrently, provide an information resource for Statewide planning purposes. The net effect of a well-developed and properly-implemented PTMS will be improved public transportation performance. This improvement in public transportation will help reduce congestion in each urban area, improve travel safety, reduce travel costs to the tax-paying public, and improve service to the population with special mobility needs.

4-2.06 Intermodal Transportation System

4-2.06(01) Background

INDOT has developed an Intermodal Management System (IMS) to evaluate the performance of intermodal transportation investments as part of the Statewide transportation planning process. This planning process recognizes the shift from our historical emphasis on individual modes, to that of intermodalism as a means of increasing economic competitiveness by minimizing the cost of transportation.

The INDOT Intermodal Management System Report (October 1997) was developed in a cooperative effort with major transportation stakeholders. The Planning Division developed the IMS in conjunction with Freight and Passenger Advisory subcommittees. These subcommittees contained representatives of other INDOT divisions, Federal agencies, metropolitan development organizations, trade associations, facility managers, and individual mode operators and transportation providers.

4-2.06(02) Definition

The Intermodal Management System (IMS) is a systematic process that provides for the efficient, safe, and convenient movement of people and goods through the integration of transportation facilities and systems. The IMS improves the coordination in planning and implementation of air, water, and various land-based transportation facilities and systems. Intermodal transportation is viewed from the perspective of the total trip. The IMS planning process identifies transfers and interactions among modes. The IMS is a systematic process of the following.

1. identifying key linkages among one or more modes of transportation, where the performance of one mode will affect another;

2. defining strategies for improving the effectiveness of these modal interactions; and

3. evaluating and implementing these strategies to enhance the overall performance of the transportation system.

4-2.06(03) Identification of Key Linkages

The National Highway System (NHS) constituted the starting point for the development of the IMS. In 1995, INDOT worked with FHWA to identify intermodal passenger and freight facilities that qualified under Federal criteria for NHS access to define a network of NHS Intermodal Connectors. The intermodal facilities, NHS, and other State highways were analyzed in a geographic information

system (GIS). Seventeen major intermodal facilities of National Significance were identified in this effort. In the development of the IMS, an additional twenty-four major Intermodal Facilities of Statewide Significance were identified in a cooperative effort by the Freight and Passenger Subcommittees as shown in Figure 4-2A, Facilities with National/Statewide Significance, and in the Indiana Intermodal Facilities map.

4-2.06(04) Connecting Links Between the NHS and Major Intermodal Facilities

The IMS process developed access links connecting the Intermodal Facilities by working with local MPOs and facility managers/operators. Each connecting link may have a State-jurisdictional element and a local-jurisdictional element. The connecting links between the Intermodal Facilities of National Significance and the NHS may qualify for NHS funding. The connecting links between the NHS and Intermodal Facilities of National or Statewide Significance are awarded points in determining proposed project priority in the Office of Environmental Services Priority Setting Procedures. The connecting links for major intermodal facilities are shown in maps for the regions as follows:

a. Bloomington and Terre Haute;
b. Clark County;
c. Elkhart;
d. Evansville;
e. Gary;
f. Fort Wayne;
g. Indianapolis;
h. Kokomo and Anderson;
i. Lafayette and Remington;
j. Northwestern Indiana;
k. Portage;
k. South Bend; and
m. Waterloo/Garrett.

4-2.06(05) IMS Strategy Recommendations

The IMS analysis results conclude that the intermodal deficiencies in Indiana were less severe than in other states due to our well-developed transportation infrastructure. The major area of concern to the IMS Advisory Committee primarily addressed safety deficiencies. Based upon the analysis of the performance of the connecting linkage highways, safety action recommendations were made for four intermodal connectors and mobility action recommendations were made for five intermodal connectors. Other strategy recommendations included the need for INDOT to develop a multi-modal

and economic development focus in project identification and prioritization (see the October 1997 IMS Report for details).

		Facility Type	Name
National Significance	1	Airport (Pass./Freight)	Indianapolis International
	2	Airport (Passenger)	South Bend Michiana Regional
	3	Airports(Passenger)	Fort Wayne International
	4	Airport (Passenger)	Evansville Regional
	5	Airport (Freight)	Hulman Regional
	6	Intercity Bus	Tri-State Coach
	7	NICTD Station	Hammond
	8	NICTD Station	East Chicago
	9	NICTD Station	Gary Metro
	10	NICTD Station	Dune Park
	11	Rail/Truck Intermodal	Indianapolis Avon Yard
	12	Rail/Truck Intermodal	Fort Wayne Triple Crown
	13	Port	Burns International Harbor
	14	Port	Southwind Maritime Centre
	15	Port	Clark Maritime Centre
	16	Port	USX Steel
	17	Port	Mulzer Stone, Evansville
Statewide Significance	18	Airport (Passenger)	Purdue University – Lafayette
	19	Airport (Passenger)	Clark County
	20	Airport (Passenger)	Hulman Regional
	21	Airport (Passenger)	Eagle Creek Airpark
	22	Airport (Passenger)	Elkhart Municipal
	23	Airport (Passenger)	Monroe County
	24	Airport (Passenger)	Anderson Municipal
	25	Airport (Passenger)	Kokomo Municipal
	26	Amtrak Station	Indianapolis
	27	Amtrak Station	Hammond
	28	Amtrak Station	South Bend
	29	Amtrak Station	Elkhart
	30	Amtrak Station	Waterloo
	31	Amtrak Station	Lafayette
	32	Amtrak Station	Garrett
	33	Intercity Bus Station	Union Station, Indianapolis
	34	NICTD Station	South Bend
	35	Park N Ride	Indiana University, Bloomington
	36	Port	Inland Steel
	37	Port	LTV Steel
	38	Port	Mulzer Stone, Newburgh
	39	Rail/Truck Intermodal	Roanoke General Motors Facility
	40	Rail/Truck Intermodal	Evansville CSX
	41	Rail/Truck Intermodal	Hoosier Lift, Remington

FACILITIES WITH NATIONAL OR STATEWIDE SIGNIFICANCE

Figure 4-2A

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CHAPTER FIVE

ENGINEERING ASSESSMENT

This Chapter provides guidelines regarding evaluation of transportation improvement alternatives for a Department project. This Chapter outlines the processes and methods adopted by the Office of Environmental Services' Environmental Policy Team.

5-1.0 ENVIRONMENTAL POLICY TEAM

The responsibility of the Environmental Policy Team is to establish effective and efficient solutions to highway transportation problems. Effectiveness measures how well a plan meets the project objectives. As a measure of economic return on investment, efficiency is a function of project cost.

The engineering-assessment process involves the development and comparison of alternatives, final selection, and documentation. This phase of INDOT's project development schedule succeeds planning and programming, and precedes final design. The Team's mission is as follows:

1. ensure comprehensive consideration of reasonable improvement options;
2. integrate engineering/transportation and environmental objectives; and
3. effect recognition and selection of a cost-effective, satisfactory course of action.

From this assessment, the Planning Division's Roadway Inventory Team produces the Engineer's Report, also referred to as the Scope of Work Report. This document presents a formal record of the analysis of alternatives and identifies the proposal (recommendation) – the official agency record of decision for implementation.

The Engineer's Report principally guides downstream project-development stages such as field survey, other design functions, and the completion of the environmental review. The document also serves to refine upstream planning and programming elements of the project, notably construction, land acquisition, and design engineering costs. The Report often forms the basis for the consultant design agreement, if required, and serves as a resource to inform interested parties outside the Department.

The Roadway Inventory Team, its in-house staff or possibly a consultant, typically produces an Engineer's Report for the each project type as follows:

1. new bridge and road construction;
2. bridge replacement and removal;

3. small drainage structure new construction or replacement;
4. drainage correction;
5. protective buying of right-of-way;
6. added travel lanes and median construction;
7. intersection improvement;
8. new interchange construction or interchange modification;
9. sight-distance improvement;
10. Interstate-route pavement replacement or rehabilitation to 3R or 4R standards;
11. rest area construction or reconstruction;
12. weigh station (port of entry) construction or reconstruction; or
13. landslide correction.

The Team does not assess and report on each project type as follows:

1. bridge rehabilitation or repair;
2. pavement resurface to non-3R or non-4R standards;
3. shoulder rehabilitation;
4. roadside work;
5. access control;
6. guardrail repair or replacement; or
7. traffic-control-devices installation.

The Roadway Inventory Team continually studies and reports on transportation matters beyond the Department's routine project development structure. Among others; the Indiana Department of Commerce economic development plans; collaborative efforts with towns, cities, counties, or other states; and the Indiana Department of Natural Resources park access needs generate these special assignments. The Roadway Inventory Team annually appraises Interstate-route pavement rehabilitation and replacement plans in advance of project programming. This exercise is commonly called a mini-scope.

5-2.0 PREPARING THE ENGINEER'S REPORT

The tasks in the following sections are listed in order of prevailing use in practice. However, an individual project may vary in level of effort and processing order. The user must use flexibility when applying these guidelines.

5-2.01 Task 1 - Determine the Essential Project Need (Deficiency) and Purpose (Objective)

A clear, solid purpose and need statement explains why expenditure of public funds is appropriate and is the basis for consideration of alternative plans. Lack of a well-established project purpose and

need complicates determination of alternatives, reasonableness, prudence, and practicality. INDOT's *Procedural Manual for Preparing Environmental Studies* provides further guidance on this subject.

An explicit need for the improvement accompanies each project entering the Department's work program. An initial task of engineering assessment is to specify, or in some cases to verify, present or impending deficiencies in the existing facility. Project needs may include elements such as lack of traffic-carrying capacity, operational/safety defect, poor intersection sight distance, substandard cross section, vertical profile or horizontal alignment, undesirable pavement condition, inadequate drainage, missing system linkage, etc. The statement of need for improvement logically drives some action.

Every project has a purpose that addresses the fundamental reason for the undertaking. The project objective is a broad definition of the intended result (e.g., the project purpose is to stabilize failure of the back slope). Objectives are neither statements of need/deficiencies nor are they a specific description of the solution. Examples of project purpose include the following:

1. reduce present or impending congestion;
2. enhance operational safety;
3. increase sight distance;
4. update geometrics;
5. improve pavement;
6. convey runoff; and
7. insert connecting links in the transportation network.

Engineering assessment seeks to establish an action plan that satisfies the project objectives while minimizing agency and user costs. An explicitly stated objective/purpose clarifies the comparison of alternative improvement strategies in terms of effectiveness and efficiency.

Initial statements of project purpose and need normally are determined in the planning and programming process, preceding the engineering-assessment phase. The Project Application form may document this prior action. Consult with the district development engineer, or, as required, the district construction or traffic engineers), Planning Division, or other responsible party to identify the purpose and need, to determine if the project remains viable and to double check whether the work-type classification is correct. During the later stages of engineering assessment, the project manager must verify that the project need is indeed credible. Engineering analysis may reveal that the needs perceived at the time of programming were not substantive. If at this initial step, or at any subsequent stage, there is a consensus that the project should be canceled or fundamentally changed, the project manager should request the district Office of Design or district Planning and Programming Division to initiate the program changes (through the Planning Division) and revise the project schedule accordingly. Also, the Environmental Policy Team may administer the changes.

5-2.02 Task 2 - Gather Information

Accurate information is essential to develop and assess alternative plans. In the information-gathering step, the project manager is directed to take advantage of the Department's resources to form a complete picture of the existing physical transportation infrastructure, plus environmental, social, and economic aspects of the project site. The project manager must execute basic data requests without delay, particularly traffic volumes and aerial photographs, as the time necessary to secure crucial information often takes several months. Likewise, events following data requests that render the information unnecessary call for immediate cancellation of the responsibility of the project manager. Figure 5-2A, Information-Gathering Guide, explains circumstances compelling the project manager to seek information.

The information that may be gathered is as follows:

1. Project Application. The data sheets are prepared by the district Production Division or the Planning Division. The Environmental Policy Team generally transmits the related Project Application to the project manager upon assignment.

2. Existing Road or Bridge Plans. The Planning Division's Research and Documents Library Team maintains microfilm and archived plans for existing State bridges, highways, traffic signals, and other related infrastructure. Contact the Research and Documents Library Team for such plans. Microfilm records can be printed at full or half size.

3. Aerial Photography/GIS Maps. Photographs or maps may be obtained from the following.

    a. County Coverage. The Department maintains a set of aerial photographs, although dated, that cover the entire State. This is known as county coverage. Contact prints, 9 in. x 9 in., are available at a 1:24 000 scale. Mylars can be made from the negatives. The largest scale available for county coverage is 1:4000. Requests should be directed to the Public Information Division's Office of Graphic Arts.

    b. New-Flight Coverage. If the project manager needs more-recent, larger-scale, or controlled-aerial photographs, new-flight coverage should be requested. Weather and seasonal restraints will result in varying delivery dates for new-flight aerials. Common scales of finished 24 in. x 36 in. mylars are 1:1000 for an urban area or 1:5000 for a rural area. However, intermediate scales are available (e.g., 1:2000). Upon explicit request, contact prints or their digital images are available to the project manager. Requests should be directed to the Office of Graphic Arts. Ground control for controlled aerials involves coordination with the Production Management Division's Survey Team.

c. Land Office. The State Land Office maintains a set of one- to ten-year-old aerial photographs covering the entire State. The photographs are at a 1:4800 scale, other than Marion County at 1:1200. The State Land Office is located in the Indiana Government Center, South Building.

d. GIS Maps. GIS maps depicting the existing infrastructure are available for select regions of the State. They are expected to become more widely available in the future. One example is the Indianapolis Metropolitan Area IMAGIS digitized database. These maps use controlled, ortho-rectified aerial photographs of the Marion County area which are digitized into their mapping database. The files or hardcopy format can be purchased from the IMAGIS Center at Indiana University Purdue University at Indianapolis.

e. Other Sources. Rapid, ongoing advances in technology are generating useful aerial mapping products. These alternative sources may produce cost-effective mapping/imaging, often in digital format.

4. Traffic Data. The project manager should evaluate each project for the requisite nature of traffic data. The data generally include current-, or base-, year, intermediate-year and design-year average annual daily traffic (AADT), A.M. and P.M. design hourly volumes (DHV), and the percentage of commercial vehicles in daily and peak-hour traffic streams. Turning movements for a project with intersections and interchange ramp terminals may warrant non-standard approaches or auxiliary approach lanes. A select major project warrants travel demand modeling and/or an origin-destination study.

Official traffic counts with projections are provided by the Planning Division's Traffic Monitoring Team. A request for traffic data should be transmitted to the Team's supervisor on the Request for Traffic Projections standard form. Figure 5-2B is a blank copy of such form. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/. All traffic data must be routed through the Office of Environmental Services's Environmental Policy Team.

The district traffic engineer also may have twelve-hour (or shorter period) counts for certain intersections, particularly signalized junctions or those previously studied for traffic control warrants. All relevant, independently secured counts should be forwarded to the Traffic Monitoring Team for its use in preparing formal turning-movement volumes.

5. Crash Data. Historical crash (accident) data are provided by the Planning Division's Safety Team. The records of crash events occurring on both the mainline and crossroads or interchange ramps should be requested. Satisfactory analysis generally requires the last three full years of historic data. There is a six- to nine-month time lag between a crash occurrence and its entry into the Department's computer data base.

A Request for Crash Records form should be submitted to the Team's crash analysis supervisor. Figure 5-2C is a blank copy of such form. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/. The designer may sometimes contact a local police agency for supplemental information.

Retrieved records will be copied to a diskette, if so requested. Each record's file then can be read, reduced, and sorted through spreadsheet software. The project manager may find it helpful to review complete hard copy/microfilmed reports on fatal events.

6. Pavement Design. For a project with moderate pavement treatment in the scope of work, preliminary pavement design should be requested from the Planning Division's Office of Pavement Engineering. In the request, summarize the project objective. Also see Chapter Fifty-two for more information. For a project that does not require a site-specific preliminary design, the Office uses the Department's generalized pavement cross sections – replacement, overlay, or otherwise.

7. Hydraulic Information. Preliminary hydraulic analysis and recommendation commensurate with the specific project type are provided by the Production Management Division's Hydraulics Team. Small-structure replacement, bridge replacement, drainage corrections, or road reconstruction involving storm sewer work, among other project types, will benefit from an abridged report from the Department's hydraulic specialists. The Hydraulics Team's cursory analysis yields preliminary recommendations on various elements. This may include a tentative suggestion on one or more hydraulically adequate structure types and associated sizes. Appropriate skew angle, wingwall configuration, and anticipated grade changes are often provided. The Hydraulics Team can assist the project manager by evaluating overall roadway drainage and rendering a preliminary drainage design. The Hydraulics Team receives all requests. See Part IV for more information.

8. Geotechnical Information. To conduct an informed analysis of project alternatives it may be necessary to obtain data, and a recommendation, from the Production Management Division's Office of Geotechnical Services. This applies to landslide correction, erosion control, work in a landslide-prone area, or a project requiring significant earthwork. The geotechnical office manager should be consulted regarding geotechnical issues. See Chapter Eighteen for more information.

9. Functional Classification Maps. Functional classification maps are available from the Planning Division for inspection. Functional classification plays a role in the selection of design criteria. Though functional classification is an official designation approved by FHWA that may differ from the prevailing conditions, the latter a guide to selection of design class. For additional guidance, see Chapter Forty.

10. Statewide Project Activity. One source of information on planned or programmed improvements that may affect a project is the *Directory of INDOT Highway Projects*. It is published by the Planning Division. The Department's scheduling system database is another comprehensive source. It lists all programmed INDOT projects and local-agency projects using Federal-aid funds. This computer database includes pertinent information on each active project and those already constructed within the last decade or longer. The project manager may request a spring report listing related projects in the database from the Office of Environmental Services' scheduling coordinator or Planning Division's Feasibility Engineering Team.

11. Planning and Feasibility Studies. Completed and ongoing planning and feasibility studies may provide valuable background information. Such reports are reserved for major projects, and are held by the Planning Division.

12. Bicycle and Pedestrian Networks. The Planning Division's pedestrian/bicycle coordinator should be consulted if pedestrian and bicycle issues arise during the course of the engineering-assessment phase. The coordinator plans activity among INDOT, the metropolitan planning organization (MPO), and local interest groups. The district Office of Design and local officials may also assist in non-motorized transportation matters.

13. Local Long-Range Transportation and Thoroughfare Plans. Each local public agency occasionally adopts a comprehensive transportation plan outlining a long-range vision for its community's transportation system. Request these planning documents directly from the local agency. Seek resolution from the Office of Environmental Services if the local plans conflict with the project's objectives.

14. Computer Database. The Planning Division maintains data that may be of use in the development of the project scope of work. The Division oversees data held in the computer database (under DOT IDMS sites named RII and PFI managed by the Department of Administration). The database includes the road inventory consisting of collected geometric information for existing highways. The database also contains bridge inspection reports and reference-post landmarks among other data regarding existing infrastructure.

15. Pavement History, Condition. The Planning Division maintains a log of historic pavement treatments on State routes. The Division also collects data annually for the Interstate system and biennially for other State routes that includes video log and pavement status ratings.

16. Inventory of Bridges. The Planning Division publishes the *Inventory of Bridges*. It lists vital statistics on each bridge under the Department's jurisdiction.

17. Railroad Status. The project manager should secure pertinent data on each railroad crossing in the study area from the Production Management Division's Railroads Team.

18. Telemetry and Weigh-In-Motion Stations, and Traffic-Actuated Signals. The designer should check for telemetry stations and weigh-in-motion stations within the project limits. If these are present, the designer should consult with the Planning Division's Traffic Monitoring Team for further information, and work to incorporate treatment of them into the design. If traffic-actuated signals are present, the designer should consult the district traffic engineer for further information, and work to incorporate treatment of them into the design.

19. Strategic Highway Research Project (SHRP). The designer should check with the Office of Research and Development's Pavement Materials Team to determine if SHRP sections, Long-Term Pavement Performance (LTPP), INDOT research, or similar test projects are within the project limits. Where these exist, approval must be obtained from the Planning Division to proceed with the project.

20. Scheduling Production Management System (SPMS), and INSTIP. The designer should check the SPMS or INSTIP files regarding local-public-agency improvement requests such as intersection improvements, roadside-safety enhancements, or other improvements within the project limits. Such SPMS or INSTIP improvements could be considered for incorporation into the project work if approved.

21. Maintenance and Traffic Programs. The designer should check the District Maintenance and Traffic Contract Programs for work which may be incorporated into the project scope.

5-2.03 Task 3 - Conduct Field Inspection

Conduct a scoping field check prior to carrying out considerable engineering assessment of improvement plans. The on-site inspection provides an opportunity to witness the project site alongside key decision makers.

5-2.03(01) Initial Research

The steps to be completed prior to the field check are as follows:

1. review existing design plans;

2. review any previous studies/reports;

3. review bridge inspection reports;

4. review traffic data;

5. review crash data;

6. review Project Application form;

7. view available aerial and ground-level photographs, topographic maps, or video;

8. identify apparent deficiencies/needs;

9. check other State or local projects in the area for consistency and conflicts;

10. determine functional classification;

11. determine NHS versus STP Indiana's 4R network versus 3R, National Truck Network Scenic Byways, and relinquishment status/funding;

12. review likely applicable design guidelines, e.g., 3R versus 4R standards, urban versus rural design class (not necessarily defined by functional classification); and

13. determine if the project is located in a floodplain, karst area, or other designated sensitive region.

5-2.03(02) Invitations

The individuals who should be invited to the field check are as follows:

1. district Design office manager, who will coordinate with the other appropriate district personnel and extend invitations as appropriate;

2. Environmental Policy Team member assigned to the project; and

3. Production Management Division representative, through the assigned office manager.

The project manager may, elect to have one or more of the individuals join the field inspection as follows:

1. Planning Division representative;

2. Hydraulics Team member;

3. Utilities Team member;

4. Office of Real Estate representative;

5. Office of Geotechnical Services engineer;

6. Pavement Engineering Office engineer;

7. Subdistrict Operations manager;

8. FHWA representative (for non-exempt Interstate-route project or other major project on the NHS);

9. metropolitan planning organization (MPO) representative;

10. city or county engineer;

11. county surveyor; or

12. others as appropriate.

5-2.03(03) On-Site Collection of Information

During the field review, the project manager should address the following:

1. record the names of all persons attending;

2. verify project need and purpose;

3. evaluate and note condition (state of repair) of existing infrastructure, including road, bridges, small structures, or traffic control devices;

4. formulate tentative solutions;

5. identify significant features, including historical structures, archaeological sites, cemeteries, churches, hospitals, fire stations, police stations, schools, parks, playgrounds, wetlands, Section 4(f) and 6(f) properties, etc;

6. evaluate existing drainage patterns and features;

7. check reasonableness of project termini;

8. discuss suitability of existing project schedule;

9. assess accommodation of pedestrian and bicycle traffic;

10. identify street lighting and its ownership;

11. discuss potential constructability issues and their solutions;

12. measure traveled way, roadway, and roadside cross sections. Measure bridge elements, clearances, etc. Determine right-of-way (property line) limits based on the locations of right-of-way markers, sidewalks, utility poles, fence lines, or other physical features;

13. secure (survey) approximate vertical profile, if necessary;

14. assess horizontal alignment and measure superelevation, if necessary;

15. measure intersection sight distance, if necessary;

16. measure turn-lane storage and deceleration lengths, tapers, or turning radii. Also, note lane configurations at intersections and interchanges;

17. note locations and design of public and private drives;

18. measure offsets to buildings and other structures subject to relocation;

19. check and record pH value of flow in small drainage structures;

20. perform drive-through inspection of potential official or unofficial detours;

21. obtain input on traffic maintenance plan, particularly from the district traffic and design engineers.

22. note posted speed limits and advisory speeds as well as other signs;

23. note land use (e.g., residential, commercial, industrial, agricultural, woodland, wetland);

24. identify terrain as either level or rolling;

25. identify traffic generators (e.g., schools, residential, industrial, commercial developments);

26. identify traffic control (e.g., signals, flashing beacons, two-way and four-way stop, railroad crossing protection);

27. identify environmentally sensitive sites;

28. photograph critical features;

29. identify access control type;

30. identify soil and rock types, unsuitable soils (e.g., peat);

31. note adjoining septic systems and water wells;

32. identify substandard roadsides, particularly with respect to clear zone or obstruction-free zone;

33. assess probability of need of additional right of way and its location;

34. identify speed monitoring, telemetry, and weigh-in-motion sites;

35. identify active, abandoned, or potential-for-abandoned railroads (helpful in identifying rails-to-trails candidates);

36. note locations of backslopes that have been steepened due to lengthening acceleration and deceleration lanes, that have therefore developed slope stability problems; and

37. gather other information as needed.

5-2.03(04) Follow-Up

After the on-site inspection, the project manager is responsible for writing minutes and distributing copies to those attending and to those invited who did not attend. Immediately after the field meeting the project manager should consider the following:

1. request additional data or cancel unneeded requests;

2. effect revision to the project schedule or work type classification;

3. arrange further meetings to discuss and resolve issues, including a public information meeting; and

4. make a reasonable effort to provide the assigned environmental scientist with provisional right-of-way acquisition limits, if any. The providing of such information must sometimes await further development of alternatives. The footprint may be superimposed on aerial photographs, sketched in a plan view drawing, or outlined in a written description to the scientist. The purpose of this effort is to accelerate the environmental review process, specifically early coordination.

5-2.04 Task 4 - Choose Design Criteria

Select the applicable design criteria. Once the facility's functional classification, prevailing adjacent land use, NHS or non-NHS designation, 4R or 3R network location, National Truck Network, and project work type are known, the applicable design criteria can be determined. See Chapters Forty and Fifty-three through Fifty-six for more information.

5-2.05 Task 5 - Perform Data Analyses

5-2.05(01) Examination of Existing Roadway Geometrics

Compare existing conditions to the selected geometric criteria. Identify deficiencies in vertical profile, horizontal alignment, superelevation, roadsides, intersection sight distance, travel lane and shoulder (paved and usable) widths, structural condition, hydraulics, etc.

5-2.05(02) Traffic Analysis

At a minimum, traffic analyses should determine current- (base-) year and design-year (typically twenty years after construction) levels of service (LOS), both with and without proposed improvements. On occasion, the project manager may find it necessary to assess the provisional construction year and another intermediate year. A cursory consideration of Task 7 may need to precede Task 5. Use the Transportation Research Board's *Highway Capacity Manual* and companion software (or compatible software/methods) for analysis. Also, see Chapter Forty-one. A project may require other state-of-the-art methods and software (e.g., freeway systems, multiple signals on an arterial, or effects of a project on a transportation network).

5-2.05(03) Crash (Accident) Analysis

See Section 55-8.0 for further guidance on conducting a crash analysis.

Effective highway design can reduce risks associated with motor vehicle travel. At a project level, this effort begins with the identification of high-frequency crash locations through the analysis of crash data. Measures of effectiveness (MOE) with respect to traffic safety include crash events/rates, traffic conflicts/rates (time to collision, evasive maneuver, etc.), critical events (e.g., disregarding signal, aggressive behavior), and traffic-stream characteristics (e.g., pedestrian presence). Each carries varied levels of uncertainty and vagueness in requisite data. Unless circumstances dictate otherwise, the project manager should use simple, historic crash events and associated rates in evaluating safety. The steps to be used in this evaluation are as follows.

Step 1. Summarize Records. This summary may be in tabular form or mapped graphically. Distinguish each crash event by location, severity (e.g., fatal, personal-injury, property-damage) and collision type (e.g., rear-end, right-angle, left-turn). Depending on the project, especially its expressed need and objective, it may be beneficial to note environmental conditions (e.g., weather, light) and other contributing circumstances.

Step 2. Evaluate Sheer Crash Events. Inspect the data summary for evidence of crash concentrations (cluster analysis). Inspect the study area for spots or segments showing high-severity events. Look for apparent relationships between existing roadway geometry or operation (e.g., sharp horizontal curvature, lack of exclusive left-turn signal phase) and crash location and collision type. See Chapter Fifty-five or other widely available pattern/probable-cause/countermeasure tables for guidance.

Step 3. Develop Crash Rates. Crash rates are a function of traffic volumes traveling through the facility during the study period, typically three full years. These rates are critical in assessing operation, because they relate crash frequency to traffic exposure. The use of rates provides a common denominator for identifying locations with unusually high crash experience.

Divide the study area into mid-block highway segments and major intersections. Determine respectively cumulative traffic exposure. Express mid-block segments in units of millions of vehicle miles (mvmi) and intersections in millions of entering vehicles (mev). Divide absolute crash numbers by the appropriate mvmi or mev. Produce a separate rate for the three crash severities, plus in aggregate for each highway segment and intersection.

The formula used to calculate intersection crash rate is as follows:

$$R_i = \frac{(A)(1{,}000{,}000)}{(T)\ (V)}$$

Where:

R_i = intersection accident rate expressed in accidents per million entering vehicles (mev)
A = number of accidents during the subject period
T = time period in days
V = total average daily traffic (ADT) entering the intersection

The formula for calculating the crash rate for a roadway (mid-block) segment is as follows:

$$R_S = \frac{(A)(1{,}000{,}000)}{(T)\ (V)\ (L)}$$

Where:

R_s = segment accident rate expressed in accidents per million vehicle miles
A = number of accidents during the subject period
T = time period in days
V = total average daily traffic (ADT)
L = segment length in miles

Step 4. Compare Crash Rates. The project manager should compare the site's crash rates with those of similar facilities in Indiana and the United States. The U.S. DOT's Bureau of Transportation Statistics publishes pertinent statistics, which are useful in comparative analyses especially for roadway and mid-block analyses. For Indiana, Figure 5-2D shows motor vehicle fatalities and injuries – 1997, 1998, and 1999 averages. Such averages may be used to determine if a particular section of highway exhibits above-average crash rates. The averages should be reviewed with the intent of reducing crashes. A computed intersection rate which exceeds 1.5 crashes per million entering vehicles at a major intersection should alert the project manager to a potential operational problem.

Step 5. Advanced Statistical Analysis. Though generally reserved for extraordinary circumstances, the project manager may wish to employ statistical methods to minimize inherent weaknesses in judging a facility's status exclusively by use of unadjusted, historic crash data. Processes vary in complexity. The results allow the analyst to state with distinct statistical confidence whether the crash risk is disproportionately high at a particular site and, therefore, whether certain remedial treatments are likely effective.

Step 6. Countermeasures. Choosing efficient, effective corrective measures logically follows the identification of safety concerns. Guidelines on effective forms of countermeasures are obtainable. The basic, key elements to safe operation to be considered are as follows:

a. consistent design (uniformity, standardization);
b. sound access control; and

c. forgiving roadsides.

Efficiency (optimal return on investment) of a proposal may also need to be addressed, though this is reserved only for a select project. See Section 5-2.09 for a discussion on economic analysis. Such a benefit-cost exercise commonly requires the use of accident-reduction factors (point values on expected impact, or reduction, on crash occurrence) and explicit values on human fatalities and injuries.

The project manager has at his/her disposal numerous reference textbooks, manuals, papers, etc., addressing traffic safety and crash analysis. Sources include TRB, AASHTO, ITE and ASCE. The ITE *Traffic Engineering Handbook* is one source normally accessible to practicing engineers and analysts.

5-2.06 Task 6 - Verify and Refine Project Needs and Objectives

Technical analyses and engineering judgment should generate clear needs. These are specific deficiencies in the transportation system as identified by the project manager and other knowledgeable parties. Project needs reflect the unacceptable, substandard performance of the facility. Ensure that the stated objectives logically address identified needs.

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Each structure of span of 20 ft or longer is considered a bridge and must have a bridge file number, separate Des number, separate Estimator cost estimate, and may warrant a separate project number. Other distinctly-separate work categories, such as a geographically-separate wetland mitigation site linked to a major project, will also require a separate Des number, separate Estimator cost estimate, and separate project number.

5-2.07 Task 7 - Develop Project Alternatives

Project needs and objectives, as defined in Task 1 and Task 6, form the basis for any potential alternative developed for consideration.

5-2.07(01) Outline Physical Features of Alternatives

Engineering judgment and coordination with project stakeholders are used in the development of the alternatives. Although there may be an infinite number of alternatives that solve a particular highway engineering problem, the project manager should address only those alternatives which are reasonable, prudent, practicable, and constructible.

Sufficiently outline the plan to allow informed comparison with competing alternatives, and convey the full scope-of-work to end-users (i.e., design engineers, environmental scientists, etc) of the Engineer's Report. The explanation may be presented in the form of drawings and/or written text. Essential elements include the typical cross section, horizontal (and, to an extent, vertical) alignment, major structures, project limits, right-of-way impacts, construction costs, and traffic maintenance during construction. Develop the proposal (i.e., recommendation or selected preferred alternative) in sufficient detail to the extent that the alignment and design features of the roadway are established, drainage needs are accommodated, environmental impacts can be assessed and mitigated, and right-of-way requirements are determined at a preliminary level.

Alternatives under active consideration (i.e., considered viable) at any given point in time must be developed in equal detail. Document for the file and/or on the Engineer's Report rationale supporting deletion of alternatives at each screening step.

5-2.07(02) Traffic Maintenance

Analyze the options for maintaining traffic during construction as outlined in Chapters Eighty-One and Eighty-Two. The project manager may in sometimes find it necessary to defer selection of a traffic maintenance plan to the design phase, or to qualify the selection as tentative. The extent to which the traffic maintenance plan influences the selection of alternatives will determine the level of detail necessary for this analysis. Costs should be determined for various traffic maintenance options. Appropriate Department staff should be consulted regarding the viability of various traffic management/maintenance alternatives. The level of commitment to the preferred traffic maintenance plan should be documented (i.e., the level of support and potential for revision as the project develops downstream). If circumstances warrant, the project manager is charged with forming and, at least initially, steering the transportation management action group according to the criteria described in Chapter Eighty-One.

5-2.07(03) Determine Alternatives' Environmental Impacts

The engineering assessment is an integral part of a larger group of pre-design activities that form the basis for compliance with the National Environmental Policy Act (NEPA) for study and disclosure of socio-economic and environmental impacts precipitated by a project. The Engineer's Report is developed in concert with the Office of Environmental Services' assigned scientist, and it assists in analysis of the project's environmental impacts and preparation of the environmental document. The project manager should collaborate with the scientist to evaluate the environmental impacts of

alternatives under consideration. This cooperative effort will be documented in the Engineer's Report and will be used by the environmental scientist in documenting environmental assessment. Projects vary in the level of environmental oversight necessary to satisfy NEPA.

5-2.07(04) Estimate Costs

Rudimentary cost estimates should be developed for each alternative. The cost estimate should be for the current year only. Document all assumptions and generally round cost items to $10,000 to avoid the false impression of precision.

5-2.08 Task 8 - Build Consensus for an Alternative

The alternative-screening process involves a coordination element to ensure that decisions made in the engineering-assessment phase will be supported and remain intact throughout the entire project development life. The level of coordination varies by project. Coordination of a project is a vital aspect of consensus building. Not every stakeholder may agree with the proposed solution. It is the project manager's responsibility to negotiate and arbitrate with all interested parties. It may be necessary to involve office managers, division directors and INDOT's executive staff in this process so that binding decisions can be made and the project can be advanced in a timely manner. It is important to maintain clear, organized records of meetings, conversations, and correspondence that document the coordination efforts. A select project may call for a formal memorandum of understanding (MOA).

The project manager may find it helpful to confer with the individuals, groups, or agencies as follows:

1. district design and program management offices;

2. district construction engineer;

3. district traffic engineer;

4. district operations engineer;

5. Planning Division;

6. Office of Real Estate;

7. Production Management Division, notably the assigned office manager, staff engineer, and hydraulics engineer;

8. Office of Materials Management;

9. Office of Environmental Services;

10. INDOT executive staff;

11. State and local elected officials;

12. city or county engineer, surveyor, or planner;

13. Indiana Department of Natural Resources;

14. Federal Highway Administration, Indiana Division office;

15. special interest groups stakeholders; and

16. others as appropriate.

5-2.09 Task 9 - Evaluate Alternatives

5-2.09(01) Background

The project manager must select from the alternatives the proposal/recommendation for advancement to design and further environmental study. Efficiency (money's worth) and effectiveness (satisfying objectives) frame most decisions. The selected course of action identified in the Engineer's Report should most efficiently and effectively satisfy project purpose and need.

One purpose of decision analysis is to clarify the problem by enhancing recognition of costs and consequences of available alternatives. The process clarifies issues, often leading to identification of new, superior alternatives. The decision analysis process also assists in building consensus for improvement strategies.

No method can possibly reflect all factors. Questions arise regarding appropriate measures of worth and associated units. Sensible decision-making involves some semblance of valuation. Informed, subjective, yet impartial judgments on the part of the project manager and others are inescapable and in fact critical in making sound decisions.

Decision-making is rarely a rigid process. It is iterative, with continual adjustments. Often the decision is straightforward or lends itself to engineering judgment or discovery rather than extensive evaluation. Sometimes it is complex, requiring sophisticated evaluation of the alternatives'

consequences. Ultimately, the selected path depends on the person(s) making the decision, the nature of the decision, and the characteristics of alternatives deemed worthy of consideration.

The broad categories of decision analysis are described below. These are strategies for making decisions, not decision rules. The processes vary in complexity. A critical distinction among the available techniques is the manner in which internal (user and sponsoring agency) versus external (non-user) factors are compared and how market (economic) versus non-market (environmental and social) elements are assessed. The decision analyses are as follows:

1. Informal Analysis. Judgment regarding optimal improvement strategy relies on standard procedure and intuitive balancing of agency costs, user benefits, and external impacts. A project assigned to the Office of Environmental Services most often may fittingly be addressed in this informal manner.

2. Engineering Economic Analysis. This analysis is limited to user and sponsoring-agency components having a tangible market dollar value in a life-cycle approach. Commonly known as traditional benefit-cost analysis, the procedure is appropriate for a project having no appreciable non-user, environmental, or social consequences. The analysis has less-frequent applications than Informal Analysis, but more so than Cost-Effectiveness Analysis.

3. Cost-Effectiveness Analysis. This analysis blends objective and subjective reasoning along with qualitative and quantitative measures into the decision. It is a more comprehensive form of benefit-cost analysis. A contemporary infrastructure improvement project often has multiple objectives, demanding accounting of non-user and external consequences. Only rarely will an engineering assessment call for such analysis, generally reserved for a massive capital improvement project on a cross-county corridor, e.g., a bypass.

5-2.09(02) Informal Analysis

Many elements of road and bridge plans have been specified in advance. The project manager is bound to these prior decisions. They are specified by the design criteria and policies adopted by the Department. For example, Chapter Fifty-three dictates that, for a rural freeway, travel lanes of 12 ft width and full access control are required. These advance instructions result from judgments of economic worth. A project with only a single improvement alternative essentially relies on these criteria and policies for full description of the appropriate scope of work. This does not require further decision analysis.

A project with more than one improvement alternative may warrant no structured approach to arrive at a sound decision regarding the best alternative. Often no more than a cursory review of the alternatives' costs, benefits, and consequences is necessary to render a valid decision. One option

may clearly dominate all others with respect to the stated project objectives. Relevant issues affecting optimal choice are clear. Rigorous analysis is unnecessary in this scenario.

5-2.09(03) Engineering Economic Analysis

Engineering economic analysis is the classical means for assessing a public-works project. Comparison of road-user benefits against project costs, incorporating money's time value, is the essence of engineering economic analysis. The process historically has been the most widely used project evaluation approach. Subjective influence imparted by the decision maker is restricted. The potential weakness of this traditional form of benefit-cost (B-C) analysis is that it recognizes only tangible attributes. Non-monetary, external impacts (e.g., social and environmental consequences) receive no direct consideration. However, engineering economic analysis applies well where non-user impacts are absent, minimal or identical for all alternatives, and user impacts have a market value.

Comparison of transportation user benefits against project development costs is the essence of engineering economic analysis. Traditional B-C is moderately rigorous and rigid. It separates characteristics of each alternative into two categories, benefits and costs. All factors convert to dollar values. The accounting procedure is to identify as benefits all user-related expenses (negative or positive) and as costs all agency-related expenses (negative or positive). Usually the existing facility, absent of improvements other than routine maintenance, serves as the base (null alternative) against which net benefits and costs are derived. Convert future cash flows to present worth. A discount rate of 5 to 7 percent (real, as opposed to nominal) is a reasonable starting point. Always test the sensitivity of B-C results to changes in key input variables possessing uncertainty, such as discount rate and economic life. In lieu of computer applications tailored to engineering economic analysis (e.g., MicroBENCOST), an electronic-spreadsheet software may be used to assist in the computations.

Benefits reflect dollars spent or saved by users of the facility. The three traditional, basic user benefit (or dis-benefit) components are vehicle operation, occupants' travel time, and crash potential. Other priceable factors may be included under particular circumstances. Although published values are available from various sources, defining sheer dollar costs associated with fatal and personal injury crashes is perplexing. The question arises as to what costs to include. One is cost to society. The other is lost quality of life. The two lumped together consist of a comprehensive crash cost. Considerable uncertainty exists with respect to expressing lost quality of life in monetary terms. As well, it is statistically difficult to predict and project rare events such as a fatal or personal injury crash. The project manager should test B-C results to the sensitivity of a range of values.

Costs are also measured in dollars. Sponsoring agency costs are those associated with project development and construction. Terminal (salvage) value may be added, though views differ on gauging its worth. Recurrent or annual facility operation and maintenance costs and future

rehabilitation outlays (or receipts) over the project's life cycle may be included, adjusted for money's time value.

After benefits and costs have been identified and valued, the analyst is ready to compare, accept, and reject alternatives. B-C results may be presented in various forms. Primary measures of project worth include net present value (NPV), also called net present worth, which is present value of benefits minus present value of costs; benefit-cost ratio (B/C), which is present worth of benefits divided by present worth of costs; and internal rate of return (IRR), which is rate generating NPV = 0 and B/C = 1. Each is valid. Use of NPV in describing alternatives' worthiness is preferred. NPV is the least ambiguous and the most straightforward. B/C ratios between alternatives within a project cannot be compared directly, as incremental, pair-wise comparison is essential.

Practical guidance in conducting traditional B-C analysis is accessible from various sources. TRB, ASCE, AASHTO, FHWA and ITE, among other organizations and individuals, publish literature in transportation and economic affairs. The normally-accessible specific sources are as follows:

1. *Civil Engineering Reference Manual*, by M. Lindeburg;

2. AASHTO's *A Manual on User Benefit Analysis of Highway and Bus-Transit Improvements*; and

3. *MicroBENCOST*, a software package for analyzing benefits and costs of highway improvements, published by the Texas Transportation Institute.

5-2.09(04) Cost-Effectiveness Analysis

Cost-effectiveness (C-E) is a class of decision processes that incorporates user, non-user, market, and non-market elements. The appraisal and program monitoring technique assists the decision-maker during evaluation of a project generating intangibles (no dollar value) and externalities (secondary impacts). Though itself a form of and often labeled a benefit-cost analysis, it differs from engineering economic analysis/traditional B-C. C-E attempts to provide a full accounting of costs: broad private, agency, and social gains and losses. The more-comprehensive approach arose from the awareness that it is difficult to credibly convert all major impacts into monetary terms, and that failure to internalize secondary impacts leads to inefficient allocation of transportation resources. As a matter of policy, the act of pricing (i.e., attaching a dollar value) to intangibles is discouraged. More suitable means exist to account for such influences.

The project manager should use the C-E analysis only where there is a complicated or vague problem structure that suggests foregoing informal and engineering economic analyses. The presence of numerous and conflicting objectives, externalities, intangibles, long-time horizons, interest groups, multiple decision makers, high stakes, etc., call for some form of C-E.

The cost side of C-E analysis, efficiency, represents economic return on investment. It is a function of tangible costs, whether agency- or user-related. Also, costs can be internal (e.g., long-term maintenance) or external (e.g., adjacent streets' reduced congestion). Efficiency consideration is limited to elements having a tangible market value, lending them to dollar-value conversion. In this sense, measures such as net present value and benefit-cost ratio, derived from traditional B-C analysis, satisfactorily represent project efficiency and can be incorporated into C-E analysis.

Balancing the costs is the effectiveness of the proposed solution. This is the degree to which an alternative satisfies project objectives or purpose. Measures of effectiveness (MOE) may include mobility factors and such environmental impacts as air pollution and wetland encroachment, plus other difficult-to-price social consequences (e.g., noise and neighborhood disruption). The best alternative attains highest satisfaction of project objectives with lowest project cost.

Selection of values within and importance (weights) of these MOE are sometimes derived subjectively, though impartially. The decision-maker should be aware of the implications of including in the decision process factors beyond those having a definite economic worth. The breadth of C-E decision analysis necessarily involves eliciting the decision-maker's subjective judgments, most often on importance of non-market externalities (e.g., wetland impact). The key is to conduct the study in a meticulous, unbiased manner using available tools to reconcile the lack of a common basis (unit) to examine market and non-market based objectives. The project manager and/or requisite group of decision-makers is responsible for making reasonable judgments.

A host of available C-E methods range from the rather simple (e.g., a chart of qualitative descriptions) to the highly sophisticated (e.g., stochastic modeling). A typical process involves forming a decision matrix from selected determinants. The magnitude and often their relative influence form a matrix that is often normalized via scaling factors. Preference lies with C-E decision-making tools that break down the problem in successive steps, particularly with paired comparison of objectives and alternatives' component values. The project manager is responsible for deciding what form the C-E analysis should take. It will hinge on the desired level of precision in assessing the worthiness of project alternatives.

Information on C-E analyses and procedures can be obtained from TRB, ASCE, AASHTO, FHWA, ITE, and other sources.

5-2.10 Task 10 - Write Engineer's Report

The Engineer's Report for an INDOT project will outline the proposed project. Generally, it will note known required design exceptions.

The general form of the Engineer's Report is a memorandum from the project manager to the Environmental Policy Team leader. He or she can provide, upon request, samples for various project types. The Environmental Policy Team leader's concurrence signature on the Report certifies the Department's official position with respect to the selected improvement plan (scope of work).

The project manager is instructed to document crucial information gathered during the engineering assessment phase, concisely and with precision. Minimize repetition, as information presented in attached drawings need not be additionally described in verbiage of the Report body.

5-2.10(01) Engineer's Report Contents

The following is a suggested outline, not a rigid framework. The project manager has the discretion of making adjustments to section headings and their sequence. The Report size will vary, principally as a function of project type. The typical sections listed in the Engineer's Report are as follows:

1. Purpose of Report. State the purpose of the Engineer's Report, which generally is to document the engineering assessment phase and, most important, to outline the proposal (recommendation). Explain the Report's intended use.

2. Project Location. Specify subject mainline road, crossing roads, stream or other feature; site's offset from nearest State, U.S., or Interstate highway, reference post(s), county, city or town, and district. Refer to project location maps and photographs, routinely appended.

3. Project Purpose and Need. Give succinct statements of the highway's deficiencies and project's objective.

4. Project History, Prior Studies. Discuss any relevant, previous study of the project or site.

5. Existing Facility. Describe the history and status of the present facility, its roads, bridges, small structures, traffic control devices, land use, etc.

6. Field Check. Highlight events of the on-site inspection. Append field-check minutes. Summarize decisions made in the field.

7. Traffic Data and Capacity Analysis. Furnish traffic counts and results of capacity analysis. Discuss meaning of results.

8. Crash Data and Analysis. Provide crash history, its analysis, and countermeasures.

9. Discussion of Alternatives / Identification of Proposal. Outline alternative improvement plans. Describe alternatives evaluation. State design guidelines. Discuss hydraulic,

geotechnical, and pavement elements. Identify the proposal (recommendation, preference, selection).

10. Cost Estimate. Tabulate present-year costs for construction, right of way, and design engineering. List separate costs for road and individual traffic signal, lighting, and bridge elements to simplify scheduling.

11. Environmental Issues. List potential environmental constraints associated with the proposal.

12. Survey Requirements. Indicate the limits of requisite field survey of the proposal.

13. Right-of-Way Impact. Indicate the limits of additional permanent and temporary right of way needed to contain road improvements and consequent impacts. State land area and type, number of parcels, number and type of relocations, etc.

14. Traffic Maintenance During Construction. With respect to the selected alternative, explain traffic maintenance options and, if appropriate, make a binding recommendation. Clarify any decisions deferred to the design phase.

15. Related Projects, Consistency. Note related projects in the area and on any selected detour. Discuss any coordination necessary among projects, their timing in particular.

16. Coordination, Meetings, Concurrence. Summarize contacts made in association with the engineering assessment phase. Include information regarding any public meeting held during the process. State agreements made in principle to the proposal.

17. Report Distribution List.

    a. Office of Environmental Services, Environmental Policy Team leader;

    b. District Design office manager;

    c. Production Management Division, office manager - 4 copies;

    d. Production Management Division, Design Team leader;

    e. Production Management Division, Survey Team leader;

    f. Production Management Division, Utilities Team Leader [(1)];

    g. Production Management Division, Property Management Team Leader [(2)];

h. Production Management Division, Office of Geotechnical Services engineer;

i. Planning Division, route transfer specialist [(3)];

j. Contract Administration Division, Local Program Assistance Team leader [(4)];

k. Federal Highway Administration, Indiana Division, field operations engineer;

l. Indiana Department of Natural Resources, Engineering Division, chief civil engineer [(5)]; and

m. Others as needed or requested, e.g., local officials, MPO, Office of Materials Management engineer, district traffic or construction engineers.

Notes:

(1) Required only for non-Interstate-route project in urban or suburban area, moderate to major expansion in rural area, or other project having unusual utility impact.

(2) Required only for project involving right-of-way acquisition.

(3) Required only for project involving road identified as candidate for relinquishment, or project proposal effecting relinquishment condition.

(4) Required only for Federal-aid funded local project.

(5) Required only for park access road project.

18. Appendices. Include as attachments relevant maps, drawings, photographs, correspondence, etc. These routinely include the following.

a. Appendix A – Graphics.

(1) Statewide project location map;

(2) topographic project location map;

(3) aerial and ground-level photographs, often with the proposal superimposed; and

(4) other graphics, drawings, exhibits (e.g., typical cross sections, plan and profile, geometric layouts, traffic maintenance plan schematic);

b. Appendix B - Data and Analysis.

(1) traffic data and capacity analysis summary (or place in Report body);
(2) crash (accident) data and analysis summary (or place in Report body);
(3) preliminary hydraulic data and recommendation;
(4) preliminary pavement data and recommendation; and
(5) geotechnical report/study and analysis.

c. Appendix C - Correspondence, Other.

(1) relevant correspondence (e.g., signing and lighting design, bridge inspection report excerpts, field inspection and other meeting minutes);

(2) Project Application form and other planning or programming support documents; and

(3) other relevant material.

The designer is still responsible for designing the project to comply with the intent of the Engineer's Report and this *Manual*. The designer is not to decrease the design speed, lane widths, or shoulder widths (paved and usable) shown in the Report, even though the *Manual* would permit a lesser value. For example, if the Report specifies an 8 ft usable shoulder, including 3 ft paved shoulder, and the *Manual* would permit a 6 ft usable shoulder, including 3 ft paved shoulder, the designer should provide the Report-specified values.

5-2.10(02) Revisions to the Engineer's Report (Scope of Work Change)

Essential criteria that determine whether explicit, formal concurrence from the Environmental Policy Team leader is required for revision to the adopted proposal (recommendation) are as follows:

1. project objective changes,
2. project termini change significantly,
3. basic design criteria change, or
4. cost substantially increases or decreases.

Proposed variances for Level One criteria included in the Engineer's Report should be considered as a proposed change in the scope.

The procedure for proposing changes in the scope of work is as follows.

1. The designer sends the proposed change in scope to the appropriate Production Management Division office manager.

2. The office manager will prepare a routing slip and route the change to the project reviewer.

3. If the change in scope is satisfactory, the project reviewer sends it to the appropriate Production Management Division's Design Team leader along with a memorandum expressing the Production Management Division's concurrence with the proposed changes.

4. If the change in scope is satisfactory, the office manager sends it to the Production Management Division director.

5. If the change in scope is satisfactory, the Production Management Division director sends it to the Office of Environmental Services's Office's Environmental Policy Team leader for concurrence.

6. If the Environmental Policy Team leader concurs in the change in scope, he or she returns it to the project manager for distribution.

Sufficient time should be granted for consideration of the revision, normally two weeks or more. The response will be in the form of outright rejection, partial acceptance, unconditional agreement, or petition for more information. Once signed concurrence is granted by the Office of Environmental Services manager, he or she will distribute the petitioner's memorandum to the appropriate individuals.

5-2.11 Checklist for Beginning Design Work on an Abbreviated Engineering Assessment (Mini-Scope) Project

1. The designer should determine if aerial photos showing the anticipated right of way are available from the Office of Environmental Services' Environmental Policy Team. Since the Mini-Scope lacks detail about right-of-way takes, aerial photographs showing the anticipated right of way have already been prepared. These aerials were developed to facilitate preparation of the environmental document.

2. The designer should determine if the environmental-document preparation work is progressing, and find out if there are any known environmental concerns. The environmental document is usually prepared concurrently with the preliminary design. Lack of an approved environmental document can hinder design work in environmentally-sensitive areas and will prevent a project from being advanced to the Design Hearing stage.

3. A non-Interstate-route pavement-rehabilitation Mini-Scope project is usually a 3R project,

with a 15- to 20-year service life for the resurfaced areas. The following criteria should be used in evaluating a 3R project.

a. The horizontal alignment should be evaluated in accordance with Section 55-4.03.

b. Superelevation should be upgraded to standard, or a design exception will be required.

c. A substandard vertical curve may remain in place if it satisfies the benefit/cost criteria outlined in Section 55-4.04. Design documentation will generally suffice, rather than a full design exception. Old plans should be obtained, if possible, so the existing vertical curve can be checked against the required design criteria.

d. If vertical alignment correction is necessary to obtain intersection sight distance, the vertical alignment should be improved to standard.

4. If the Mini-Scope recommends a 6:1 or 4:1 roadway foreslope within the obstruction-free zone, there is generally no reason to exceed the given recommendation. The intent is to keep embankment reconstruction and right-of-way acquisition to a minimum.

5. The designer should review the pavement design recommended in the Mini-Scope. If the project is primarily partial 3R to extend the service life of the existing pavement, the project can be designed without underdrains. This will permit the use of substantially shallower roadside ditches. The Planning Division's Pavement Engineering Office manager's preliminary recommendations regarding underdrains should be obtained. If the project requires pavement replacement in excess of 30%, spot usage of underdrains may be required.

6. Verify the Mini-Scope recommendations regarding maintenance of traffic with the district construction engineer. If the project is to be constructed under traffic, substantial changes to the vertical alignment will result in significant additional expense for temporary widening or a temporary runaround.

7. A grade review meeting or even possibly a pre-grade review meeting should be held. Representatives should be invited from the Office of Environmental Services' Environmental Policy Team, the Pavement Engineering Office, the district Design Office, and the Production Management Division.

5-3.0 MISCELLANEOUS

5-3.01 Project File

The project manager should maintain a project file. Typically it should include the following:

1. project history and background information;

2. cost estimate working notes;

3. field check notes;

4. engineering calculations and worksheets;

5. project manager's notes to file;

6. software output for highway capacity analysis;

7. meeting and conference minutes;

8. correspondence, including hardcopies of electronic mail; and

9. Engineer's Report original plus file copy.

All duplicate and reproducible material shall be purged from the file upon completion of the engineering-assessment phase.

5-3.02 Route Relinquishment

The term relinquishment refers to the process of transferring maintenance responsibility of a State or U.S. route, including all right of way, bridges, and appurtenances, between highway agencies. If a roadway's alignment changes, the facility being replaced must be either removed or relinquished to the appropriate local government agency. Limited alignment changes (e.g., construction of a bridge on new alignment, intersection relocation) can trigger relinquishment activities.

Sometimes a project is created to satisfy a condition defined in a signed relinquishment agreement between INDOT and another local highway agency. The project manager should consider whether a route transfer agreement will need to be developed.

The project manager or the Planning Division's road relinquishment specialist is instructed to advise local officials of relinquishment issues early in the engineering-assessment phase. Willingness and conditions imposed by the local officials will influence the recommended course of action. The relinquishment specialist is responsible for leading the Department's discussions and negotiations with a local agency regarding relinquishment.

5-3.03 Access Control

Access control is a critical element in protecting through-movement capacity and enhancing safety. A roadway provides access to adjacent properties and mobility to through traffic. These functions often conflict. A roadway that offers unlimited access to abutting properties will generally provide less-efficient travel for through traffic than a roadway on which the frequency of driveways is limited. Establish the suitable level of access control by assessing the official functional classification and apparent roadway function. Evaluate the study area according to Chapters Forty and Eighty-six, as well as guidelines from Chapters Fifty-three to Fifty-five.

5-3.04 Scheduling and Programming Considerations

A large, complex project often has component parts for which schedules for baby projects and costs should be segregated. It may be appropriate to divide a larger mother project to effect more streamlined project development or construction. The project manager should work with the Planning Division's Office of Systems Analysis and Planning to ensure that scheduling and programming issues are addressed. Unless circumstances suggest otherwise, simplify program management by deferring, or at least minimizing, creation of baby projects, pending completion of the engineering assessment phase.

5-3.05 Public Input Guidelines

For additional guidance on public involvement procedures, see Chapter Eight and the Office of Public Hearings publication, *Public Involvement Procedures*.

5-3.05(01) Public Hearing

A public hearing is an opportunity for the public to make formal statements of position. The Planning Division's Office of Public Hearings oversees these meetings. The Department views the hearing as a specific observable administrative benchmark for public involvement. Only one public hearing is required. It occurs most often in the design phase. For guidance on public hearing requirements, see Section 8-8.0.

The Office of Public Hearings is responsible for any hearing deemed necessary in the corridor-location stage of engineering and environmental assessments. A public-information meeting may later be held by the Production Management Division to acquaint the public with the project details. If the public hearing is held during the design phase, the Production Management Division will represent the Department.

The Office of Public Hearings transcribes the event. Disposition of comments typically is a collaborative effort on the part of the hearings examiner and the host division.

5-3.05(02) Public Information Meeting

A public information meeting may be held during the engineering-assessment phase at the discretion of the project manager, Office of Environmental Services, and Office of Public Hearings. This decision is often made in conjunction with the Department's executive staff and the district. Such a meeting is normally conducted before the environmental document has been prepared. A public information meeting held during the engineering-assessment phase should accomplish these objectives as follows:

1. solicit public input on alternatives under consideration; and
2. inform the public of INDOT's improvement plan: the proposal/recommendation.

5-3.05(03) Guidelines for Public Information Meeting

The public information meeting is structured in the same manner as a formal public hearing. However, it is not a formal hearing and is not a substitute for the public hearing required by NEPA regulations. The Office of Public Hearings is responsible for the public information meeting. It must be requested by the Office of Environmental Services at least eight weeks in advance of the desired meeting date.

The information to be provided to the Office of Public Hearings when requesting a public information meeting should be as follows:

1. clearly stated goal of the meeting;
2. narrative describing the project and the alternatives being considered;
3. list of property owners, if possible or deemed necessary; and
4. maps, drawings, sketches, displays, or aerial photographs.

Information packets will be provided to the public. The project manager may wish to design the information packet. If so, the Office of Public Hearings must receive the draft packet a minimum of seven work days before the meeting. The Office of Public Hearings will review and edit the packet within two work days. If the Office of Public Hearings prepares the information packet, a draft copy of the packet will be provided to the project manager seven work days before the information meeting. Revisions must be submitted within two work days to the Office of Public Hearings. The Office of Public Hearings will copy the information packet for the meeting.

The hearings examiner will oversee the meeting. He or she will make introductions and guide the meeting through its agenda. A typical agenda will include the following:

1. explanation of the public meeting process;
2. explanation of methods in which the public can record its comments;
3. introductions of the Department's staff or representatives;
4. presentation of the project plans by the project manager; and
5. public comment opportunity.

Transcription and disposition of comments are addressed as required. The Department may choose to forego these tasks for an informal public meeting.

5-3.05(04) Press Release

In lieu of or in addition to a public information meeting, a press release is sometimes an effective means of informing the public of improvement plans. The project manager will work through the Public Information Division to generate a press release.

Data Type	Project Type								
	Bridge Construction, Replacement, Removal	Small Structure, Drainage Correction	Added Travel Lanes	Intersection Improvement	Interchange Construction	Sight Distance Improvement	Road Rehab., Construction	Landslide	Rest Area, Weigh Station
Project Application	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Existing Road, Bridge Plans	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Aerial Photographs New Existing	 Yes No	 No Yes	 Yes No	 Yes No	 Yes No	 Yes No	 C/C C/C	 No Yes	 Yes No
Traffic Data Mainline Turning	 Yes No	 Yes No	 Yes Yes	 Yes Yes	 Yes Yes	 Yes C/C	 Yes C/C	 Yes No	 Yes C/C
Crash Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pavement Design	No	No	Yes	No	Yes	No	Yes	No	Yes
Hydraulic Data	Yes	Yes	Yes	No	C/C	No	C/C	No	C/C
Geotechnical Study/Report	No	No	No	No	No	No	No	Yes	No
Feasibility/Planning Study/Report	No	No	Yes	No	Yes	No	C/C	No	C/C
Road/Pavement History	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: "C/C" abbreviates case-by-case. Whether a road project warrants new aerial flight/photography depends on anticipated extent of work and nature of land use, among other factors. Turning movements of course only apply where an intersection or interchange ramp terminal is present. The project manager may find it necessary to request of the chief geotechnical engineer, through the Engineering Assessment Section manager, a formal geotechnical analysis, if no recent study exists at a landslide site. Feasibility studies may or may not have been conducted for those marked as "Yes" or "C/C."

A GENERALIZED GUIDE
Figure 5-2A

TRAFFIC PROJECTIONS REQUEST

Date _____.

MEMORANDUM

TO: _____
Urban and Corridor Modeling and Forecasting Program Director
Planning Division

FROM: _____
Project Manager

_____
INDOT location or consultant

ROUTE _____
DES. NO. _____
PROJECT NO. _____
_____ _____ of _____ to _____ _____ of _____
COUNTY: _____

For additional information contact _____; Telephone: _____.

Type of work planned: _____

Year for Traffic Projections: _____

The data requested is as follows:

_____
_____
_____
_____
_____
_____

Attached additional information to be returned: ☐ Yes ☐ No

[Please include any additional information that will prove helpful in fulfilling your request (i.e., Project Location Map, aerial photos, etc.).]

Click When Done Clear Data

INDIANA DEPARTMENT OF TRANSPORTATION

INDIANAPOLIS, INDIANA 46204

INTERDEPARTMENT COMMUNICATION

, 20

REQUEST FOR CRASH RECORDS

MEMORANDUM

TO:

Project Manager

FROM:

Designer

☐ Division

☐ District

☐ Design Firm,

ROUTE NO. OR ROAD NAME(s):
DES NO.
COUNTY:
CITY OR TOWN:

Please provide three years of crash data for the following location.
[check one and complete necessary data including all known road names]

☐ Intersection of [main road] with [crossroad]

☐ Ramp of [main road] with [crossroad]

☐ Road segment from to

:

Functional Class Categories	Fatal Crashes	Fatal-Crash Rate	Injury Crashes	Injury-Crash Rate	Property-Damage Crashes	P.-D. Crash Rate	Total All Cashes	All-Crash Rate
RURAL								
Interstate Freeway	60	0.73	1,445	17.63	5,626	68.08	7,131	86.34
Other Principal Arterial	118	1.96	2,828	47.15	8,244	137.45	11,190	186.57
Minor Arterial	99	2.06	2,583	53.48	7,536	155.98	10,218	211.52
Major Collector	168	1.38	9,837	81.13	28,215	232.66	38,220	315.18
Minor Collector	45	1.97	2,039	89.67	5,787	254.57	7,871	346.21
Local Road	112	3.65	2,702	87.96	7,660	249.45	10,474	341.07
RURAL SUBTOTAL	*602*	*1.65*	*21,434*	*58.62*	*63,067*	*172.42*	*85,103*	*232.69*
URBAN								
Interstate Freeway	24	0.33	1,065	14.50	4,068	55.38	5,157	70.21
Other Freeway or Expressway	36	3.12	518	45.27	1,513	132.28	2,067	180.67
Other Principal Arterial	64	0.61	10,591	99.50	32,383	304.39	43,038	404.50
Minor Arterial	70	0.93	8,336	110.51	27,553	365.16	35,959	476.59
Collector	37	1.56	2,671	113.24	8,893	376.64	11,601	491.43
Local Road	37	0.68	6,027	111.89	20,084	372.67	26,147	485.24
URBAN SUBTOTAL	*267*	*0.78*	*29,208*	*84.83*	*94,493*	*274.41*	*123,968*	*360.02*
Interstate System	84	0.54	2,509	16.08	9,694	62.05	12,287	78.67
All Other Roads	785	1.42	48,133	86.84	147,867	266.77	196,784	355.03
STATEWIDE TOTAL	*869*	*1.22*	*50,642*	*71.34*	*157,560*	*221.92*	*209,071*	*294.48*

Notes:

1. Fatal- and Injury-crash rates are number of Fatal / Injury crashes per 160 million vehicle kilometers of travel.
2. The average of uninvestigated crashes of 40,013 events is not included in the above totals.
3. Data are from Program Development Division’s congestion and safety management engineer.

MOTOR VEHICLE FATALITIES AND INJURIES – AVERAGES FOR 1997, 1998, AND 1999

Figure 5-2D

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CHAPTER SIX

CONSULTANT SERVICES PROCEDURES

6-1.0 CONSULTING SERVICES

6-1.01 Procedures

The INDOT Consulting Services Procedures govern consultant design/plan development. These were revised May 1998 and approved on July 15, 1998. The approved INDOT Consulting Services Procedures are shown as Figure 6-1A.

6-1.02 How the Consultant Submits Plans and/or Reports

The consultant submits plans and/or reports to the Department as shown below.

INDOT Production Management Division
Consulting Services Team
100 N. Senate Ave., IGC N642
Indianapolis, IN 46204

Attn: (Name of Project Manager)

All plans, reports, and Quality Assurance Forms that are being submitted to the Production Management Division must be submitted to its Consulting Services Team's project manager. The plans and/or reports should not be submitted directly to the reviewers.

6-2.0 QUALITY ASSURANCE PROCEDURES

6-2.01 Introduction

The purpose of these procedures is to demonstrate to the Production Management Division that quality control measures are being incorporated into the design process. The increased awareness and documentation provided by these procedures is intended to provide the Production Management Division with a level of confidence in the quality of plans which will promote a reduction in review time resulting in quicker turnaround times for plan submittals.

These procedures are not intended to replace quality control measures currently in use but to promote an increased awareness regarding the importance of quality control in the design process. Computation sheets and drawings must still be initialed by the originator and checker as per past practice. Review of items should be done independently by a second qualified individual. The qualifications of the checker should be commensurate with the item to be reviewed. For example, a second drafter would be qualified to check preliminary plotting but, usually, only an engineer would be qualified to review structural computations for bridge design.

6-2.02 Quality Assurance Form

The designer must complete the Quality Assurance Form, Figure 6-2A, and include it with each submittal. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/. The reviewer must provide a signature with the name typed or neatly printed below the signature line. The item blank will generally be the corresponding number from the appropriate checklist in Chapter Fourteen which was checked by the reviewer. The items identified by letters beneath each numbered item are not to be listed unless these items were reviewed by more than one individual. If some numbered items are not applicable for a specific project, they should be listed with a "N/A" in the reviewer space. When items are reviewed which do not correspond to a number in the checklist, a short description should be included in the item space.

> ***** PRACTICE POINTER *****
>
> The Quality Assurance Form is to be signed by both the designer and the reviewer.

Immediately prior to submittal, the project manager will review the plans for consistency between sheets, completeness and overall content. This will include verifying that the proper number of plans and items such as construction cost estimates are included with the submittal. The project manager should also verify that all revisions requested from a previous submittal have been made or communicate what changes were not made and why. Providing the name and telephone number of the project manager is important for future communication between the INDOT reviewer and the project manager. Telephone conversations are encouraged to clarify items or answer questions during the review process.

Changes which are made to the plans that are not requested by the Production Management Division should be communicated for each submittal. A note could be written on the plans or included in the remarks section of the Quality Assurance Form. The remarks section could also be used to list any revisions requested which were not made with an appropriate reason; however, the project manager

is encouraged to discuss these items with the INDOT reviewers prior to submittal.

6-2.03 Structural Review Plan

For a project which involves a bridge structure, the consultant shall provide a plan for checking structural design and detail computations prior to proceeding with the design. The consultant shall provide written certification that the approved process has been followed along with the submittal of final plans.

6-2.04 Plan Submittal

Chapter Fourteen includes plan submittal information for the following types of projects.

1. Road Design (new construction/reconstruction);
2. Interstate Rehabilitation;
3. Bridge (new bridge construction/bridge replacement);
4. Bridge Rehabilitation;
5. Signing;
6. Signals; and
7. Lighting.

The checklists included in Chapter Fourteen are intended as a guide and are not all inclusive. These lists are not a checklist of drafting and design items to be included on the plans. Their purpose is to provide a minimum list of items that are to be independently reviewed prior to submittal. The numbers of the items in the checklist are to be the items listed on the Quality Assurance Form. The applicable portions of the *Indiana Design Manual*, INDOT memoranda, and other available publications should be consulted regarding specific technical procedures, formats, etc.

6-3.0 CONSULTANT EVALUATION

6-3.01 Introduction

To monitor the quality of the plans prepared by consulting firms and being reviewed by INDOT, evaluations are performed on most plan and document submittals. A copy of each completed evaluation will be returned to the consultant. The consultant has the right to question any of the ratings. The results of the evaluations will be used in the selection of consultants for future projects.

The Level I design criteria presented in Section 40-8 are all considered to be major items.

6-3.02 Rating Definitions

The review of each submittal is being performed so the consultant has an idea of how the quality of its work is being perceived by INDOT as the project is being developed. The review of the completed evaluations can be extremely important to a consultant's project manager, because the evaluation reflects the comments within the reviewed plans and/or reports. If there are any questions with regard to the rating, the evaluator will answer these questions. A rating of 3, 2, or 1 indicates that the reviewer felt the item reviewed was substandard. If a consultant questions an evaluation solely because a substandard rating impacts the consultant's future selection, it will not be well-received. At the same time, INDOT reviewers can sometimes make a mistake in the rating. If this is true, and a valid reason is presented, the Department will be more than willing to revise a rating.

The ratings will range from a high of 5 to a low of 1. The general interpretations of the ratings are as follows:

5 - Excellent. The consultant went above and beyond what was required. One or two very minor revisions will be allowed.

4 - Good. There were some revisions necessary and, of those found, they were minor.

3 - Marginal. There were many necessary revisions and, of those found, one or two were major and the remainder were minor.

2 - Poor. There were many revisions necessary and, of those found, three or four were major and the remainder were minor.

1 - Unsatisfactory. There was a considerable amount of necessary revisions, with a majority of them being major.

6-3.03 Plan Evaluation

A copy of the blank plan evaluation form used by the Production Management Division is shown as Figure6-3A, Routing/Evaluation Form/Design Plan Process. The form is also used as a routing slip within the Department. This form will be attached to all submittals of plans and/or reports to be reviewed. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/ .

The Production Management Division's Consulting Services Team's project manager initiates the use of the form when the consultant makes a submission. The project manager completes the general project information and the coordination team rating items. The general project information is found

at the top of the form.

The section and reviewer to whom the plans and/or report are being sent can be found on the top of the evaluation form. On the middle left of the evaluation form is where the project manager indicates the type of plans and/or report that has been submitted. On the lower left, the project coordinator indicates what other information was included in the submittal.

Items to be rated are located on the right half of the evaluation form. The project reviewer rates the items found in the middle right under Reviewer's Rating Items. The project coordinator rates the items found at the lower right under Coordinator's Rating Items. The rating to be used is found at the lower right of the evaluation form.

At the very bottom of the form is the final area to be completed by the reviewer. In this area the reviewer can indicate what submittal of plans and/or report to be submitted next. The reviewer also indicates whether the revisions to the evaluated plans and/or report were major or not. This helps the project coordinator set a due date for the next submission. The last line on the form is for the reviewer to sign and date the evaluation which has been completed.

6-3.03(01) How the Consulting Services Team Project Manager Rates the Submittals

When plans, reports, and Quality Assurance Forms are submitted to the project manager, an evaluation form will be attached to the submittal. The evaluation form also serves as a routing slip for the submittal.

The project manager is responsible for rating the submission for scheduling and procedure compliance. These items can be found in the lower right corner of the standard evaluation form. The rating for these items is as follows:

1. Scheduling. The rating of this item by the project manager is as follows:

   Once a due date has been presented to the consultant, it is the consultant's responsibility to meet that due date. If a due date can not be met, the consultant must contact the project coordinator.

   If the consultant requests that a due date be revised, the consultant will work with the project manager to identify an acceptable revised due date. If the due date is being revised due to reasons beyond the consultant's control or responsibility, the consultant's rating for scheduling can still be a 4 or 5 provided the revised due date is met. If the revision of the due date is a result of the consultant's own work, the rating must be a 3, 2, or 1. Because the consultant did contact the project manager and revised the due date, the consultant will not be penalized for the procedure compliance rating due to scheduling problems.

2. Procedure Compliance. The rating of this item will be based on the overall completeness of the submittal with regards to plan submittal procedures. Substandard ratings (3, 2, 1) could result because of the following:

   a. all of the items requested were not received,
   b. the consultant did not contact the Project Manager to revise the due date, or
   c. the correct number of copies of a requested item were not received.

   A 1 will be given if the Quality Assurance Form is not received with each submission. These are typical reasons for a rating of 3, 2, or 1 for Procedure Compliance.

6-3.03(02) How the INDOT Reviewers Rate the Submittal

Figure 6-3B, Items Rated for Each Submittal, General Plans Review, and Figure 6-3C, Items Rated for Each Submittal, Bridge Rehabilitation Review, illustrate the items which will be checked at each project stage. The following briefly describes each item.

1. Design Concept. The consultant will be evaluated on the completeness of a proposed design concept. The term completeness encompasses how well the consultant has thought through all of the necessary factors that promote the best possible design. If certain items were omitted from the design concept that are detrimental to the design, a lower rating will be issued.

   If the consultant is following the Engineer's Report that has been previously established by the Office of Environmental Services's Environmental Policy Team, the evaluation will reflect how well the consultant has followed that Report. The evaluation will also consider how well the consultant has addressed any obstacle that was encountered and not foreseen when the development of the Engineer's Report was completed.

2. Critical Design Elements. Section 40-8 discusses the Level I Design Criteria. Failure to satisfactorily address all applicable Level I Design Criteria will result in a rating no higher than 3.

3. Calculations. The operations of mathematical computations and deletions and/or additions to the computations are areas of scrutiny. With the implementation of the Quality Assurance Program, the review of how well the computations were executed will not be examined as thoroughly as in the past. However, spot checking will occur and the rating of this item will reflect the spot checking. The scoring will be as follows:

a. A major error is defined as an error originating from the computations that will result in a significant design change.

b. A minor error is one that poses no change to any element of the design.

If computations are not submitted because of the nature of the submittal or if they were not warranted, this item will not be rated. If the reviewer believes that some computations were needed but not submitted, the reviewer will not rate this category on this basis alone. This will be addressed in the Documentation of Work item, thereby, eliminating double penalties.

4. Plan/Report Quality. All material submitted at each stage of development such as plans, Design Summary (DS), design computations, special provisions, and any other supportive material will be evaluated. Ratings will be based on legibility, structure, and print quality.

5. Engineering Judgment. The rating of this item is subjective to the evaluator. If it is felt that poor or good judgment was used, the rating will reflect this. Engineering Judgment will be evaluated for areas such as rehabilitation options, project constructability, selection of construction materials, and maintenance of traffic scheme.

6. Documentation of Work. This item will be rated based on how well each design decision is documented or if they were documented at all. A majority of the documentation will be found in the Design Summary, but documentation can also occur elsewhere.

7. Environmental Mitigation/Permit Compliance. This item will be rated on the basis of whether the consultant has included all required environmental mitigation measures. This rating will also depend upon whether the consultant has identified all necessary permits and has initiated permit applications in a timely manner so that the permits are approved at the appropriate time.

8. Procedure/Standard Compliance. This category will evaluate how well the consultant is familiar with Federal, State and local policies, and will consider how well the consultant uses the available standards and guidelines and if the standards and guidelines were implemented properly into the design. This category will also evaluate how well the consultant follows established procedures for items such as foundation reviews, the final tracings submittal memorandum to the Contract Administration Division's Office of Contracting, etc.

9. Quality Assurance. The reviewer will rate this category based upon the consultant's compliance with the Quality Assurance Guidelines. Design computations should be initialed by both the design engineer and a second engineer who has reviewed the design engineer's work. This item rating is intended to monitor how well the consultant has performed the evaluation of checks and balances required for quality assurance including the submittal of the Quality Assurance Evaluation Form.

10. Cooperation. The reviewer will base this rating on how well the consultant cooperates with the reviewer when changes are requested. Willingness to answer questions and ease of participation for project development will also be a part of this category.

6-3.04 Design Exception Evaluation

The Production Management Division will review all Design Exception requests using the form shown as Figure 6-3D, Routing/Evaluation Form/Design Plan Process – Design Exception. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/ . The following briefly describes each rating item.

1. Identification of Need. The reviewer will evaluate how well the consultant determines the need for a design exception.

2. Analysis. The reviewer will evaluate how well the consultant documents the basis and rationale for granting the requested design exception(s).

3. Procedure/Compliance. The reviewer will evaluate how well the consultant complies with Section 40-8.04(01).

4. Cooperation. The reviewer will base this rating on how well the consultant cooperates with the reviewer when changes are requested. Willingness to answer questions will also be part of this category.

5. Timeliness. The reviewer will base this rating on the timeliness of the submission. A design exception should not be applied for until after the preliminary field check is held. Thereafter, the consultant should apply for a design exception after determining that a critical design element (Level 1) does not meet the appropriate criteria in the *Indiana Design Manual*.

6-3.05 Contracts and Construction Evaluation

The Contract Administration Division will review all consultant-prepared contract documents just prior to contract letting using the form shown as Figure 6-3E, Routing/Evaluation Form/Design Plan Process – Contracts and Construction. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/ . The following briefly describes each rating item.

1. Special Provisions. The reviewer will evaluate whether or not the consultant has properly specified needed special provisions and unique special provisions.

2. Pay Items. The reviewer will evaluate whether or not the correct pay items and unique pay items are specified.

3. Procedure/Standard Compliance. The reviewer will base this rating on whether or not the right format is used in supplying contract special provisions, pay items, estimates, etc.

4. Cooperation. The reviewer will base this rating on how well the consultant cooperates with the reviewer when changes are requested.

Revised May, 1998

INDIANA DEPARTMENT OF TRANSPORTATION
CONSULTING SERVICES PROCEDURES

Figure 6-1A

A. GENERAL

1. Applicability

   a. These procedures apply to all divisions and districts of the Indiana Department of Transportation.

   b. These procedures do not apply to:

      i. the acquisition of land, except to the extent right-of-way engineering services are utilized.

      ii. Local Public Agency (LPA) contracts; however, LPA consultants shall be evaluated as provided in Section N of these procedures.

2. Definitions

   a. "Actual Costs" - means verifiable direct expenses that are directly attributable to a specific project and are the type of costs consistently charged to a particular project as an expense.

   b. "Consulting Services" - means the furnishing of services by:

      i. a person licensed, certified, or registered under I.C. 25-2.1 or by any board listed in I.C. 25-1-5-3;

      ii. an attorney;

      iii. an expert witness, court reporter, or investigator retained by the department in connection with judicial or administrative proceedings;

      iv. a minister, priest, rabbi, or other person empowered by the person's religious faith to conduct religious services or to provide spiritual counseling or guidance; or

      v. a person who performs services, the satisfactory rendition of which depends upon the person's unique training or skills.

   c. "Consulting Services Unit" - means the unit of the Legal Division responsible for consultant contracting.

   d. "Cost Plus Fixed Fee" - means a payment method whereby the consultant is reimbursed actual costs on a project, plus paid a specific dollar amount for performing the work.

   e. "Cost Plus % of Profit" - means a payment method whereby the consultant is reimbursed actual costs on a project, plus paid a profit margin on salaries and overhead only, exclusive of overtime premiums for completing the work. Profit is not to exceed 15% and should be based on the degree of risk involved in the scope of work.

f. "Department" - means the Indiana Department of Transportation.

g. "Executive Document Summary (EDS)" - means State Form 41221 issued by the Indiana Department of Administration to accompany **all contract documents** for tracking purposes.

h. "Lump Sum" - means a payment method whereby a consultant is paid a specified sum of money for a specific pay item of the contract.

i. "Negotiated Labor Rates" - means a payment method whereby the consultant and INDOT have agreed upon a specified hourly rate per classification for personnel working on an INDOT project. The negotiated (or agreed upon) rate takes into account the consultant's overhead rate and profit (which is not to exceed 15%), and must be approved by INDOT's contract audit supervisor.

j. "Open End Contract" - means a contract with a consultant that does not specifically identify the projects to be included under the contract scope of work. Usually, projects will be assigned under the contract on an "as needed" basis through the duration of the contract term.

k. "Person" - means an individual, partnership, corporation, or other business organization.

l. "Requesting Division" - means the division or district requesting the consulting service.

B. APPROVAL OF PROJECTS FOR CONSULTANT UTILIZATION

1. Necessity for Use of Consultant

The services of a consultant may be requested if funding is available and:

a. the in-house capabilities of the department are insufficient to accomplish the work within the desired time frame;

b. the complexity or nature of the project requires specialized expertise;

d. it is more economical to engage such services; or

e. it is otherwise in the public interest.

2. Authorization to Employ a Consultant

A Division Chief makes recommendations that consulting services be used for individual projects. The requesting division shall prepare a memorandum which contains the following:

a. verification that adequate funding is available;

b. a description of the project and the services request; and

c. the type and percentage of funding to be used (ex. 80% federal, 20% state)

d. for “open-end” contracts, the request shall also identify the approximate number of projects to be assigned, the approximate duration, and the proposed maximum fee.

3. Routing Consultant Utilization Request

The request shall be sent via memorandum to the division's Deputy Commissioner for approval. If the request is approved, the original of the Deputy Commissioner's approval shall be sent to the Consulting Services Unit, and then the project will be included in a Professional Services Bulletin (PSB). If denied, the request shall be returned to the originating division. The Consulting Services Unit is responsible for retaining original approval memoranda.

If the consultant’s fee for federally funded work will be less than $100,000, the department may select a consultant in accordance with the Small Purchase Procedures without issuing a Professional Services Bulletin. The department may negotiate the scope of work and fee.

4. Sole Source Selections

A consultant may be selected by the department without advertising the work in a PSB, and only that consultant requested to submit a proposal, if the project will be funded with 100% state funds and one of the following conditions exists:

a. the project involves an emergency which will not permit the time necessary to issue a professional services bulletin, select a consultant, and negotiate a fee; or

b. the service is available only from a single source; or

c. after solicitation of a number of sources, competition is determined inadequate; or

d. it is considered to be in the public interest.

Any sole-source selection requires the approval of the Commissioner. The requesting division will be responsible for documenting the reason(s) for using sole-source selection. A copy of the documentation and the Commissioner’s approval shall be sent to the Consulting Services Unit.

The department will develop an adequate scope of work and cost estimate before negotiating the fee. Negotiations will be conducted in accordance with Section G of these procedures.

C. PROFESSIONAL SERVICES BULLETINS

1. Preparation of a Professional Services Bulletin

Once approved requests for use of consultants are received, the Consulting Services Unit shall prepare a Professional Services Bulletin (PSB). Requests from various divisions should be combined whenever possible and will be coordinated with the participating divisions.

The requesting division is responsible for providing the Consulting Services Unit with the information regarding the project(s) to be included in the bulletin, including:

a. information the division would like submitted by consultants for evaluation

b. detailed description of the technical requirements for the services to be rendered

c. anticipated method of payment

d. list of evaluation factors and the order of relative importance

e. whether the budgeted amount for the work is to be included in the PSB

f. any data and forms necessary for consultants to prepare statements of interest and proposals

The PSB will specify the closing date for accepting statements of interest and proposals. Design PSBs will be advertised for a period of fourteen (14) days, unless the Design Division requests otherwise. PSBs for all other requesting divisions will be advertised for a period of thirty (30) days, unless FHWA has approved a different time period for PSBs containing projects with federal participation. The Commissioner may determine the closing date on PSBs containing 100% state-funded projects. The Commissioner and the requesting division(s) shall review and approve draft copies of the PSB.

2. Information to be Placed on Display

Each requesting division shall assemble copies of all relevant information on the projects before the PSB is mailed. The information shall be available for review from 7:45 a.m. to 4:15 p.m. until the PSB closing date. Each requesting division shall be responsible for displaying the information and answering questions about their projects.

3. Display of Professional Services Bulletin

A copy of the PSB is to be displayed in the Consulting Services Unit of the central office and the Toll Road Division office. The PSB is to remain on display until the closing date for the PSB has passed.

4. Consultants to Receive Professional Services Bulletins

The Consulting Services Unit shall send a PSB to all firms that are currently on the consultant mailing list that have expressed an interest in one or more types of work contained in the PSB. Copies of the PSB will also be made available to the public in the Consulting Services Unit. Before the PSB is mailed, Division Chiefs may inform the Consulting Services Unit of additional firms to receive the PSB.

The department will not be liable for any errors in the PSB or for failure to mail a PSB to any consultant.

5. Distribution of Professional Services Bulletin

In addition to the consultants, copies of the PSB are to be distributed as follows:

a. Commissioner;

b. Deputy Commissioners of Division(s) with item(s) on the PSB;

c. Chief Counsel;

d. Deputy Chief Engineer;

e. Division Chief(s) of Division(s) with item(s) on the PSB;

f. Division Chief of Civil Rights;

g. FHWA; and

h. Governor's Office

6. Public Notice of Professional Services Bulletin

The Consulting Services Unit shall arrange to have a notice of the PSB published in an Indianapolis newspaper of general circulation. The notice should state that a Professional Services Bulletin has been issued, a general description of the types of work available, where a copy of the PSB may be obtained, and the closing date for submitting statements of interest.

7. Statements of Interest and Proposals

Statements of interest and proposals shall be submitted to the Consulting Services Unit. If a consultant properly identifies submittals as statements of interest and/or proposals, as instructed on the PSB, the submittals will not be opened until the closing date for that PSB.

The Consulting Services Unit will prepare a list of the consultants responding to the PSB and distribute the statements of interest and proposals to the appropriate division(s). The requesting division shall be responsible for custody and control of the Statements of Interest and Proposals after receiving them from the Consulting Services Unit. The division shall retain and dispose of the Statements of Interest and Proposals in accordance with the most current Approved Record Retention and Disposition Schedule of the Commission on Public Records.

D. CONSULTANT SELECTION

1. Selection Process

a. Statements of Interest/Proposals Selection

i. The Chief of the requesting division or the Chief's designee shall review the statements of interest and proposals and compile a candidate list containing the following:

aa. list of consultants responding with item numbers shown, and whether the consultant is a DBE firm;

bb. list of existing projects by consultant;

cc. list of pending projects by consultant;

dd. list of the consultant’s existing, pending, and total fees by category of work and/or division;

ee. a minimum of three potential consultants for each item on the PSB; and

ff. the reasons for each recommendation.

ii. The above information shall be submitted to the appropriate Deputy Commissioner for review and approval.

iii. Once selected by the Deputy Commissioner, the name of the selected consultant shall be reviewed with the Commissioner and then submitted to the Consulting Services Unit.

iv. Upon receiving the name of the selected consultant, the Consulting Services Unit shall prepare a selection notification letter for the Commissioner's review and signature.

2. Notification of Selections

The Consulting Services Unit shall prepare a selection notification letter for the Commissioner's approval and send a copy of the selection notice to all consultants that responded to the PSB, all divisions with items on the PSB, the appropriate Deputy Commissioners, and the Governor's Office.

The official notification of selection shall be the Notification of Selection letter prepared by the Consulting Services Unit. No consultant shall be notified of its status in the selection process until the Commissioner approves the official Notification of Selection letter prepared by the Consulting Services Unit.

The Consulting Services Unit will retain a copy of the selected notice for all PSBs. The division shall retain and dispose of the selection notices in accordance with the most current Approved Record Retention and Disposition Schedule of the Commission on Public Records.

3. Federal Transit Funds

Request for noncompetitive negotiation must receive prior Federal Transit Administration approval. A consultant may be selected by the department through noncompetitive negotiation only when the award of a contract is not feasible under competitive proposal procedures and at least one of the following circumstances applies:

a. the service is available only from a single source;

b. the project involves public exigency or emergency and does not permit a delay resulting from competitive solicitation; or

c. the results of a competitive solicitation has determined competition to be inadequate.

All noncompetitive negotiated contracts must be submitted to the Federal Transit Administration for pre-award review in accordance with Federal Transit Fund Circular 9040. A cost analysis (in accordance with Section E of these procedures, Audit Evaluations) verifying the proposed cost data, the projections of the data, and the evaluation of the specific elements of costs and profit, is required.

If the consultant's fee for federally funded work will be less than $100,000, the department may select a consultant in accordance with the Small Purchase Procedures without issuing a Professional Services Bulletin.

E. AUDIT EVALUATIONS

1. Pre-negotiation Audit

   When consulting projects are awarded which are expected to exceed $250,000, the requesting division shall request the Contract Audit Unit of the Division of Accounting and Control to perform a pre-negotiation audit of the consultant's proposal; an overhead audit shall also be performed, if necessary. A pre-negotiation audit is required for contracts less than $250,000 if any of the following conditions exist:

   a. There is insufficient knowledge of the consultant's accounting system;

   b. There is previous unfavorable experience regarding the reliability of the consultant's accounting system; or

   c. The contract involves procurement of incidental equipment or supplies for which cost experience is lacking.

2. Overhead Rate Audit

   The Contract Audit Unit will determine if an overhead audit is necessary. An overhead audit should be performed, if practical when:

   a. the consultant's latest audited overhead rate is more than two (2) years old;

   b. the department has never performed an overhead audit of the consultant; or

   c. the circumstances warrant an overhead audit

      The department may use an audit performed by an independent certified public accountant, another state, a federal agency, or a local governmental agency if the audit is current and of sufficient detail. The overhead audits are to be treated as confidential information.

      The Contract Audit Unit shall notify the Division of Design when a consultant overhead audit is scheduled. The Division of Design may request the Contract Audit Unit to perform an audit of one or more of the consultant's completed lump-sum projects while performing the overhead audit. The audit(s) shall indicate, as a minimum, the number of man-hours charged per classification and the consultant's total cost to complete the project.

F. SCOPE OF WORK

1. The requesting division shall provide the consultant with existing reports regarding the project, the anticipated schedule for the project, and shall indicate the method of payment (i.e. lump-sum, cost-plus-fixed-fee, unit prices and/or negotiated hourly rate) to be used for each pay item on the project.

2. The requesting division shall arrange a scope of work meeting with the consultant, if necessary. Once the scope of work for the project has been agreed upon, the consultant shall be instructed to submit a proposal to the requesting division. The submittal shall include:

a. the requested number of copies of the proposal;

b. a brief description of the project and services;

c. a man-hour justification for each lump-sum pay item or cost-plus-fixed-fee contract (except open-end contracts);

d. other information requested by the division;

e. request to subcontract any portion of the work.

3. The consultant shall be given a deadline for its submittal. If the consultant's submittal is not received by the deadline, the consultant's selection may be rescinded and the project may be awarded to another consultant responding to the PSB.

4. Subcontracts

All proposed subcontracts must be approved in advance by the requesting division. The subcontract request shall be submitted with the consultant's proposal and include the following information:

a. name of proposed subcontractor;

b. type of work to be subcontracted;

c. proposed subcontractor fee; and

d. MBE-2 Forms, if a non-DBE firm is utilized.

The requesting division shall review the subcontract request and notify the prime consultant if the request is approved or denied.

G. NEGOTIATIONS

1. The requesting division shall send copies of the proposal to other divisions for review, as needed. The divisions performing reviews shall send the results to the requesting division for use in the negotiations.

2. The requesting division shall be responsible for keeping schedules for consultant projects current so that the Division of Policy and Budget can program each project for the appropriate fiscal year.

3. The requesting division shall prepare a detailed cost estimate with an appropriate breakdown of specific types of labor required, estimated hours by classification, and an estimated fixed fee (if applicable) based upon the size, duration, risk, and complexity of the project, for use during negotiations.

4. The requesting division shall perform a technical evaluation of the consultant's proposal. Prior to negotiating, the requesting division shall review the consultant's overhead audit, the technical evaluation, and the reviews by other involved divisions. The requesting division shall document how the above information was used in the negotiations.

5. If negotiations are not successful, the consultant shall be notified in writing that the department is rescinding its selection. The requesting division shall prepare the letter for the Commissioner's signature. A copy of the letter shall be sent to the Consulting Services Unit. The requesting division shall indicate the reason(s) for rescinding the selection. The requesting division shall decide whether to recommend an alternate consultant from those responding to the PSB or to re-advertise the item in a future PSB.

6. The consultant may withdraw from negotiations at any time by giving the requesting division written notice. The requesting division shall decide whether to recommend an alternate consultant from those responding to the PSB or to re-advertise the item in a future PSB.

7. The Chief of the requesting division or his/her designee shall be responsible for the negotiation of consultant fees. The negotiations may be handled by telephone.

8. Cost-Reimbursable Contracts:

    a. The Chief of the requesting division or his/her designee shall be responsible for negotiating the fixed-fee and the maximum amount payable. On federal-aid projects, a fixed-fee greater than 15% of direct salary and overhead costs must be submitted to and approved by FHWA. Cost-reimbursable contracts utilizing federal-aid funds must be cost-plus-fixed-fee or negotiated labor rate agreements.

    b. Federal Highway Administration Authorization:

        For each project that is to utilize Federal Highway Administration funds, the requesting division shall prepare a FMIS form to request the obligation of funds and authorization from FHWA for the consultant to proceed with preliminary engineering, right-of-way, construction engineering, or project management on the project. The FMIS form request may be prepared once the contract has been negotiated. The total amount to be obligated shall be noted by the requesting division. The FMIS form shall be sent to the Division of Policy and Budget for approval. The Division of Policy and Budget shall then identify the class of funds and the federal aid requested in the form of an electronic agreement that is sent to the Federal Highway Administration.

        A division representative for the Commissioner shall sign the electronic agreement with the Federal Highway Administration. Once the Federal Highway Administration has signed the agreement, a copy of that agreement is then sent to the project manager who may then issue a notice to proceed.

    c. Other Federal-aid Authorization:

        For projects utilizing federal-aid other than Federal Highway Administration funding, the requesting division shall follow the appropriate federal guidelines.

H. PROCESSING OF CONTRACT

1. <u>Contract Request</u>

After negotiations for a project are complete, the request for a contract shall be made with a memorandum from the requesting chief (or the chief's designee) to the Chief Counsel, attention: Consulting Services Unit. The request shall include the following:

a. Name and address of selected consultant

b. Project description, including Des. No., if any

c. Maximum amount to be paid under the contract

d. Whether funds are federal or state, and the percentage of each type

e. Duration for the contract expressed either as an expiration date or term for a period of months or years.

f. The year, bulletin, and item number of the PSB for the work

g. The method of payment for the contract: lump-sum, cost-plus-fixed fee, cost-plus % of profit or negotiated labor rates

h. Approval from contract audit of the overhead rates, negotiated rates, or facilities capital cost of money rates, if any requested

i. A completed Executive Document Summary (EDS); however, the Consulting Services Unit will complete the agency's EDS number on the form.

2. Contract Preparation

The Consulting Services Unit shall prepare a contract, incorporating the terms from the scope of work and the fees arrived at during the negotiation phase. The contract shall specify the method of payment for each element of the work. The contract shall be sent to the requesting division for review and comment. The division's written approval or written request for changes shall be sent back to the Consulting Services Unit.

3. Consultant Signature

The Consulting Services Unit shall resolve the division's comments and send two copies of the contract to the consultant for review and signature. The letter shall be signed by the Program Coordinator, Consulting Services Unit.

4. Department Signature

Once returned by the consultant, the Consulting Services Unit shall send the documents for signature to the Commissioner through the appropriate Deputy Commissioner.

5. Attorney General's Approval

After the department signatures are obtained, the Consulting Services Unit shall send the documents to the Office of the Attorney General for approval as to form and legality.

6. Other Required Signatures

On occasion, the State Budget Agency or the Department of Administration may be required to approve professional services contracts. If this is necessary, the Consulting Services Unit shall obtain the required signatures.

7. Workers' Compensation Certificates

The Consulting Services Unit shall maintain a file of current workers' compensation certificates for all consultants providing services to the department. Prior to distributing the executed contract, the Consulting Services Unit shall verify that the consultant has a current workers' compensation certificate on file. If the consultant does not have a current certificate on file, the Consulting Services Unit shall contact the consultant to obtain one.

8. Distribution of Contracts

When the Consulting Services Unit has obtained all required signatures and verified that the consultant has a current workers' compensation certificate on file, the Consulting Services Unit shall transmit one original contract to the requesting division. The requesting division shall retain a copy of the contract, then forward the original to the consultant. The Consulting Services Unit shall retain the other original contract in the project file.

The contract may be distributed once the funds have been encumbered and all of the required signatures have been obtained.

I. SUPPLEMENTING OR MODIFYING CONTRACTS

1. Circumstances requiring Contract Modification

Circumstances may exist that require a consultant contract to be modified, amended, or supplemented. Situations requiring a formal change to the contract include, but are not limited to:

a. a change in the maximum amount payable

b. a change to a specific pay item

c. any additions or deletions of pay items

d. revisions to the scope of work

e. a change in the term of the contract or completion date for the work

2. Requesting Changes to Existing Contracts

a. A request to change an existing contract may be made with a memorandum from the requesting division chief (or the chief's designee) to the Chief Counsel, attention: Consulting Services Unit. The request shall contain the following information:

i. identify the consultant agreement to be modified

ii. state the specific nature of the changes, including any revision to the amount of payment

iii. an Executive Document Summary (EDS) for the supplemented or modified contract time, after the contract term has expired.

b. Requesting divisions should make requests for changes in a timely manner to allow changes to be made and all required signatures obtained within the existing term of the contract. Requests for extensions of time should be made as soon as it becomes apparent that additional time will be required.

c. Open-end contracts will not be supplemented, except for a change in the scope of work, to extend the duration of the contract for work already assigned, or to increase the maximum amount payable to complete work already in progress. If a division desires to increase the maximum amount payable of an open-end contract for work not in progress, the division must request a new contract, instead of supplementing the existing contract.

J. NOTICE TO PROCEED

The requesting division is responsible for ascertaining the availability of funding and issuing a written notice to proceed to the consultant. No notice to proceed shall be given until the contract is fully-executed, the funds have been encumbered, and any necessary federal approvals have been received. No payment will be made for work undertaken prior to the notice to proceed. A copy of the notice to proceed shall be sent to the Consulting Services Unit.

In the event there is a change in scope of work after the issuance of the written notice to proceed, adjustments in compensation to the consultant shall be determined by INDOT, subject to the consultant's approval. The consultant shall not commence the additional work until a supplemental contract is agreed to in writing, executed by all parties and approved by the Attorney General.

However, upon approval by the Design Division, INDOT may authorize supplemental work up to $30,000.00 prior to the execution of a supplemental agreement for work. Any authorization for additional work shall not be binding on the parties, unless and until the supplemental agreement is approved by the Attorney General as to form and legality.

K. PROGRESS REVIEW

1. The Chief of the requesting division shall provide final review and supervision of the consultant's work. The Chief of the requesting division will assign member(s) of the staff to directly monitor progress of the work, compliance with the contract, and any applicable state and/or federal standards and regulations.

2. Each division that revises a department manual, road or bridge memorandum, etc. affecting consulting work shall be responsible for ensuring that all consultants currently doing work for the department are made aware of the change(s).

3. The consultant shall make submittals and progress reports in accordance with the provisions of the contract. The plans and/or reports shall be sent to the division responsible for monitoring the work.

   Each division shall have a process in place to deal with untimely submittals.

After reviewing the submittal, the division shall send directions, comments, and/or marked-up plans or reports to the consultant.

The consultant shall be requested to attend a conference if its submittals are wholly inadequate or substantially unsatisfactory.

4. Each division monitoring any portion of the consultant's work will watch for unauthorized subcontract work. If unauthorized subcontract work is discovered, the requesting division shall request an explanation from the consultant.

   The consultant's response shall be sent to the personnel responsible for the selection of the consultant. Penalties against the consultant for use of unauthorized subcontractors may range from a written warning against future violations to affecting future selection for consultant projects. The department may also elect to terminate the contract.

L. INVOICE VOUCHERS

1. Consultants shall send invoice vouchers to the requesting division. The requesting division shall log in each invoice voucher received and write the date received on the voucher. The voucher must be reviewed, signed, and sent to the Division of Accounting and Control within 21 calendar days of the date received in order to avoid paying interest on the payment. If the invoice voucher is unacceptable, the requesting division will reject the invoice voucher and return it to the consultant with a Notice of Good Faith Dispute.

2. The invoice voucher shall be checked by the requesting division for the following:

   a. purchase order number;

   b. location, function and object codes;

   c. state share, federal share and total disbursement;

   d. cost account number;

   e. project number;

   f. consultant signature; and

   g. fund and participation codes.

3. The requesting division will verify that:

   a. money is available in the subject purchase order to pay the invoice;

   b. the correct fee for the work has been used;

   c. the consultant's claimed progress agrees with division records and the information received from other divisions;

   d. the hourly rates and provisional overhead rates on cost reimbursable contracts are valid; and

e. the mathematical computations are correct.

If the voucher information is correct, the requesting division will sign and forward the invoice voucher to the Division of Accounting and Control.

If the voucher information is incorrect, the requesting division of primary concern shall reject the invoice and mail the consultant a “Notice of Good Faith Dispute” letter detailing the reason(s) for the rejection.

M. PROJECT COMPLETION

1. Lump-sum Contracts

The requesting division shall detail the fee earned and mark "lump-sum" on the face of the final invoice voucher to notify the Division of Accounting and Control that no audit is needed for final payment. The invoice voucher will then be forwarded to the Division of Accounting and Control.

If the contract contains a cost-plus provision for changes during construction, and work has been performed thereunder, the requesting division may request the Division of Accounting and Control to perform a final audit for the cost-plus portion of the contract when that portion is less than $25,000. The requesting division shall request the Division of Accounting and Control to perform a final audit when the “cost-plus” portion of the contract is $25,000 or more.

2. Cost Reimbursable Contracts

The requesting division shall request the Division of Accounting and Control to perform a final audit for "cost-plus" contracts in excess of $25,000.00.

Upon receipt of the audit report, the requesting division shall follow the procedures established by the Division of Accounting and Control for audit resolutions and the finaling out of cost reimbursable contracts.

3. Closed Projects/Contracts

When a project has been completed and the contract has been closed, the requesting division shall promptly notify the Consulting Services Unit that the contract is closed. Upon such notification, the Consulting Services Unit will remove the contract file from active status and will be responsible for the storage and retention of the contract in accordance with the most current Approved Record Retention and Disposition Schedule of the Commission on Public Records.

N. CONSULTANT EVALUATIONS

1. The department will evaluate each consultant's performance on:

a. each department project; and

b. each Local Public Agency project utilizing federal-aid funds.

2. The evaluation must include the following factors:

   a. Timely completion of work.

   b. Quality of work.

   c. Administrative effectiveness.

3. Each division responsible for monitoring a portion of a project shall prepare an evaluation for each submittal or at regular intervals during the progress of the work and send a copy to the consultant.

   The original shall be retained by the division performing the evaluation. The consultant shall be given the opportunity to discuss its evaluations. If the consultant submits written comments, they shall be attached to the evaluation.

O. CONSULTANT PREQUALIFICATION

1. Division Criteria

   Each division that establishes prequalification is responsible for the prequalification process to be used by that division, if any. Consultants desiring to become prequalified should contact the division directly. Consultants desiring to provide services for divisions that utilize prequalification must be prequalified in order to be considered eligible for placement on the department mailing list for such services.

   If Federal Highway Administration (FHWA) funds are to be used, the requesting division's prequalification process must receive prior FHWA approval.

2. Prequalification Appeals Requirements

   In accordance with I.C. 4-21.5, divisions that establish prequalification criteria must have an appeals process in place and notify consultants of their appeal rights. Appeals must be conducted in accordance with I.C. 4-21.5.

3. Geotechnical Services Prequalification

   Consultants desiring to provide geotechnical services, as either contractors or subcontractors, must be prequalified by the Division of Materials and Tests. The Division of Materials and Tests shall send a list of the prequalified firms and/or changes to the list to the Consulting Services Unit each time the list changes.

4. Hazardous Materials Services

   The department may utilize the consultant lists of the Indiana Department of Environmental Management when the services of hazardous waste consultants are required.

5. Consultant Mailing List

   The Consulting Services Unit shall maintain a consultant mailing list. The purpose of the list is to facilitate the mailing of Professional Services Bulletins.

The Consulting Services Unit shall request all consultants to complete an "areas of interest" form regarding the types of work desired. Consultants will be placed on the mailing list to receive Professional Services Bulletins pertaining to the consultant's areas of interest after submitting the "areas of interest" form. In addition to the "areas of interest" form, the Consulting Services Unit shall request all consultants to provide data qualifications materials, which must be on file before a consultant may be considered for selection in response to a PSB. It is the consultant's responsibility to notify INDOT of changes to the areas of interest form and/or the data qualification materials, whenever the consultant information changes, or at least once every two (2) years. It is also the consultant's obligation to keep INDOT advised of the consultant's current mailing address. PSBs or other correspondence returned to INDOT undeliverable by the U.S. Postal Service at the address provided by the consultant shall result in the consultant being deleted from the mailing list.

6. Updating Prequalification Data

Prequalification data shall be updated in accordance with the requirements of each division utilizing prequalification criteria. Such divisions shall maintain their own prequalification data.

P. DISADVANTAGED BUSINESS ENTERPRISE REPORTS

1. Documentation of DBE Utilization

The Consulting Services Unit shall prepare a monthly report of all consulting services contracts. The report will be sent to the Civil Rights Division by the fifth of each month.

The report shall include the following information:

a. date contract is distributed;

b. consultant name;

c. project description;

d. project number;

e. contract amount;

f. federal participation;

g. state participation;

h. DBE contracts identified;

i. monthly and fiscal year (state and federal) DBE total contract (primes and subcontractors) amount, federal participation, and state participation;

j. monthly and fiscal year (state and federal) consultant total contract, federal participation, and state participation;

k. monthly and fiscal year (state and federal) DBE percentages.

Q. EXCEPTIONS

Any exceptions to this procedure must be approved by the Commissioner, and FHWA must approve any exceptions to these procedure if any federal funding is to be utilized.

Approved by: _____ Date _____, 20___
Commissioner

Approved by: _____ Date _____, 20___
FHWA

QUALITY ASSURANCE FORM

CONSULTANT COMPLETES THIS SECTION

Consultant:

Des. No.: Project No.:

Project Description:

Submittal:

This submittal has been reviewed with regard to consistency, completeness, and overall content prior to submittal by , Project Manager, on , 20 , telephone number .

REVIEWER COMPLETES THIS SECTION

The submittal described above has been reviewed for quality in accordance with the Quality Assurance Procedures.

The consultant is responsible for checking all of its work as outlined in *Indiana Design Manual* Section 6-2.0, Quality Assurance Procedures. The table shown below indicates which of the reviewer's personnel has checked which items.

Item	Designer	Reviewer

Remarks:

Item No.	Item Rated	Hydrau-lics	Stage 1	Stage 2	Stage 3
1	Design Concept	X	X	X	X
2	Critical Design Elements		X	X	X
3	Calculations	X			
4	Plans/Report Quality	X	X	X	X
5	Engineering Judgment				
6	Documentation of Work	X	X	X	X
7	Environmental Mitigation / Permit Compliance		X	X	X
8	Procedure / Standards Compliance	X	X	X	X
9	Quality Assurance	X	X	X	X
10	Cooperation	X	X	X	X

Notes: Table can be applied to either a PDP or pre-PDP project.

A change in the project scope may result in evaluations at subsequent design stages where such an evaluation was not originally scheduled.

Stage 1 corresponds to the Grade Review, Structure Type and Size, Final Field Check, and Design Summary phases.

Stage 2 corresponds to the Design Hearing and Preliminary Plans for Final Approval phases.

Stage 3 corresponds to the Final Check Prints and Final Tracings phases.

ITEMS RATED FOR EACH SUBMITTAL
General Plans Review

Figure 6-3B

Item No.	Items Rated	Inspection Report	Preliminary Plans	Final Plans	Tracings
1	Design Concept	X	X	X	
2	Critical Design Elements	X	X	X	
3	Calculations	X		X	X
4	Plan / Report Quality	X	X	X	X
5	Engineering Judgment	X	X	X	
6	Documentation of Work	X	X	X	
7	Environmental Mitigation / Permit Compliance	X	X	X	
8	Procedure / Standards Compliance	X	X	X	X
9	Quality Assurance		X	X	X
10	Cooperation	X	X	X	X

Note: A change in the scope of the project may result in evaluations at subsequent design stages where such an evaluation was not originally scheduled.

ITEMS RATED FOR EACH SUBMITTAL
Bridge Rehabilitation Review

Figure 6-3C

RATING / EVALUATION
PLANS-DEVELOPMENT PROCESS, DESIGN EXCEPTION

Consultant:

Route:

Des. No.

Description:

Structure No.:

CN Project No.:

REVIEWER'S ITEMS TO BE RATED

Identification of Need
Analysis
Procedure/Compliance
Cooperation
Timeliness

5 = Excellent, 4 = Good, 3 = Marginal
2 = Poor, 1 = Unsatisfactory

Comments:

Are Revisions Major? ☐ Yes ☐ No

Reviewer's Signature: _____ Date:

RATING / EVALUATION

PLANS-DEVELOPMENT PROCESS, PRODUCTION MANAGEMENT DIVISION

Contract No.: Letting Date: District:

Route: Des. No.:

Description:

CN Project No.: Structure No.:

Consultant: Project Manager:

REVIEWER'S ITEMS TO BE RATED

Special Provisions
Pay Items
Procedure / Standards Compliance
Cooperation

5 = Excellent, 4 = Good, 3 = Marginal
2 = Poor, 1 = Unsatisfactory

Comments:

Are Revisions Major? ☐ Yes ☐ No

Reviewer's Signature: _____ Date:

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CHAPTER SEVEN

ENVIRONMENTAL PROCEDURES / DESIGN SUMMARY

7-1.0 ENVIRONMENTAL PROCEDURES

7-1.01 INDOT Document

The INDOT *Procedural Manual for Preparing Environmental Studies* provides the Department's procedures for the preparation of the environmental documents described below.

The designer should refer to the appropriate document as needed to determine the role of environmental procedures in project development. Copies of such document may be obtained from the Production Management Division's Office of Environmental Services.

An editable version of Figure 7-1A, Scope / Environmental Compliance Certification / Permit Application, may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

If more right of way is required for a project than is described in the environmental document, the designer should submit a written request to the Office of Environmental Services' Environmental Policy Team to determine if an Additional Information subsection is required.

Such documents prepared for a Department project will apply as shown below.

7-1.01(01) Categorical Exclusion (CE)

The type of project for which the environmental document is typically considered to be a CE is as follows:

1. access control;
2. added travel lanes with little or no right-of-way take;
3. bridge rehabilitation;
4. bridge replacement;
5. drainage correction;
6. erosion and landslide control;
7. guardrail and lighting;
8. intersection improvement;

9. railroad-crossing improvement;
10. rest-area modernization and construction;
11. Resurfacing, Restoration, and Rehabilitation (3R);
12. safety improvements;
13. sight distance correction;
14. signalization and signing;
15. small-structure replacement; or
16. weigh-station modernization and construction.

7-1.01(02) Environmental Assessment / Finding Of No Significant Impact (EA/FONSI)

The type of project for which the environmental document is typically considered to be an EA/FONSI is as follows:

1. added travel lanes involving acquisition of large amounts of right of way and a considerable number of relocations; or
2. construction of a new roadway.

7-1.01(03) Environmental Impact Statement / Record of Decision (EIS / ROD)

The type of project for which the environmental document is typically considered to be an EIS / ROD is as follows:

1. construction of a new controlled-access freeway;
2. construction of 4 or more lanes on a new location; or
3. project with a significant adverse impact on the human environment.

7-1.01(04) Environmental Commitments

A commitment is defined as an agreement by the Department with an outside party, that the Department will perform an action or refrain from certain actions. A commitment may come from a variety of sources, such as resource agencies, landowners, utilities, or the public in general. A commitment can be classified as firm, indicating that failure to comply with it has legal consequences, or it can be an item for further consideration, meaning that it is desirable but it is not required by law.

During the development phase of a project a number of commitments or agreements with property owners or public agencies can be made, some which cannot be fulfilled until the project is constructed. Environmental commitments are included in the language of the permits that are

included in the construction contract. Commitments made to property owners or public agencies will be documented. This will allow the project engineer/supervisor to have copies of these agreements during construction.

All environmental, context-sensitivity, and regulatory-agency permits commitments to be incorporated into each project should be summarized in one electronic location (document), as described in Section 7-1.01(05).

The designer may request and receive written approval from a commitment's originator to omit a commitment. Such request, including the rationale for deletion or modification of a commitment, should be sent to the Environment, Planning and Engineering Division's Environmental Assessment Section. A copy of the request should also be sent to the appropriate design project coordinator. The Environmental Assessment Section will notify the designer whether it is acceptable to pursue deletion of a commitment with the appropriate regulatory agency. The designer may not delete a commitment until written approval is received from the appropriate regulatory agency or agencies.

An example of a commitment included in the environmental document that might be considered for deletion is the fish spawning restriction (no in-channel work between April 1 and June 30), especially if it is an intermittent stream (dry most of the time).

If a project has not received design approval and the designer believes that one or more of the commitments listed in the environmental document should be omitted, the designer should follow the procedure described above. The designer should then develop the Fish and Wildlife Review and Mitigation Section of the Design Summary accordingly, based upon the written response from the Environmental Assessment Section and the appropriate regulatory agency or agencies. The designer should attach to the Fish and Wildlife Review, the letter(s) from the appropriate regulatory agency or agencies approving deletion or modification of a commitment.

Each environmental document includes a section with a summary of commitments. There are Required and Optional subsections.

If INDOT committed to the fish spawning restriction in the Fish and Wildlife Review and such restriction is not contained in any of the permits to be included in the contract documents, the designer must prepare a unique special provision and include it in the special provisions attachments.

1. Site Construction Approval of Wetland Mitigation Areas for Local Transportation Project. The INDOT wetland scientist, wetland biologist, or landscape architect should not be referenced in the special provisions as an approving agent for wetlands under construction. These duties are the responsibility of the design firm or the agent of the local public agency who will be monitoring these sites. The local public agency is

responsible for the five year monitoring of these mitigation areas. It is their responsibility to ensure the viability of the site for intended mitigation.

2. Preliminary Site Investigation Review. The designer should review the preliminary site investigation and site assessment and take appropriate action (place notes on plans, include special provisions, etc.). For clarification or assistance with understanding these reports, the designer should contact the Environment, Planning and Engineering Division's Environmental Services Section manager. Information shown in these documents regarding gas storage tanks and hazardous waste should be incorporated into the plans or specifications.

3. Woody Vegetation Plans Procedures. The procedure for processing Woody Vegetation plans is as follows:

   a. The Woody Vegetation plans should be transmitted to the Design Division's project coordinator at the Preliminary Field Check and Final Plan stages. The submittals will be logged in by the project coordinator and sent to the Design Division's landscape architect for review.

   b. Once the plan review has been completed, the landscape architect will send a memorandum to the designer with a copy to the project coordinator. For a consultant-designed project, the landscape architect will also send a copy of the memorandum to the Design Division's project manager.

   The preliminary woody revegetation review should be coordinated with the Design Division's landscape architect. This is to occur in advance of the Fish and Wildlife Review submittal. The landscape architect is to respond directly to the designer with a written summary of the review with a copy to the Design Division's project coordinator.

   The designer should work directly with the landscape architect regarding final woody revegetation review. The Design Division's project coordinator is to receive a copy of the written summary of the review.

4. Asbestos Certification. The designer is required to file a statement to certify that no asbestos-containing material was specified as a building material for the project. The certifications that are received are placed in the project file. In order to be of use to INDOT, it must be able to retrieve the appropriate statement when the structure is worked on in the future. Therefore, the designer should send the original certification to the appropriate district bridge inspector, with a copy to the Environment, Planning and Engineering Division's Environmental Services manager, and place a copy in the design calculation book for the project.

7-1.01(05) INDOT Project Commitment Database

A commitment-tracking procedure has been developed to ensure that everyone involved with a project is aware of its commitments, and to provide a means to document when the commitments are to be implemented.

1. Procedure and Web Portal Access.

   See Figure 7-1B, Project Commitments Database Procedure. Access to the Project Commitments Database is provided through the INDOT website, as described below.

   An internal user should not use the SPMS MyTasks application. Instead, such user should access the website through the INDOT Web Portal, at https://webapp.indot.in.gov/iwp/login/login.aspx.

   An external user should access the INDOT Web Portal through https://netservices.indot.in.gov/iwp/login/Login.aspx.

   The designer should upload the All Project Commitments Report, at the appropriate design stages. The Report should include the correct ERMS Document Type as shown in the revised Final Tracings Checklist at http://www.in.gov/dot/div/contracts/design/dmforms. The Report should also include the correct Project File Naming Conventions as shown in Figure 7-1C. The Report will be posted to the INDOT website at the time of contract advertisement along with all other supporting documents.

   Most consulting firms have admittance to the INDOT Web Portal as their primary access to ERMS. Admission to the Portal can be granted by submitting a user-enrollment or organization-enrollment form. Once admission has been granted, the procedure for a user to gain admittance to the database is as follows:

   a. click on Select New Process;
   b. check Project Commitments from the available list;
   c. click on Submit, then
   d. request each permission level (group description) desired.

   An external user may choose only from Commitments_UPDATE or Commitments_VIEWERS. An internal user may choose from the entire list.

Additional FAQ and Help documents concerning the process of accessing the Project Commitments Database and using the INDOT website are located at http://www.in.gov/indot/6813.htm under Project Commitments Documents.

2. Responsibilities.

a. Designer. The designer is responsible for ensuring that the commitments are included in the plans, pay items, and specifications. The All Project Commitments Report should be included in the Final Tracings submittal.

b. Project Manager. A copy of the All Project Commitments Report should be provided to the designer by the project manager for the designer's signature. The Report should not be incorporated into the project's Contract Information book.

The project manager should ensure that all active commitments are listed in the Report prior to letting. The project manager will supply the Report to the area engineer.

The project manager should document changes in commitments or indicate commitments that cannot be satisfied. An unresolved commitment determined by the project engineer/supervisor to require monitoring after construction should be resolved by ensuring that a contract exists for the required monitoring.

c. Project Engineer/Supervisor. After the final inspection, the project engineer/supervisor will maintain a copy of the All Project Commitments Report in the field office.

7-1.02 Wildlife Habitat Replacement

To some extent, the project will likely disturb existing wildlife habitat. Wildlife habitats may include woodlands, overgrown fields, pastures, or wetlands. The Department's policy is to replace any disturbed wetland. This will often require the purchase of additional right of way. To determine the project's effect on plants and animals, the designer should review the Engineer's Report or, where provided, the EIS or EA. These reports may also provide recommendations on the type and quantities of habitat to be replaced.

The designer is responsible for incorporating the mitigation of the wildlife habitat into the road or bridge plans. This may include revegetation with special grasses and woody species, wetlands grading and seed mixtures, etc. However, wetlands revegetation with aquatic and woody species is usually administered under a separate contract once the road or bridge plans have been

completed. The Office of Environmental Services will assist in coordinating habitat types and quantities. Its Ecology and Permits Team will assist in the development of plans and specifications.

7-1.03 Wetland Design Guidelines

Wetlands are often disturbed by a highway project. The Department's policy is to replace any disturbed wetland areas when required. Therefore, where the creation of new wetlands for the replacement, enhancement or restoration of existing wetlands is necessary, the following guidelines should be considered.

1. Wetland Sites. Previously altered wetland sites are preferred over upland sites.

2. Early Coordination. Initiate and continue throughout the design process if the road or bridge and associated wetland designs are accomplished by separate designers.

3. Design Features. Incorporate features which will allow control over the wetland water elevation when necessary. This is critical to successful installation and establishment of various aquatic species.

4. Wetland Contract. When setting up a separate contract involving wetlands, it will be the designer's responsibility to include one or more of the conditions as follows.

    a. The wetland should be one of the first items constructed and operational, excluding aquatic plantings or seedlings. This is imperative because the wetland hydraulics must function as intended and any corrections must be made during the contract time. It will be necessary to include such items as sodding, temporary seeding, or erosion control that pertain to the wetland in the complementary road or bridge contract.

    b. Install aquatic plantings and seeding in a separate follow-up contract. A minimum of one growing season establishment period will be required. More than one establishment period may be necessary. The Office of Environmental Services' Ecology and Permits Team should be consulted for guidance in determining the establishment periods.

    c. Install aquatic plantings and seeding in the road or bridge contract when it is not practical to do so in a separate contract. A one-growing-season establishment period will be required. It is imperative that the wetland is one of the first items to be constructed and operational because availability, delivery, and installation of aquatic plantings and seeding are on a limited basis.

5. Vegetation Plans. When developing wetland vegetation plans, specify species which are commonly supplied by nurseries specializing in aquatic species. Avoid species that are rare or uncommon which, typically, are limited in supply.

6. Native Species. It is important to realize that species which are present at or near the wetland site will self colonize the new wetland given the necessary hydraulic requirements. Sometimes these species are difficult or impossible to find and should be omitted from recommended planting lists.

7. Planting Recommendations. When specifying aquatic plants, tubers, roots, etc., the following application rates are recommended.

Proposed Wetland Site Treatment	Application Rate Per Acre
Enhancement	1,000
Restoration	1,000
Creation	1,000 – 3,000

It is also recommended that plants be installed in groupings of approximately 10 to 20 plants.

For additional information on wetland design, see the *INDOT Division of Design, Wetland Mitigation Design Guide*.

7-2.0 DESIGN SUMMARY

7-2.01 Introduction

The Design Summary is a written document describing a project, its existing conditions, the planned improvements, and the different considerations utilized in developing the design for the project. It is a Production Management Division document prepared primarily for the use of the Local Programs Division's Office of Public Hearings.

A Design Summary must be prepared for each project (including one that does not involve the acquisition of new right of way), except for a bridge rehabilitation or bridge widening project without right-of-way requirements. Such a project requires a Bridge Inspection Report which is submitted to obtain design approval. See Chapter Seventy-two for a discussion on the Bridge Inspection Report.

An Abbreviated Design Summary will be required for an Interstate-route rehabilitation project as described in Section 7-2.03. A Brief Design Summary is required for each stand-alone project. Blank design summary forms are shown as the figures as follows:

Figure	Title
7-2A	Design Summary Form (Road / Bridge / Culvert Replacement)
7-2B	Design Summary Form (Roadway Lighting / Roadway Signs / Signalization Project)

Editable versions of these figures may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

Where a major roadway project includes bridge replacement or new bridge construction within the project limits, the structure should be discussed within the Design Summary for the major project.

The Final Design Summary should be processed for design approval as soon as all public involvement requirements have been satisfied. With the exception of an Interstate-route rehabilitation project, it is not necessary to wait for the final pavement design before obtaining design approval.

Section 7-2.0 assumes the project to be consultant designed, but it need not be limited to that use. Each Design Summary should follow the format suggested in this Section. Direct all questions on the preparation of the Design Summary to the project manager.

7-2.02 Design Summary Sections

It is not necessary to attach the documents to the Design Summary as follows.

1. title sheet;
2. Index;
3. cost estimate (except for an Interstate-route rehabilitation project);
4. design concept letter;
5. hydraulic review;
6. scour review;
7. permits;
8. photographs; or
9. pavement design (except for an Interstate-route rehabilitation project).

The following documents, however, are required in the Design Summary.

1. Title Block. This information is used to identify the project and report submission. The following format should be used.

Design Summary Type _____
Route No.: SR-___ or US-___ or I-___
Des No.: _____
Project No.: _____
Structure No.: _____
County: _____
City or Town: _____
Federal Oversight: (Not Required) (Required)

a. Design Summary Type. The Design Summary should be prepared in three phases: Preliminary Draft, Draft, and Final. The applicable submission type should be indicated in the Title Block.

b. Route No. The route number and/or road or street name should be included.

c. Des. No. This can be found in the INDOT project scheduling system, or, for a consultant-designed project, it can be found on the Notice to Proceed letter.

d. Project No. The Construction project number can be found in the INDOT project scheduling system, or, for a consultant-designed project, it can be found on the Notice to Proceed letter. Subsequent correspondence generated by the project manager will reflect any changes in the project number.

e. Structure No. If applicable, this can be found in the INDOT project scheduling system, or, for a consultant-designed project, it can be found on the Notice to Proceed letter. Subsequent correspondence generated by the Contract Administration Division's Consulting Services Team will reflect any changes in the structure number.

f. County. The county in which the project is located should be shown.

g. City or Town. The city or town for an urban-area project should be shown.

h. Federal Oversight. This information can be found in the Engineer's Report or in the INDOT project scheduling system.

2. Location and Project Description. Provide a description of the location of the project, as a distance from a given reference point, and the county name. See Section 40-8.0 for Department policies for adherence to design criteria.

A brief written description of the planned improvement must be included in this section. Any important design elements or features that were not addressed in the environmental document should be included in the Design Summary.

The first sentence of the Design Summary should include the work category. Examples of work category include: Added Travel Lanes, Bridge Replacement, Road Reconstruction, etc.

a. Roadway. The data that should be included are as follows:

(1) total project length;

(2) changes in horizontal and vertical alignment;

(3) length of approach work from each end of a bridge (bridge project only); and

(4) indication of whether the intersection sight distance meets the applicable criteria for the project.

b. Structure (if applicable). The data that should be included are as follows:

(1) description of the structure (e.g., structure type, span lengths, skew); and
(2) clear-roadway width of structure.

c. Miscellaneous Project-Related Information. If applicable, the project features that should be briefly addressed are as follows:

(1) significant county road relocations;
(2) less-than-standard intersection sight distance;
(3) underground storage tank remediation;
(4) channel relocation;
(5) clearing of wooded/forest areas;
(6) significant historical/archaeological considerations;
(7) sidewalks;
(8) Level One design exceptions;
(9) Level Two design criteria not met;
(10) permanent road closures; and

(11) non-Interstate-route permanent median crossover closures.

d. Discussion of Alternatives. It is not necessary to repeat the discussion of alternatives contained in the Engineer's Report and environmental document. The Office of Public Hearings can usually refer to the environmental documents which it has on file.

3. Need for Improvement.

a. The need for the improvement should include a brief description of the existing facility and the current condition of the facility. For a bridge, discuss the existing structure condition, substandard geometrics or the inadequacy of the existing waterway opening.

b. The accident history of the project location should be briefly discussed, if it is a contributing factor to the need for the project.

c. For a major project, the additional points that may be applicable are as follows:

(1) transportation demand, including the urban transportation plan;

(2) Federal, State, or local government authority (legislation) directing the action;

(3) social demands or economic development, new employment, schools, land use plan, recreation, etc. What projected economic development/land use changes indicate the need to improve or add to the highway capacity? References to the environmental document could be helpful in these areas;

(4) Intermodal Relationships information on how the proposed facility may interface with airports, rail facilities, mass transit services, etc. References to the environmental document could be helpful in these areas;

(5) system linkage questions, such as: Is the proposed project the connecting link? Does it connect with other highway facilities? How does it fit into the system?

(6) Capacity can add to the demand, social services demand, or economic development. What capacity will be needed? The existing and proposed Level of Service should be discussed. Is the capacity of the existing facility adequate for the present traffic?

4. Prior Studies and Considerations. List the environmental-document approval date, field check dates, and all permit information. If a design exception was obtained, list its approval date also.

   Include the following statement: *The proposed design is consistent with the approved environmental documentation*. If this is not true, briefly explain any minor deviations from the environmental report. Any significant deviations must be addressed in an Additional Information (AI) to the environmental document. If more right of way is required than is described in the environmental document, the designer should submit a written request to the Office of Environmental Services Environmental Policy Team to determine if Additional Information is required.

5. Design Data. Design data should at least include the project design criteria, functional classification, terrain, and design speed. Also include posted speed, access control, proposed roadway and shoulder widths, minimum and maximum right-of-way widths, obstruction-free-zone widths, or clear-zone widths, side slopes, and, if appropriate, structure clear-roadway width. A presentation similar to the following example should be shown.

Design Data

Project Design Criteria:	3R (Non-Freeway)
Functional Classification:	Rural Minor Arterial
Terrain:	Rolling
Design Speed:	55 mph
Posted Speed:	55 mph (90 km/h)
Access Control:	None
Number of Lanes and Widths:	2 @ 12 ft
Shoulders:	9 ft (8 ft HMA stabilized) 12 ft (9 ft HMA stabilized) in Guardrail Sections
Maximum Right-of-Way Width:	110 ft (60 ft north and 50 ft south)
Minimum Right-of-Way Width:	Existing 60 ft (30 ft north and 30 ft south)

Structure Clear Roadway Width: 42 ft

Obstruction-Free Zone or Clear Zone: 20 ft

Side Slopes: 4:1

6. Traffic Data. Data should include existing and projected AADT, DHV, and commercial vehicles. The data is available in the Engineer's Report. A presentation similar to the following should be shown.

Traffic Data:

AADT (20___) _____ VPD
AADT (20___) _____ VPD
DHV (20___) _____ VPH
Comm. Veh. _____ DHV
_____ % AADT

7. Description of Right of Way. Discussion of right of way should include the area to be acquired in acres for both permanent and temporary right of way. Include a list of any business or residential relocations. Include a reference on the use of any temporary right of way such as Temporary Right of Way for Drive Construction.

8. Estimated Cost. The project costs should be shown. Estimated project costs for both the year in which the report is expected to be approved and the anticipated year of construction should be shown. The costs shall include preliminary engineering, right of way, and construction. Each of these costs should be shown separately in a tabular form as follows:

Project Cost Summary:

	Year: _____	Year*: _____
Preliminary Engineering:	$ _____	$ _____
Right of Way:	_____	_____
Construction:	_____	_____
Total Cost:	$ _____	$ _____

* ____ % annual inflation is used for projection

The preliminary engineering cost for a consultant-designed project will usually be the consultant's design fee. The in-house design cost is 10% of the construction cost, which includes environmental work, surveying, geotechnical, etc., in the preliminary engineering costs. The recommended inflation factor for the construction cost is 5% per year. The preliminary engineering and right-of-way costs should not be inflated for the projected year of construction.

9. Maintenance of Traffic During Construction. Discussion should include specific information pertaining to maintenance of traffic during construction. Discussion should include economic information used to determine whether to maintain traffic or use a detour. If the traffic maintenance plan changes as a result of the hearing, the Design Summary should be revised before requesting design approval.

10. Mitigation Measures. Most environmental considerations are outlined in the environmental document. Standard mitigation measures which recur on every project need not be reiterated within the Design Summary. Items such as seeding and erosion control are addressed adequately by the INDOT *Standard Specifications*.

    Special project-specific mitigation measures should be mentioned in this section. If a fish and wildlife review is required, the designer should refer to the Fish and Wildlife Review Instructions and Form. Editable versions of such documents may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/. The discussion should include mitigation measures which were not mentioned in the environmental document or those which need further explanation. Wetland mitigation, woody revegetation, or time restrictions on tree clearing or channel work are examples of mitigation to include.

    If there are no project-specific mitigation measures, this section should include a statement similar to the following: *No special mitigation measures are required for this project*.

11. Public Involvement. For the Draft Design Summary, a statement should be made indicating that an opportunity for a public hearing will be offered by advertising in local newspapers. Add that any opinions or comments received by the published deadline date will be added to this report. Afterwards, the Final Design Summary will incorporate all views expressed by the public.

    For the final report, indicate one of the scenarios as follows:

    a. an opportunity for a public hearing was advertised in local newspapers with no requests forthcoming by the published hearing deadline of ___*date*___;

b. an opportunity for a public hearing was advertised and a hearing was requested, but concerns were addressed on an individual basis; or

c. a public hearing was held on ___*date*___.

A summary and analysis of any views received concerning the proposed project is then developed. Comment sheets can be used to address all views or the comments can be added to the final section of the Design Summary. It is not considered responsive to state, "it is not part of the project scope," or "it will be investigated."

For a project that does not require a hearing because less than 0.5 ac of additional permanent right of way is required, a statement should be included similar to the following: *This project is exempt from public hearing requirements because less than 0.5 ac of additional permanent right of way is required.*

12. Miscellaneous.

a. The preparer of the Design Summary should sign the document. Information to be included should be the consulting firm name, name of the preparer, and the date:

*(Preparer's Name)*_____ *(Date)*_____
(*Consulting Firm Name*)

b. Attachments should include the following:

(1) a copy of the Field Check Minutes. Include documentation of any field check concerns that were resolved after the field check minutes were prepared;

(2) a copy of the Fish and Wildlife Review Memorandum (if applicable). See Section 7-2.05. A Fish and Wildlife Review is required for each project impacting rivers, streams, or wetlands, or one with special environmental mitigation measures;

(3) a copy of the memorandum indicating that the hearing requirements have been met, the Certification of Public Hearing Requirements and Socio-Economic-Ecological-Environmental Evaluations (SEE Certificate). See Section 7-2.05;

(4) a map showing the location of the project, and

(5) a quadrangle map or other local map showing the location of the project.

Other information that is pertinent to the report may also be attached. The designer should check with the project manager for clarification on what to attach to the report.

7-2.03 Road Rehabilitation Project

For a road rehabilitation project, a brief Design Summary should accompany the design approval packet when it is submitted for design approval. The design approval packet typically includes the field check minutes, the pavement design letter, and a current cost estimate. For a project which requires a public information meeting, the Design Summary information should be made available at the time the meeting is requested, even if the project has not yet reached the design approval stage.

The Design Summary format for a road rehabilitation project should be as follows:

1. Title Block. Follow the guidelines for a full Design Summary (Section 7-2.02).

2. Location and Project Description. Describe the location of the project by showing the beginning and ending points as a distance from a given State route. Provide the project length and the county name. Briefly describe the type of pavement rehabilitation treatment that is being specified.

   Do not discuss bridge rehabilitation work, as this is addressed in the Bridge Inspection Report. It is also unnecessary to address signage or lighting requirements.

3. Maintenance of Traffic During Construction. Indicate whether the mainline traffic will be maintained by crossovers or lane closures. Discuss any ramp closures that will occur. Address situations where staging of ramp closures may be required so that adjacent interchanges are not closed simultaneously. Include the approximate duration of each ramp closure and identify the proposed marked detour route. Describe any improvements that will be made to local roads or city streets that will be used as a marked or unmarked detour. Will a formal agreement with local governments be required?

   If the project is located near a large urban or other heavily congested area, discuss any capacity constraints due to lane closures. Include the anticipated delays to the motoring public during peak traffic periods. Provide the approximate length of the queue and discuss user costs. Indicate whether a transportation management plan (TMP) was utilized in developing the traffic control plan (TCP) for the project. Discuss whether A-Plus-B bidding would be beneficial.

The items of discussion specified in this section are most often not required for a rural Interstate-route rehabilitation project, unless ramp closures or long delays are anticipated.

4. Resolution of Field Check Items or Scope Changes. Discuss any items which may have been left unresolved in the field check minutes or attach memoranda which may indicate how field check issues were resolved. Provide a brief, written documentation of any changes from the original project scope.

5. Design Exceptions. If applicable, list any Level One design elements for which a design exception was obtained and give the date of the design exception approval.

6. Attachments. The attachments to the Design Approval packet should include the following:

   a. field check minutes;
   b. pavement design letter; and
   c. cost estimate.

   The Scope/Environmental/Permit Compliance Certification Form should be submitted along with the Final Design Summary at the Design Approval stage.

7-2.04 Transmittal for Design Hearing

See Figure 7-2F, Document Transmittal to Office of Public Hearings and Request for Public Hearing – Cover Memorandum Form.

7-2.05 Attachments

The attachments that should be included with the Design Summary are as follows:

1. Figure 7-3A, Fish and Wildlife Review Memorandum, as described in Section 7-3.0.

2. If a public hearing is held, Figure 7-2G, Certificate of Public Hearing Held, should be attached. If a public hearing is afforded but not held, Figure 7-2H, Certificate of Public Hearing Afforded but Not Held, should be attached.

3. Figure 7-1A, Scope / Environmental Compliance Certification / Permit Application Certification.

Editable versions of all of the attachments listed above may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

7-2.06 Design Approval Process

In order to obtain Design Approval, it is necessary to have met the environmental requirements. The environmental requirements are considered met under any one of the conditions as follows:

1. Environmental Impact Statement is complete and the Record Of Decision (ROD) has been issued;

2. Environmental Assessment is complete and a Finding Of No Significant Impact (FONSI) is made by Federal Highway Administration; or

3. Categorical Exclusion is complete. If there is a line for Federal Highway Administration to sign, it must be so signed.

Once the Design Summary procedure is completed, the design approval packet should be transmitted to the Production Management Division director for approval. See Figure 7-2 I, Design Approval Packet Transmittal – Cover Memorandum form. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

7-3.0 FISH AND WILDLIFE REVIEW

The procedure for conducting a fish and wildlife review is as follows. Once the review is complete, the Environmental Consultation Form should be completed. The form, designated as Summarization Figure 7-3C, should be used for all applicable project types, without regard to the type of environmental documentation. An editable version of the new form is available on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

1. A fish and wildlife review is required for each project that impacts streams shown on USGS quadrangle maps as either solid blue lines or intermittent blue lines, and that includes a structure with a crossing span of 20 ft or greater. Each project that impacts wetlands should also receive a fish and wildlife review.

2. The designer should complete the entire Fish and Wildlife Review memorandum form before it is submitted for review.

3. The Office of Environmental Services' Environmental Policy Team leader will sign the form once he or she finds the content satisfactory.

4. The United States Fish and Wildlife Service's copy of the form should be sent to its Warsaw, IN, office if the project is in one of the counties as follows:

Allen	Lagrange	Porter
DeKalb	Lake	Pulaski
Elkhart	LaPorte	St. Joseph
Fulton	Marshall	Starke
Jasper	Newton	Steuben
Kosciusko	Noble	Whitley

The form for a project in a county not listed above should be sent to the USFWS Bloomington, IN, office.

SCOPE / ENVIRONMENTAL COMPLIANCE CERTIFICATION / PERMIT APPLICATION CERTIFICATION

Route

Des No.

Bridge File:

Project Type:

Project Location:

[Ckeck One:]

☐ Scope Reviewed at Preliminary Plans Submittal. (1)
☐ Environmental Document Reviewed at Hearing Plans Submittal. (1) (2) (3) (4)
☐ Environmental Document Reviewed Upon Design Approval. (1) (2) (3) (4)
☐ All Permit Requirements Have Been Determined and Applications Have Been Made at Final Check Prints Submittal. (1) (2) (3) (4)

[Check Those Appropriate:]

☐ (1) I have reviewed the Scope of Work/Environmental Document. The design is consistent with the Scope of Work and statements made in the Environmental Document.
☐ (2) All mitigation measures stated in the Environmental Document or Permits are incorporated into the plans and specifications.
☐ (3) The Design Summary is accurate and consistent with the Environmental Document and Plans.
☐ (4) The following Permits are required and applications have been made.

Permit	Required		Applied For	
	Yes	No	Yes	No
FAA Tall-Structure Permit	☐	☐	☐	☐
IDEM Section 401 Water Quality Certification	☐	☐	☐	☐
IDNR Construction in a Floodway Permit	☐	☐	☐	☐
IDNR Lake Preservation Act Permit	☐	☐	☐	☐
National Pollutant Discharge Elimination System (NPDES) Permit	☐	☐	☐	☐
Rule 5 Submission [Yes box in Applied For column should be checked only after NOI has been sent.]	☐	☐	☐	☐
U.S. Army Corps of Engineers Levee Permit	☐	☐	☐	☐
U.S. Army Corps of Engineers Section 404 Permit Type: Individual ☐ Regional ☐	☐	☐	☐	☐
U.S. Coast Guard Bridge Permit (Section 9)	☐	☐	☐	☐
U.S. Coast Guard Construction, Dumping and Dredging Permit	☐	☐	☐	☐

Printed Name:

Consultant:

INDOT Reviewer's Initials: _____
Date:

Signature: _____

Date:

PROJECT COMMITMENT DATABASE PROCEDURE
Figure 7-1B

The purpose of the Project Commitments Database is to provide a venue of communication regarding project commitments and their resolution from inception through design and onto construction.

Step 1: Commitment Proposal

A proposed commitment is brought to the attention of the project manager or designer for review.

Step 2: Data Entry

a. Proposed Commitment Due to Legal Requirement. The commitment is entered into the database. An environmental commitment will be entered into the database by a member of the environmental staff, either from the Central Office or the appropriate district. All other commitments will be entered into the database by the project manager or their designee.

b. Proposed Commitment Not Due to Legal Requirement. The terms of the commitment must be discussed with the appropriate parties, including the project manager, to determine if it should be included in the project. If the commitment is determined to be necessary, it is entered into the database.

Step 3: Communication

If a commitment is entered into the database by a person other than the project manager, that person should notify the project manager. The notification must identify the Des number to which the commitment has been added. The project manager should ensure that all affected parties are informed of commitment additions, changes, or deletions.

Step 4: Commitment Status

a. Required or For Consideration. A status of *Required* or *For Consideration* should be selected from a dropdown list in the database spreadsheet. *Required* indicates that the commitment is due to a legal requirement. *For Consideration* indicates that the commitment is desirable, but is not required by law.

b. Implement During Project Development. This indicates whether or not the commitment should be considered during the design process for eventual inclusion in the contract documents. If it is determined that a required commitment will not be implemented, the party that originally proposed the commitment as recorded in the database must be notified.

c. Attention to Construction. The default value for this field is *No*. The field may be changed to *Yes* only by the project manager, if attention to the commitment by construction personnel at the preconstruction conference is warranted.

Once a commitment has been reviewed and it has either been implemented into the design for inclusion in the contract documents or determined to not be applicable, the project manager will either input a summary of the action taken into the Notes/Resolution field, or change the status of the commitment in the database.

Step 5: Periodic Review

The project manager and the designer will review the commitments database at regular intervals. An updated commitments list with current status should be included with ERMS submittals at Stage 1, Preliminary Field Check; Stage 2, Final Field Check; and Stage 3, Final Check Prints and Final Tracings. The commitments should be reviewed by the district Office of Construction's area engineer at all three stages.

The last review of commitments must be made not later than 6 weeks prior to the letting. New commitments may be entered up until that date, but should only be added if they are of an urgent nature since the development of the Contract Information book has already begun. Inclusion of a commitment after RFC requires a revision to the contract and should not be done unless it is vital to the project.

Step 6: Preconstruction Review

A list of all applicable commitments, including information about how each has been addressed in the contract documents, should be provided by the project manager to the area engineer prior to the letting for discussion at the preconstruction conference.

Step 7: Construction Responsibilities

The project engineer or supervisor will maintain a copy of the list of commitments in the field office. The list should be referenced if contract changes are necessary to ensure that such changes consider the commitments. The list should be produced upon request during a quality-assurance review.

PROJECT FILE NAMING CONVENTIONS, Figure 7-1C

Revised 11/19/09 Russ Brittain

ERMS Format (also to be the File Name): **[Submittal] [Description] [Des #] for [Bridge, Roadway, Contract] Services**

Submittal:	Abbr.
Bridge Inspection	BrInsp
Bridge Rehab	BrRehab
Construction Change *	ConstChg
County Drain Permit	CoDrain
Engineer's Report	EngRpt
Environmental	ENV
FAA Navigable Airspace/Tall Structure Permit	FAA
Final Check Prints	FCP
Final Field Check	FFC
Final Hearing	FHRG
Final Pavement Design	FinalPvmtDgn
Final Right-of-Way	FRW
Final Tracings	FT
Fish & Wildlife	FW
Foundation Review (if submitted independently)	FndRvw
Geotechnical	GEO
Grade Review (Road)	GR
Hydraulics	HYD
IDEM 401 Water Quality Permit	401Wtr
IDNR Const. in a Floodway Permit	DNR
IDNR Lake Preservation Act Permit	LakePres
National Pollutant Discharge Elimination System Permit	NPDES
Pavement Design	PvmtDgn
Preliminary Field Check	PFC
Preliminary Hearing	PHRG
Preliminary Right-of-Way	PRW
Railroad	RR
Rule 5 Erosion Control Permit	Rule5
Stage 1	STG1
Stage 2	STG2
Stage 3	STG3
Structure Size & Type (Bridge)	SST
Survey (Also need CD and Hard Copies)	SVY
Traffic	TRAF
US Coast Guard Bridge Permit (Section 9)	CstGdBr
US Coast Guard Const., Dumping, Dredging Permit	CstGdCDD
USACE 404 Permit	404Corps
USACE Levee Permit	LeveeCorps
Utility	UTIL
Woody Revegetation	WdyRvg

* to be uploaded into ERMS 4

Description:	Abbr. Description:
[Previous Submittal] Mark-ups	[Previous Submittal]
10-Week Letter	10WkLtr
Abbreviated Engineer's Report	AbbEngRpt
All Projects Commitments Report	Commit
Asbestos Certification (14-1D)	AsbCert
Asbestos Report	AsbRpt
Bridge Load Rating Memo	LoadRtgMemo
Bridge Search Data Form (59-BSD)	BSDF
Consultant Project Input Form (20-2A)	ConProjInFrm
Contract Preparation Documents Form (14-1C)	ContPrepDoc
Correspondence	Corresp
Cost Estimate	Est
Cross Sections	Xsect
Deeds	Deeds
Design Approval Packet Transmittal Cover Memo (7-2I)	DACover
Design Computations (ALL Comps - includes Geotechnical Criteria Comps, Hydraulic Comps, Inlet Spacing Comps, Intersection Sight Distance Comps, Level 1 Comps,	DgnComps
Draft Design Summary Report (7-2A or 7-2B)	DDSR
Draft Engineer's Report	DraftEngRpt
Draft Environmental Document	DraftEnvDoc
Environmental Review Plans	EnvRvwPlans
Final Design Summary Report (7-2A or 7-2B)	FDSR
Final Engineer's Report	FinalEngRpt
Final Environmental Document	FinalEnvDoc
Form	Frm
Geotechnical Report *	GeoRpt
Geotechnical Review of FCP Form (18-1B)	GeoRvwFrm
Geotechnical Review of FCP Plans	GeoRvwPlans
Geotechnical Waiver	GeoWaiver
Inspection Report	InspRpt
Level 1 Design Criteria Checklist (40-8B)	Lvl1Chk
Level 1 Design Exception Request (40-8C or 40-8D)	Lvl1Exc
Level 2 Design Exception Request	Lvl2Exc
Level 3 Design Exception Request	Lvl3Exc
Limited Review Certification (6-Ltd Cer)	LmtRvwCert
Location Control Route Survey Plat	LCRSP
Pay Item List	PayItmLst
Permit Application (9-4A, B, C, D, E, F(02), F(20), F(29),	PermitApp
Permit Review Plans	PermitRvwPlans
Permits (All permit approvals combined for Final Tracings)	Permits
Pictures	Pics
Plans	Plans
Plans for Load Rating	PlansLR
Plans with Cross Sections (if file too large, separate plans &	PlansXsect
Preliminary Draft Design Summary Report (7-2A or 7-2B)	PDDSR
Proprietary Material Use Justification Form (17-1A)	ProprMtrlFrm
Public Hearing Comments and Resolutions	PubHearCom
Public Hearing Request	PubHearReq
Public Hearing Transcript	PubHearTr
Quality Assurance Form (6-2A)	QAFrm
Quantity Calculations	QtyCalcs
R/W Clear Certification Letter	RWCert
R/W Funding - Land, Improvements & Damages Letter	LIDLtr
Railroad Flagging Contract	RRFlaggingCont
Railroad Special Provisions	RRSP
Relocation Plans (Utility)	RelocPlan
Request	Request
Response to Comments Letter	RespLtr
Schedule	Schedule
Scope/Env/Permit Form (7-1A)	ScoEnvPermitFrm
Scour Report	ScourRpt
Special Provisions (Recurring)	SplProv
Special Provisions (Unique)	UnqSplProv
Special Provisions Menu (Recurring)	SplProvMenu
Special Provisions Menu (Unique)	UnqSplProvMenu
Summary of Design Exceptions	SumDgnExc
Survey Book	SvyBook
Survey Book Checklist (23-2A)	SvyBookChk
Topography	Topo
Transmittal Letter	TransLtr
Utility Coordination Certification (10-2B)	UtilCert
Utility Coordination Waiver (10-2D)	UtilWaiver

* to be uploaded into ERMS 4

Quick Reference - Tracing Checklist Items	
Description:	**Abbr.**
All Project Commitments Report	Commit
Asbestos Certification (14-1D)	AsbCert
Asbestos Report	AsbRpt
Bridge Load Rating Memo	LoadRtgMemo
Bridge Search Data Form (59-BSD)	BSDF
Consultant Project Input Form (05-27)	ConProjInFrm
Contract Preparation Documents Form (14-1C)	ContPrepDoc
Cost Estimate	Est
Final Tracing Checklist	ChkList
Geotechnical Report	GeoRpt
Geotechnical Waiver	GeoWaiver
Permits (All approvals combined for Final Tracings)	Permits
Plans	Plans
Plans with Cross Sections (if file too large, separate	PlansXsect
Proprietary Material Use Justification Form (17-1A)	ProprMtrlFrm
Quantity Calculations	QtyCalcs
R/W Clear Certification Letter	RWCert
Railroad Special Provisions	RRSP
Relocation Plans (Utility)	RelocPlan
Special Provisions (Recurring)	SplProv
Special Provisions (Unique)	UnqSplProv
Special Provisions Menu	SplProvMenu
Special Provisions Menu (Unique)	UnqSplProvMen
Transmittal Letter	TransLtr
Utility Coordination Certification (10-2B)	UtilCert
Utility Coordination Waiver (10-2D)	UtilWaiver

Approved for release in conjunction with Design Change Memo 09-28
Revised by Russ Brittain, Kate Francis Greg Klevitsky

PRELIMINARY DRAFT ☐ DRAFT ☐ FINAL ☐ DESIGN SUMMARY
Road ☐ Bridge or Culvert ☐ Project

Delete all gray-highlighted instructional copy, such as this, from the completed version, which is not pertinent to it.

, 20

Route:
Des. No.:
Project No.:
Structure File:
Over:
County:
Federal Oversight: Yes ☐ No ☐

Location and Project Description

The project is located about of to about of .

The existing roadway consists of driving lanes, each of which is about width. The present highway right-of-way width is about .

Need for Improvement

This road reconstruction project will

Additional discussion in this area should be limited to significant county road relocations, less-than-desirable intersection sight distance, underground storage tanks, channel relocation, clearing of wooded or forested areas, significant historical or archaeological considerations, sidewalks, or design exceptions.

Prior Studies and Considerations

Fish and Wildlife Meeting Held:
Environmental Document Type and Approval Date:
Environmental Document Addendum Type and Approval Date:

Preliminary Field Check Held:
Environmental Permit Required, Date Received

,
,
,
,
,
,
,

The proposed design is consistent with the approved environmental documents.

Design Data

Project Design Criteria:
Functional Classification:
Terrain:
Design Speed:
Posted Speed Limit: mph
Access Control:
Number of Lanes and Width: at
Shoulders Width and Type:
Maximum Right-of-Way Width:
Minimum Right-of-Way Width:

Traffic Data

AADT (20): VPD
AADT (20): VPD
DHV (20): VPH
Comm. Veh.: % DHV
%AADT

Description of Right of Way

☐ The proposed project will not require additional permanent right of way.

☐ The proposed project will require an additional total of of permanent right of way from the properties as follows:

Parcel Property Owner(s) Station Offset

☐ Relocations of businesses or residents will not be required.

☐ Relocations of businesses or residents will be required of the properties as follows:

Parcel Property Owner(s) Station Offset

☐ The proposed project will not require additional temporary right of way.

☐ The proposed project will require an additional total of of temporary right of way from the properties as follows:

Parcel Property Owner(s) Station Offset Reason

Estimated Costs

	Year:	Year*:
Preliminary Engineering:	$	$
Right of Way:		
Construction:		
Total Cost:	$	$

* % annual inflation is used for projection

Maintenance of Traffic During Construction

During construction, traffic will be

☐ maintained by utilizing the existing roadway of .

☐ placed onto an official detour over State-maintained routes, using portions of , and , adding to a through trip. Local routes can be used by local traffic, adding to a through trip. Delay to emergency and public services will be about minutes using the detours. The cost to the public to use the detours will be $, assuming that % use the local detour, or AADT, during a -day detour, and $ / user cost.

Mitigation Measures

The following project-specific mitigation measures are required.

☐ Woody revegetation will be placed in specific areas.

☐ "Do Not Mow or Spray" signs will be posted along the right of way.

☐ "Do Not Spray" signs will be posted along the right of way, since legume seed mixture will be used.

Other Specific Mitigation Measures:

Public Involvement

No views or opinions other than those of the officials of the highway organizations and the affiliated workers have been expressed in this report.

☐ An opportunity for a public hearing will be offered through advertising in local newspapers. All opinions or comments received by the published deadline will be attached to this report.

☐ An opportunity for a public hearing will not be offered through advertising in local newspapers.

☐ A public hearing will be scheduled. All comments received at the public hearing will be attached to this report including their resolutions.

☐ A public hearing will not be scheduled.

Design Engineer

:

Attachments:
☐ Fish and Wildlife Meeting Report
☐ Field Check Report
☐ Public Hearing Transcript
☐ Public Hearing Comments and Resolutions

PRELIMINARY DRAFT ☐ DRAFT ☐ FINAL ☐ DESIGN SUMMARY
Roadway Lighting ☐ Roadway Signs ☐ Signalization ☐ Project

Delete all gray-highlighted instructional copy, such as this, from the completed version, which is not pertinent to it.

, 20

Route:
Des. No.:
Project No.:
County:
Federal Oversight: Yes ☐ No ☐

Location and Project Description

The project is located about of to about of .

The existing roadway consists of driving lanes, each of which is about in width. The present highway right-of-way width is about .

Need for Improvement

This road reconstruction project will

Additional discussion in this area should be limited to less-than-desirable intersection sight distance, sidewalks, or design exceptions.

Prior Studies and Considerations

Environmental Documentation: This project satisfies the requirements of a Categorical Exclusion under the Federal Register of August 28, 1996, Section 717.117(C)8.

Field Check Held:

Public Hearing: This project satisfies the INDOT Public Involvement Procedures for project development approved by the FHWA.

Permits and Agreements: FAA Navigable Airspace Permit –
Railroad –
Utilities –

Description of Right of Way

☐ The proposed project will not require additional permanent right of way.
☐ The proposed project will require an additional total of of permanent right of way from the properties as follows:

Parcel Property Owner(s) Station Offset

☐ Relocations of businesses or residents will not be required.
☐ Relocations of businesses or residents will be required of the properties as follows:

Parcel Property Owner(s) Station Offset

☐ The proposed project will not require additional temporary right of way.
☐ The proposed project will require an additional total of of temporary right of way from the properties as follows:

Parcel	Property Owner(s)	Station	Offset	Reason

Estimated Costs

Preliminary Engineering: $
Right of Way:
Construction:

Total Cost: $

Design Engineer

:

Attachment: Field Check Minutes

PUBLIC HEARING / OPPORTUNITY REQUEST

, 20

MEMORANDUM

TO:
Public Hearings Office Manager
Production Management Division

FROM:
Project Manager

INDOT location or consultant

Route:

Des. No.

Bridge File:

PE Project:

R/W Project:

CN Project:

Location: of

County:

Description:

Transmitted herewith are three sets of Design Hearing Plans, one set of cross sections, and three copies of the Design Summary Report for your use.

Yes ☐ No ☐ Please advertise for an opportunity for a hearing.
Yes ☐ No ☐ Please set up for a hearing.

:

cc: Roadway Services Manager or Structural Services Manager,
or District Design Manager
file

INDIANA DEPARTMENT OF TRANSPORTATION
Driving Indiana's Economic Growth

100 North Senate Avenue
Room N758
Indianapolis, Indiana 46204-2216 (317) 232-5533 FAX: (317) 232-0238

Mitchell E. Daniels, Jr., Governor
Michael W. Reed, Commissioner

Writer's Direct Line

, 20

CERTIFICATION OF PUBLIC HEARING REQUIREMENTS AND
SOCIO-ECONOMIC, ECOLOGICAL, AND ENVIRONMENTAL EVALUATIONS

Route: Des. No.: Project No.:

Project Location: of

Project Description:

The Indiana Department of Transportation hereby certifies that a public hearing relative to the subject project was held at on , in compliance with Title 23, Code of Federal Regulations, Section 771.111(h) entitled "*Early Coordination, Public Involvement and Project Development,*" and the *Indiana Public Involvement / Public Hearing Procedures for Federal-Aid Project Development* approved by the Federal Highway Administration, U.S. Department of Transportation, on July 8, 1997.

The Indiana Department of Transportation further certifies that the economic and social effects of the location, its impact on the environment, and the consistency with the goals and objectives of urban planning, as has been promulgated by the community have been considered.

Signed _____ Signed _____

Public Hearings Office Manager
Local Programs Division

Environmental Services Office Administrator
Production Management Division

INDIANA DEPARTMENT OF TRANSPORTATION
Driving Indiana's Economic Growth

100 North Senate Avenue
Room N758
Indianapolis, Indiana 46204-2216 (317) 232-5533 FAX: (317) 232-0238

Mitchell E. Daniels, Jr., Governor
Michael W. Reed, Commissioner

Writer's Direct Line

, 20

CERTIFICATION OF PUBLIC HEARING REQUIREMENTS AND
SOCIO-ECONOMIC, ECOLOGICAL, AND ENVIRONMENTAL EVALUATIONS

Route: Des. No.: Project No.:

Project Location: of

Project Description:

The Indiana Department of Transportation hereby certifies that an opportunity for a public hearing relative to the subject project has been afforded in compliance with Title 23, Code of Federal Regulations, Section 771.111(h) entitled "*Early Coordination, Public Involvement and Project Development,"* and the *Indiana Public Involvement / Public Hearing Procedures for Federal-Aid Project Development* approved by the Federal Highway Administration, U.S. Department of Transportation, on July 8, 1997. No hearing requests were received by a designated deadline of .

The Indiana Department of Transportation further certifies that the economic and social effects of the location, its impact on the environment, and the consistency with the goals and objectives of urban planning, as has been promulgated by the community have been considered.

Signed _____ Signed _____

Public Hearings Office Manager
Local Programs Division

Environmental Services Office Administrator
Production Management Division

DESIGN-APPROVAL-PACKET TRANSMITTAL

, 20

MEMORANDUM

To:
Deputy Commissioner, Design, Project Management, & Technical Support

Thru:
Director, Highway Design, Bridge

Thru:
Reviewer

Thru:
Project Manager

From:
Designer

Re: Design Approval

Route:
Des. No.:
PE Project No.:
R/W Project No.:
CN Project No.:
Project Location: of
Project Description:

Transmitted herewith is the design approval packet for the above referenced project. All environmental and public hearing requirements have been met.

Design Approval Packet Approved:

Deputy Commissioner, Design, Project Management, & Technical Support
Date:

:

cc:

ENVIRONMENTAL CONSULTATION FORM

To be submitted at Design Stage 3

(1) County: **(2) Route:** **(3) Designation Number:**

(4) Date of Plan Submission:

(5) Funding Source(s): ☐ Federal ☐ State ☐ Local ☐ Private

(6) Project Description:

(7) Need for Improvement:

(8) Right-of-Way Data:
Existing:
Proposed Permanent:
Temporary:
Number of Relocations:

(9) Type of Environmental Document:
☐ Exempt ☐ CE-1 ☐ CE-2 ☐ CE-3 ☐ CE-4 ☐ EA / FONSI ☐ EIS / ROD

Date of Initial Environmental Approval:

Environmental Reevaluation Screening:

(10) Are the scope and impacts still consistent with the approved CE/EA and all subsequent re-evaluations, if any? ☐ Yes ☐ No

(11) What is the approval date of the most recent Additional Information document, if any?

(12) If an Additional Information document was prepared subsequent to the initial environmental approval, were there changes to the environmental commitments? ☐ Yes ☐ No
If Yes, the changes should be addressed in the Project Commitments Database.

Impact Data:

(13) Is the roadway being horizontally realigned? ☐ Yes ☐ No
(14) Number of bridge spans and lengths:
(15) Width of vegetation clearing at corners of structure:
(16) Channel impacts:
(17) Is the channel being relocated? ☐ Yes ☐ No
(18) Wetland impacts:

(19) Is a causeway planned? ☐ Yes ☐ No
(20) Is mitigation expected to be required? ☐ Yes ☐ No

(21) If the type of approval was an EIS / ROD:
Most recent date of an FHWA authorization (final design, right-of-way acquisition):

Have more than three years passed between federal approvals? ☐ Yes ☐ No
If Yes, what were the results of reevaluating the validity of the EIS?

(22) Has the funding been switched from 100% state and/or local, to now include federal participation or need a federal action, such as permit approval? ☐ Yes ☐ No
If Yes, does the current environmental document and approval address all of the applicable federal regulatory requirements? ☐ Yes ☐ No

(23) Public Involvement:
Opportunity for public hearing offered? ☐ Yes ☐ No
Was a public hearing held? ☐ Yes ☐ No
If Yes, public comments are as follows:

(24) Commitments:
A printout from the Project Commitments Database is attached.

(25) Waterway Permit Information:

Permit Type		Required?	Date Obtained	Expiration Date	Incorporated Into Contract?
US Army Corps of Engineers 404 / Section 10	Individual (IP)	☐ Yes ☐ No			☐ Yes ☐ No
	Nationwide (NWP)	☐ Yes ☐ No			☐ Yes ☐ No
	Regional General (RGP)	☐ Yes ☐ No			☐ Yes ☐ No
	Pre-Construction Notification (PCN)	☐ Yes ☐ No			☐ Yes ☐ No
IDEM	Section 401	☐ Yes ☐ No			☐ Yes ☐ No
	Isolated Wetlands Determination	☐ Yes ☐ No			☐ Yes ☐ No
	Wetlands Mitigation required	☐ Yes ☐ No			☐ Yes ☐ No
	Stream Mitigation required	☐ Yes ☐ No			☐ Yes ☐ No
	Rule 5	☐ Yes ☐ No			☐ Yes ☐ No
	Pre-Construction Notification (PCN)	☐ Yes ☐ No			☐ Yes ☐ No
IDNR	Construction in a Floodway	☐ Yes ☐ No			☐ Yes ☐ No
	Lake Preservation	☐ Yes ☐ No			☐ Yes ☐ No
US Coast Guard Section 9 Bridge		☐ Yes ☐ No			☐ Yes ☐ No
Others		☐ Yes ☐ No			☐ Yes ☐ No

INDOT has reviewed the original Environmental Document and all subsequent reevaluations, if any, and hereby finds that the Document remains valid.

(26) Prepared by: _____ Date:
Designer

Approved by: _____ Date:
District ESM / DPD or ES

cc: , IDNR
, USFWS
, IDEM
File

Instructions for Completing the Environmental Consultation Form

1. The county in which the project is located. If the project is located in more than one county, list all counties beginning with the starting terminus of the project.
2. The State, US, or Interstate route, or local road name or number for which the project is programmed.
3. The seven-digit designation number for which the project is programmed.
4. The date of submission for the current set of plans.
5. The type(s) of funding sources for the project. Indicate all applicable types.
6. The facility improvement that is planned at the time of this submittal.
7. The transportation problem which the project is intended to address.
8. The acres or hectares of land to be acquired, including reacquisition of apparent right of way, if necessary. Also indicate the number of relocations anticipated.
9. The specific type of environmental document that was prepared. Indicate only one type.
10. Subsequent to a comparison of the current design plans with the project footprint addressed in the approved environmental documentation, indicate whether or not the project remains as essentially discussed in the approved environmental documentation.
11. If Yes is checked, list all of the environmental-approval dates and reevaluation dates associated with the project. If No is checked, a project reevaluation is required before the completion of this form.
12. Based on the just-completed reevaluation, were there changes required for the environmental commitments? If Yes is checked, address changes on the attached Commitment Summary Form.
13. State whether the roadway is being moved from its existing horizontal alignment.
14. Indicate total length of the bridge and the length of each span, if applicable.
15. Indicate clearing which will be necessary at the corners of the structure. Repeat for multiple structures.
16. List the extent of channel length in linear feet or meters which will be impacted, both upstream and downstream of the structure. Repeat if there are multiple structures.
17. State whether channel relocation will be necessary.
18. Indicate the estimated acres or hectares of impacts to wetlands due to the project work.
19. If it is known that a temporary causeway will be used during construction, it should be indicated here.
20. State whether it is anticipated that mitigation for channel or wetland impacts will be necessary.
21. This is not applicable to an EA / FONSI or CE level project. If three years has passed between Federal approvals for an EIS document, it must be reevaluated to confirm that it is still valid.
22. If a project has been “federalized” by addition of federal funding or approvals (such as permitting or connection to the interstate system), then the project must be reviewed to verify that NEPA has been satisfied.
23. Summarize public involvement activities and results to date.

24. This should include all commitments marked Active at the current time.
25. The information required here is whether a specific type of permit is required for this project, when the permit was obtained, what is the expiration date of the permit is, and whether the stipulations and the requirements of the permit been incorporated into the construction contract. This table is to be completed by the project manager for an INDOT-sponsored project, or the design consultant for an LPA-sponsored project.
26. The form should be completed by the project designer and reviewed by the district scoping manager or Central Office Environmental Services, as appropriate.

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CHAPTER EIGHT

PUBLIC-INVOLVEMENT PROCEDURES

8-1.0 INTRODUCTION

The Department has established a proactive public-involvement process that provides complete information, timely public notice, full public access to key decisions, and supports early and continuing involvement of the public in developing plans and transportation improvement programs.

The goal is to develop a continuous public-involvement process which is accessible to the public and identifies and addresses critical environmental issues early in the project-development process. It also minimizes duplication of public-involvement efforts and meets the needs of the public and resource/regulatory agencies to provide early and continuing input into the project-development process. The following are elements of the public-involvement process which INDOT utilizes to accomplish this goal.

1. MPO Procedures. Each metropolitan planning organization (MPO) develops a public-involvement process to solicit public comments on a comprehensive transportation plan and transportation project within the MPO's area. The MPO will include a discussion of the disposition of comments in their Transportation Plan or Transportation Improvement Program (TIP).

2. INDOT's Regional Process. INDOT's district offices will host annual meetings to seek public comment on the Statewide Transportation Plan and transportation projects programmed in the Indiana Statewide Transportation Improvement Program (INSTIP). These meetings will focus on the planning issues and projects outside MPOs' areas while recognizing the leadership role of the MPOs in conducting comprehensive transportation planning in the State's urbanized areas. The district offices will conduct transportation planning/public involvement meetings to include clusters of communities within that region. These meetings will be held periodically to focus on local-area goals and objectives.

3. Stakeholder Involvement. INDOT will involve stakeholders in the development of policies and strategies for the Statewide Transportation Plan as outlined below.

4. Statewide Transportation Forum. INDOT will conduct regular meetings to seek public comments on the Statewide Transportation Plan from public agencies, Statewide interest groups, stakeholders in the transportation system, and others who are not able to attend the individual MPO or district meetings. INDOT will invite the appropriate MPO to participate and provide a comprehensive overview of the metropolitan transportation plan. The

Statewide Transportation Plan and INSTIP will include a discussion of the disposition of comments from the above meetings.

5. Public Hearing. Once a project-specific environmental document required under the National Environmental Policy Act (NEPA) is approved for circulation, INDOT will offer a formal public hearing, as described in Section 8-8.0, to seek additional public comment. INDOT will include a disposition of these comments in the final approved NEPA document.

6. Design Summary. INDOT develops the design summary to serve as a public-information document, which includes permits, mitigation, design features, right-of-way features, etc., which are decided during final design.

8-2.0 BACKGROUND

The Statewide Planning and Metropolitan Planning Regulations (23 CFR Part 450 and 49 CFR Part 613, October 28, 1993) require that INDOT and the MPOs develop public involvement procedures. These regulations also require that a Major Investment Study (MIS) be accomplished to involve agencies and the public in efforts to define the design concept and scope of major transportation investments.

The regulations involving Air Quality Conformity (40 CFR Part 51, November 24, 1993) and the Management and Monitoring systems (23 CFR Part 500, December 1, 1993) indicate that the planning public-involvement process will serve as the vehicle for public input to air quality conformity determinations and the results of the management systems.

The procedures that also meet the public-involvement requirements are as follows:

1. 23 USC 128;
2. Executive Orders 12898, 11988, and 11990;
3. 36 CFR 800;
4. 49 CFR 622;
5. 33 CFR 115.60; and
6. 33 CFR 325 and 327.

These procedures are consistent with the Council on Environmental Quality's (CEQ) regulations for implementing NEPA (40 CFR, Parts 1500-1508) and FHWA internal operating procedures required by NEPA (23 CFR 771, Environmental Impact and Related Procedures).

8-3.0 MPO PROCEDURES

The Department recognizes the important role that an MPO plays in transportation network planning for an urbanized area. INDOT participates in the cooperative transportation planning process within the MPO's jurisdiction. An effective metropolitan plan must incorporate transportation under both local and State jurisdiction. Therefore, INDOT will rely on the MPO to include public involvement in the development of its comprehensive Transportation Plan and Transportation Improvement Program.

Procedures have been developed by each MPO to provide opportunity for the public to provide input on the MPO Transportation Plan (20-year planning horizon), MPO Transportation Improvement Program (TIP), and Major Investment Studies (MIS), where applicable. INDOT utilizes the MPO public-involvement process as the vehicle for soliciting public comment for an INDOT project within the MPO area. INDOT acknowledges the unique nature of each metropolitan area and has determined that the MPO procedures and the Statewide transportation forum meet the planning public-involvement requirements of 23 CFR 450.316(b) for each transportation project within the MPO area.

The MPO procedures include mechanisms for the public to express its views and to obtain information. The MPO procedures also provide a general approach for involving the public in MIS. Within this framework, the MIS will include the development of public involvement strategies.

The MPO procedures will also detail how the transportation needs of persons and groups who are traditionally underserved by existing transportation systems are identified and addressed per Executive Order 12898 (12/11/94), Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations. For example, an MPO may institute advisory committees to represent transportation-disadvantaged groups and communities such as transit patrons, elderly, handicapped, low income, and minorities.

When substantial written and oral comments are received on the draft Transportation Plan or TIP as a result of the public-involvement process or the interagency consultation process required by the conformity regulations, a summary, analysis, and report on the disposition of comments should be made part of the draft Transportation Plan and TIP. INDOT and the MPO will respond to comments and questions and include the responses in the final Transportation Plan and TIP.

INDOT and the MPO will coordinate the MPO plan and Statewide Transportation Plan through the cooperative transportation-planning process that INDOT and the MPO conduct. INDOT's participation in the MPO planning process ensures that Statewide issues are considered in the MPO planning process. INDOT will summarize and include the individual MPO transportation plan in the Statewide Transportation Plan.

8-4.0 INDOT REGIONAL PROCESS

INDOT recognizes that the district offices serve a critical role in identifying transportation needs within their respective areas. Local public officials and the public at-large will identify transportation needs through both formal requests for projects and informal telephone requests for maintenance. The results of the management systems are also considered in identifying metropolitan and Statewide transportation needs.

The district office's design staff will participate in the MPO public-involvement process to cooperatively identify INDOT transportation projects within the MPO area for inclusion in the metropolitan Transportation Plan and TIP. The district office should continue to utilize the various public-involvement mechanisms unique to its district to identify transportation needs.

To invite broader participation in the identification of transportation needs focusing on an area outside the MPO planning area, each INDOT district will conduct a transportation-planning and public-involvement process to identify transportation needs.

The district office, in cooperation with the Office of Environmental Services, conducts transportation planning meetings to include clusters of communities within that region and provide the opportunity for public involvement. These meetings will be conducted periodically within the district to better respond to local transportation needs and address community goals and objectives.

INDOT will provide notice in the local news media before a public meeting. The district office should utilize other communication techniques to encourage broad public participation (e.g., transportation fairs, telephone hot-lines, focus groups, surveys). The notice should include the meeting date, location, and information available for public review and comment. The district office will provide reasonable public access to technical and policy information used in the development of the Statewide Transportation Plan and INSTIP.

A comprehensive mailing list to notify the public and transportation stakeholders of planning and programming meetings will be maintained by the Central Office and the district offices for district meetings (see Section 8-6.0).

The district office will consider and respond to all issues identified through written and oral comments. This summary, analysis, and report on the disposition of comments should be made part of the final submittal to the Central Office listing the district's proposed projects for inclusion in the INSTIP.

Information on other public involvement methods is also available. Methods include direct participatory techniques such as workshops, on-site tours, brainstorming sessions, task forces, or advisory committees, agency hot-lines, surveys, and project-site information centers. Indirect participatory techniques may include newsletters, pamphlets, brochures, posters, information kits, and current mailing lists. The mass media may be used to inform the public.

The Local Programs Division's Office of Public Hearings is available to assist each district office by providing guidance on innovative public-involvement techniques and meeting formats that maximize meaningful public input. The Office of Public Hearings will also identify successful techniques being utilized by the district office and communicate those techniques to the other district offices.

8-5.0 STAKEHOLDER INVOLVEMENT

INDOT will seek to involve transportation stakeholders in the development of policies and strategies for the Statewide Transportation Plan. Such efforts will focus on specific transportation issues and will strive to include various interested parties including intermodal transportation representatives, environmental organizations, academic advisors, economic development interests and representatives of other State agencies. INDOT may form advisory committees as appropriate.

8-6.0 STATEWIDE TRANSPORTATION FORUM

The Office of Public Hearings will maintain a list of stakeholders in the transportation system including public agencies, representatives of transportation agency employees, private providers of transportation, organizations representing the traditionally underserved and other interested parties and segments of the community affected by transportation plans, programs and projects. The Office of Public Hearings will annually distribute a notice listing the various INDOT and MPO public involvement opportunities. The notice will include all available meeting dates and locations and addresses for submittal of written comments. The Office of Public Hearings will also provide reasonable public access to the technical and policy information used in the development of the plan, INSTIP, draft MPO and district materials.

INDOT and the MPO will conduct regular meetings to seek involvement by the stakeholders in the transportation system, and invite public agencies, Statewide interest groups, or others who were not able to attend the individual MPO and district meetings. INDOT will make a presentation outlining the transportation planning process and the major initiatives evolving from the planning process. The presentation may also briefly outline the air quality conformity process and how the results of the management systems are considered in developing metropolitan and Statewide transportation plans and improvement programs.

The meeting format will allow full participation by the general public and stakeholders in the State's transportation system. Three ways to comment are as follows:

1. public statements before an audience of concerned citizens;
2. verbal comments to a court recorder which can be transcribed verbatim; or
3. comments submitted in writing at the meeting, by mail or via the Internet.

The format will consist of INDOT, in cooperation with the MPO, presenting the Statewide plan, if applicable. In a nearby room, handouts and displays will explain the Statewide and local transportation plans. A public-statement session will be held at an appropriate time during the meeting. All groups and individuals wishing to make public statements will have an opportunity to speak.

Written and oral comments will be collected at the Statewide Transportation Forum. A discussion of the disposition of comments from the district-office process, Statewide Transportation Forum, and those received by mail will be included each year in the final INSTIP and the Statewide Transportation Plan, if applicable.

Copies of the final INSTIP and Statewide Transportation Plan, where applicable, will be distributed to the district office and MPO. The respective district and MPO will publish the availability of the INSTIP (and Transportation Plan where applicable) and provide copies for review in convenient locations. INDOT will provide copies of the INSTIP (and Transportation Plan where applicable) to public agencies and interested groups.

8-7.0 AMENDMENTS TO THE TIPS AND INSTIP

Public involvement for amendments involving significant projects to the INSTIP or a TIP will be facilitated by the MPO or district office in which the amendment occurs. A notice will be published by the MPO in local news media informing the public of proposed changes within urbanized areas. A notice will be published by the district in local news media for informing the public of proposed significant changes outside urbanized areas.

A comment period should be established allowing time for interested parties to comment on the proposed amendments. A discussion of the disposition of comments will be included with the transmittal of the amendment to the FHWA/Federal Transit Administration (FTA) requesting approval.

Examples of revisions which are not sufficiently significant to require additional opportunity for public comment include minor changes in project scope/cost and moving minor or noncontroversial projects among the first three years of the INSTIP/TIP.

8-8.0 PUBLIC INVOLVEMENT DURING PROJECT DEVELOPMENT

8-8.01 Early and Continuing Opportunities for Public Involvement

Each transportation project will have a program of early and continuing public involvement coordinated with the stages of the NEPA process and building on public involvement conducted as

part of INDOT's or the MPO's transportation planning and programming process. Early and continuing public involvement may be conducted through many different public involvement techniques. Public meetings are only one element of a well-rounded involvement program. Transportation projects vary in scope, complexity, and level of public interest in a given project. A project may require a public hearing or an opportunity for a public hearing, as described in Section 8-8.02. For a complex project, additional involvement activities before the public hearing are appropriate. For a simple project with a low level of public interest, public notice through the transportation programming process may suffice.

The Office of Public Hearings in cooperation with the Office of Environmental Services, conducts public information meetings on an as-needed basis to seek public input to assist in defining the scope of a proposed project. INDOT normally conducts these public informational meetings before it prepares the environmental document.

The Office of Public Hearings provides guidance on innovative public involvement techniques and meeting formats to maximize meaningful public input on such topics as gathering information on social impacts or locally known environmental resources (e.g., unmarked graves, long-abandoned underground storage tanks).

Although separate location and design public hearings are no longer required and all references to design approval have been deleted from the regulations, there are instances where additional meetings may be desirable. Where there are several practical location alternatives, preliminary public informational meetings may be appropriate.

Once additional design details are available, an informational meeting may be held to acquaint the public with specific design considerations for the project. This enables involved property owners to learn how the proposed project may affect abutting property.

The MPO public involvement procedures establish the general approach for involving the public in Major Investment Studies (MIS).

8-8.02 Public-Hearing Requirements

The INDOT and MPO procedures for seeking and addressing public comments in the development of transportation plans and improvement programs will provide early and continuing opportunities for public involvement. The public hearing is an opportunity for the public to make formal statements of position immediately before project decision-making and preparation of the final environmental document. INDOT views the hearing as a specific, observable, administrative benchmark for public involvement. Public meetings, as needed during the development of the NEPA document, provide additional opportunities for early and continuing public involvement.

The Office of Public Hearings will conduct one or more public hearings or provide the opportunity for public hearing at a convenient time and place for a Federal-aid project on a State-maintained route if a project meets one of the criteria as follows:

1. The proposal requires more than 0.5 ac of permanent right of way.

2. The proposal substantially changes the layout or function of connecting roadways or of the facility being improved.

3. The proposal may have substantial adverse impact on abutting property.

4. The proposal may have a significant social, economic, environmental, or other effect.

5. The proposal is determined by FHWA, in consultation with INDOT, to warrant a public hearing in the public's interest.

6. The proposal involves impacts to resources in or eligible for inclusion in the National Register of Historic Places, wetland impacts, and/or significant floodplain encroachments.

Under the supervision of the Office of Public Hearings, public hearings will be conducted for a local-agency project by the local authority or its agent(s) if it meets one or more of the criteria listed above.

Public hearings will be held for each transportation project which involves the development of an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA). The disposition of both oral and written comments will be included in the final approved NEPA document which constitutes FHWA location approval.

A transportation project that does not individually or cumulatively have a significant environmental effect is categorically excluded from the requirement for a NEPA document (EIS or EA). The public-involvement requirements for a Categorical Exclusion (CE) project can be satisfied either by holding a public hearing or by INDOT publishing notices offering the opportunity for a public hearing. Based on the re-evaluation of project environmental documents required by 23 CFR 771.129, FHWA, in cooperation with INDOT, will determine whether changes in the project or new information warrant additional public involvement.

INDOT will publish notices in local media. For a local-agency project, local authorities will publish such notices in accordance with I.C. 5-3-1-4. The procedure for requesting a public hearing should be explained in the notice. In addition, the notice should indicate the availability of the appropriate environmental document and should explain where appropriate project materials may be reviewed. Further, the notice shall advise of significant floodplain encroachments and whether a practicable alternative exists for the use of impacted wetland and historic resources. The deadline for submission of a request for a public hearing should be clearly stated. If no response is received on

the notice by the stated deadline, the Office of Public Hearings will certify that the public involvement requirements have been satisfied and document the files accordingly. INDOT should forward a copy of each certification to FHWA for information.

If a limited number of requests are received in response to a notice offering the opportunity for a public hearing, appropriate INDOT representatives may meet individually with those who responded to determine their involvement and concerns. The Office of Public Hearings will certify that the public-involvement requirements have been satisfied and will note the certification in the project files.

A project-limits resident may request a public hearing be held if a substantial and significant social, economic, or environmental interest in the matter is perceived. If a resident identifies no significant interest and INDOT determines that it is not in the public interest to hold such a meeting, the Office of Public Hearings will prepare a report to serve as documentation for the certification that the public-involvement requirements have been satisfied.

8-8.03 Hardship and Protective Buying of Right of Way

Federal regulation 23 CFR 771.117(d)(12) provides for the acquisition of land for hardship or protective purposes for a particular parcel or a limited number of parcels. Where the imminent development of land would preclude further transportation use, protective acquisition is permitted. Advance acquisition is permitted only where the acquisition will not limit the evaluation of alternatives which may be required in the NEPA process. The Office of Public Hearings will assure that all property owners are contacted, made aware of INDOT's reasons for early acquisition of their property, and informed of the availability of the Categorical Exclusion environmental document concerning the proposed right-of-way acquisition. Property acquisition may proceed once the Office of Public Hearings certifies that the contacts have been completed, thereby satisfying the public-involvement requirement.

If the governor or other appropriate official declares an emergency and INDOT deems it to be in the overall public interest for a specific project, INDOT can recommend to FHWA that alternative procedures for public involvement be followed or that certain requirements be waived. Written concurrence must be obtained from FHWA for such alternative procedures or waiver of certain steps.

8-8.04 Public Notices

Once the documentation for a categorical exclusion (where applicable) has been approved by INDOT, or FHWA has approved an EA for circulation, INDOT will publish a Public Notice of Planned Improvement in accordance with I.C. 5-3-4-1, offering the opportunity for interested individuals to request a hearing. Should a hearing result or the documentation for a draft EIS is

approved for circulation, INDOT will publish a Notice of Public Hearing in accordance with I.C. 5-3-4-1. INDOT will also achieve public-involvement goals in the appropriate minority and foreign-language communities where a project is proposed in accordance with the Civil Rights Act of 1964 and the Civil Rights Restoration Act of 1987 by publishing legal notices in the appropriate community media and language.

INDOT will publish this notice at least 15 days in advance of the public hearing. The *Federal Register* DEIS notice of availability should establish a period of not less than 45 days to return comments on the DEIS. Regulations require that interested parties submit EA comments within 30 days of the notice of the availability of the EA. FHWA recommends that two notices be made for an EIS project: an initial, minimum 15-day notice, with a second notice 5 to 12 days in advance of the hearing.

In addition to formal notices of the hearing, copies of the notice or a press release may be distributed to appropriate news media and local, State, or Federal governmental agencies that are affected or involved in the project or program. Copies will also be mailed to any agency, local public official, public advisory group, or individuals who have requested notice of hearings and to other groups or agencies who are on the current INDOT mailing list.

Each notice of a public hearing shall specify the date, time, and place of the hearing or meeting, and should include a general description of the proposal. The notice should specify that location maps and other pertinent information, including the appropriate environmental document developed for the proposal, will be available for public review. The notice should also provide information required to comply with public involvement requirements of other laws, Executive Orders, or regulations, as follows.

1. Per the Clean Water Act, the notice will indicate the availability, where applicable, of the Section 404 Permit application and reference the U.S. Army Corps of Engineers Public Notice seeking comments on the application.

2. Where historic properties are involved (i.e., buildings, structures, or sites including archeological sites, or objects that are listed in or eligible for listing in the National Register of Historic Places), the notice will indicate as follows: *Per the National Historic Preservation Act, the views of the public are being sought regarding the effect of the proposed project on [list specified properties involved]*.

3. Per Executive Order 11990, Protection of Wetlands, and Executive Order 11998, Floodplain Management, the notice should seek public comment on wetland impacts and floodplain encroachments where applicable.

INDOT maintains a current mailing list upon which any Federal or State agency, local public official, public advisory group, or any other interested committee or persons may enroll to request all legal

notices issued by the Office of Public Hearings. Any agency, official, group, or citizen desiring to receive such notices must submit a written request to the following:

INDOT Local Programs Division
Office of Public Hearings
Room N848
Indiana Government Center North
100 North Senate Avenue
Indianapolis, Indiana 46204-2249

8-8.05 Conducting the Hearing

The Office of Public Hearings will hold a public hearing at a place and time generally convenient for persons affected by or interested in the proposed undertaking and in a facility that is accessible to the handicapped. The Office of Public Hearings will also be responsible for assuring that all public-involvement requirements listed below are satisfied. The identical procedures will be observed by the local entity or its agent(s) when conducting public-involvement procedures for a local-agency project.

Representatives of INDOT, the MPO, and the local authority or its agent(s), when appropriate, will explain the information as follows:

1. the project's purpose, need, and consistency with the goals and objectives of any local urban planning;

2. the project's alternatives and major design features;

3. the social, economic, environmental, and other impacts of the project;

4. the relocation-assistance program and the right-of-way acquisition process; and

5. INDOT's procedures for receiving both oral and written statements from the public.

INDOT will ensure that engineers, planners, or other qualified personnel are present to explain the proposal and answer questions which may arise.

At the public hearing it should be announced, or otherwise explained, that at any time after the hearing and before final approval is obtained, information developed relating to the proposed undertaking will be available upon request during normal working hours for public inspection and copying. If the proposal requires the acquisition of property, INDOT's right-of-way procedures,

including the relocation-assistance program (if applicable), will be explained. The availability of the appropriate environmental document will be announced at the public hearing.

INDOT is committed to providing a public-hearing format that allows full participation by the public. This format will permit the public to comment on the project in any of the methods as follows:

1. public statements before an audience of concerned citizens,
2. verbal comments to a tape recorder which can be transcribed verbatim, or
3. written comments provided in person, by mail, or via the Internet.

8-8.06 Section 106 Consultation Under the Historic Preservation Act

Once the views of interested persons have been considered and documented, the finding of no adverse effect or the Memorandum of Agreement can be forwarded to FHWA for approval. The INDOT transmittal letter should document the means employed to solicit public comment, summarize the views of interested persons, and discuss the resolution of any outstanding issues. Once the Section 106 process is completed, FHWA can process the 4(f) Programmatic Agreement where applicable and conclude the NEPA approval process.

8-8.07 Public-Hearing Transcript

A transcript of the verbal and written statements from the public involvement phase should be made. The future availability of the transcript should be announced at the public hearing or by news release subsequent to its completion and distribution. In addition, copies will be provided to individuals who request such copies as provided for in the INDOT policy concerning public disclosure. INDOT should submit to FHWA a copy of each public-hearing transcript and a certification that a required hearing or hearing opportunity was offered. The transcript will be accompanied by copies of all written statements from the public, both submitted at the public hearing and during an announced period after the hearing.

***** PRACTICE POINTER *****

With respect to resolution of hearing comments, it is not considered responsive to reply with statements such as, “It is not part of the scope,” or, “It will be looked into.” An explanation must be given.

Explicit consideration and response to both oral and written comments will be included in the Final Environmental Impact Statement (FEIS). If no significant impacts are identified, INDOT should

furnish FHWA a copy of the revised EA as appropriate; the public hearing transcript, where applicable; copies of any comments received and responses thereto; and recommend a Finding-Of-No-Significant-Impact (FONSI). If a project is located in an MPO area, the MPO will be given the opportunity to review and make additions to responses. The MPO will provide expertise and assistance in addressing metropolitan-planning and community-development issues. Therefore, the public-hearing responses will constitute joint INDOT-MPO comments. Once the FHWA has granted final location approval by issuing the FEIS, Record of Decision, or FONSI, the project may be advanced to final design, right-of-way acquisition, and construction.

8-9.0 DESIGN SUMMARY

A Design Summary is required for each project for which a public hearing or the opportunity for a public hearing is offered. Although the Design Summary is not required by regulation, INDOT has developed this public-information document to provide a complete description of the proposed project and transcript of the public hearing or certification of hearing requirements. This document will also permit closure of unresolved issues at the time of FHWA approval of the FEIS/Record of Decision (ROD), EA/FONSI, or FHWA determination that the project is categorically excluded (CE) from the requirement to prepare a NEPA document.

The Design Summary includes findings on permit, mitigation, design, and right-of-way issues. The Design Summary also serves to respond to issues raised by written and oral comments on a project which is categorically excluded by FHWA from the requirement to prepare a NEPA document.

Copies of the Design Summary will be made available to interested parties upon request as provided for in the INDOT policy concerning public disclosure. FHWA will be supplied a copy of the Design Summary for each project located on the National Highway System.

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CHAPTER NINE

PERMITS/CERTIFICATIONS

9-1.0 GENERAL

9-1.01 Introduction

Many construction activities performed by the Indiana Department of Transportation impact the environment, navigation, public land, or private land. Depending upon the nature of the impact, the activity may require the Department to obtain a permit, certification, approval, etc., during the design phase of a project. Personnel involved in project development should be aware of the requirements for these permits/certifications so that they can ensure that all necessary authorizations and clearances are obtained. The need to receive one or more permits/certifications can significantly affect the project schedule.

This Chapter briefly documents the basic information related to Federal and State permits/ certifications which may be required for a project. The Chapter is subdivided as follows:

1. Section 9-2.0 discusses those permits/certifications which are commonly required;

2. Section 9-3.0 discusses those permits/certifications which are only required for special circumstances; and

3. Section 9-4.0 references permit applications and other information to assist the designer.

The Chapter user should be aware that considerable research is needed to identify all relevant information for each permit or certification (e.g., warrants, procedures, applications). The user must contact the applicable government agencies to determine the permit/certification procedures.

9-1.02 Timing of Permit Application Submittal

The designer is responsible for placing known information on each permit's application form. The designer then submits it in a timely manner to the Production Management Division's permits coordinator, who then completes the application with the remaining required information. The permits coordinator then transmits the completed application to the permitting agency with timeliness such that the permit is received before the Ready for Letting (RFL) date.

The timing of permit application for the most common types of permits is shown in Figure 9-1A.

Any wetlands-mitigation requirements should be coordinated with the appropriate permitting agency and the Office of Environmental Services's Environmental Policy Team prior to when the permit application is transmitted to the agency. The delineation of the impacted wetlands, the proposed mitigation plan, and the wetlands-monitoring plan must all be included with the permit application.

The permits coordinator will return a permit application to the project manager if there is no project-manager transmittal memorandum attached.

The designer should track the status of permit expiration dates to ensure that valid permits will be available for the current project construction schedule. All regulated areas including wetlands and streams must be delineated on the plans.

9-1.03 Submittal of Approved Permits with Final Contract Documents

The designer must submit copies of all permits when the final special provisions are submitted at the Final Tracings stage. The copies should be single-sided. Furnishing duplex copies has occasionally resulted in missing pages appearing in the contract document.

If the final special provisions are turned in before all of the approved permits are available, it is the designer's responsibility to ensure that copies are furnished to the Contract Administration Division's Office of Contracting after the approved permits are received.

Each permit should be read and appropriate action should be taken to make the plans, specifications, and estimate consistent with the permit conditions. For example, special provisions and a pay item for erosion control blankets should be included where required by a permit.

Revisions are often made to the erosion control plans and summary tables after final tracings are submitted. It is the designer's responsibility to initiate plan and contract revisions for all changes that arise during the Rule 5 Submission approval process. Plan revisions and construction changes must be processed in accordance with Sections 14-1.02(04) and 14-1.02(05), respectively.

If a condition is not in a permit, it is not required even if it is listed in the environmental document or the Fish and Wildlife Review. The exception to this is that all conditions with respect to the Endangered Species Act are required (for example, the tree cutting restriction for the Indiana bat).

This procedure does not apply to woody-revegetation requirements which are provided as determined by the Production Management Division's landscape architect.

9-1.04 Delivery of Permits to Project Site

Permits will be given to the designer by the Production Management Division's permits coordinator. For those permits which are to be publicly displayed on the project site, the designer will be responsible for delivering such permits to the project personnel in a timely manner, generally at the preconstruction conference.

9-2.0 COMMON PERMITS OR CERTIFICATIONS

9-2.01 Introduction

1. Section 404 Department of the Army Corps of Engineers Permit. This permit is obtained from the Corps of Engineers for the discharge of dredge or fill material into Waters of the United States, including adjacent wetlands. Waters of the United States are defined in Section 9-2.02(07). Each Corps district has its own procedures and permit requirements.

2. Section 401 Water Quality Certification. This certification is obtained from the Indiana Department of Environmental Management (IDEM). A Section 401 Certification is required if a Section 404 Permit is required.

3. IDNR Certification of Approval for Construction in a Floodway. This certification is obtained from the Indiana Department of Natural Resources, Division of Water. This approval is required for an urban stream with a drainage area equal to or greater than 1 sq mi or a rural stream with a drainage area equal to or greater than 50 sq mi.

4. Rule 5 Submission. The Indiana Department of Environmental Management is the responsible agency for Rule 5 compliance. IDNR, acting as IDEM's agent, coordinates the review and acceptance of each erosion control plan through the appropriate soil and water conservation district (S&WCD). Once the S&WCD representative has determined that an erosion control plan meets the acceptance criteria, a Notice of Intent (NOI) is sent to IDEM.

9-2.02 Section 404 Department of the Army Corps of Engineers Permit

9-2.02(01) Name

The formal name is a Section 404 Department of the Army Corps of Engineers Permit. The informal name is Corps Permit.

9-2.02(02) Responsible Federal Agency

United States Army Corps of Engineers (Louisville or Detroit district) is the Federal agency with overall responsibility for administering the program, reviewing each permit application and issuing the permit.

The Corps only regularly issues Regional General Permits and Individual Permits.

9-2.02(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator all completed application forms and required sketches showing the location, nature and quantity of the fill into Waters of the United States. These sketches should be in accordance with the permit-application instructions and should include a location map.

9-2.02(04) Legal References

The legal references are as follows:

1. Section 404 of the Federal Water Pollution Control Act (1972), as amended by the Clean Water Act (1977 & 1987): 33 USC 1251-1376, DOT Order 5660.1A;

2. 23 CFR 330, 23 CFR 650, Subpart B, 771;

3. 33 CFR 209, 320-323, 325, 328, 329; and

4. 40 CFR 121-125, 129-131, 133, 135-136, 230-231.

9-2.02(05) Purpose

The purpose of Section 404 is to restore and maintain the chemical, physical, and biological integrity of the Waters of the United States through the prevention, reduction and, elimination of pollution.

9-2.02(06) Applicability

A Corps Permit is required for any discharge of dredged or fill material (e.g., concrete, riprap, earth fill, excavation) into the Waters of the United States, including wetlands. See Section 9-2.02(07) for a definition of Waters of the United States.

Figure 9-4A, U.S. Army Corps of Engineers Section 404 Permit and Levee Work Permit Application, is accessible from the Department's website at www.in.gov/dot/div/contracts/design/dmforms/ as a link to the permitting agency's website for application and instructions.

9-2.02(07) Definitions

The following definitions are applicable.

1. Headwaters of the United States. A river, stream, or its lake or impoundment, including adjacent wetlands, which are part of a surface tributary system of a navigable Waterway of the United States, upstream of that point on such river or stream at which the average flow rate is less than 5 ft^3/s.

2. Ordinary High Water (OHW). The line showing on the shore which is established by fluctuations of water and is indicated by physical characteristics such as clear, natural lines impressed on the waterway bank, shelving, changes in the character of the soil, destruction of terrestrial plants, the presence of litter or debris, or other appropriate means that consider the characteristics of the surrounding area. Ordinary High Water (OHW) is different from Average High Water.

3. Special Aquatic Sites. Mudflats, refuges, riffle and pool complexes, sanctuaries, vegetated shallows, and wetlands.

4. Waters of the United States. In general, for identification, the Waters of the United States includes all jurisdictional wetlands and areas within a blue solid line or a blue dash line on a USGS quadrangle map. Each river, stream, creek, intermittent tributary, pond, impoundment, lake. or wetland is considered part of the Waters of the United States.

5. Jurisdictional Wetland. Bog, marsh, slough, or swamp are other terms used to describe this type of area. A floodplain, or area where water stands on, at or near the groundline may be considered a suspected jurisdictional wetland. A riverine wetland is not a part of a jurisdictional wetland. Guidelines as established by the U.S. Army Corps of Engineers indicate that a jurisdictional wetland must have all of the characteristics as follows:

    a preponderance of water-tolerant plants;

    b. hydric soils; and

c. water on, at, or near the surface of the ground during a specified portion of the growing season.

9-2.02(08) Individual Permit

An Individual Coprs Permit application is required for each project that does not qualify for a Regional General Permit. Where 1 ac or more of jurisdictional wetland or Waters of the United States are impacted, an Individual Permit is required. If the wetland area impacted is greater than 0.1 ac but less than 1 ac, the project will generally qualify for a Regional General Permit. However, the Individual Permit application form must be filed with the Corps of Engineers for an impact of 1 ac or more.

The permit application packet should include 8" x 11" sketches of all impacts to Waters of the United States, such as a bridge-crossing location or jurisdictional-wetland impact locations. Each bridge-location sketch requires a plan and elevation view. Each wetland impact sketch must show a plan view and a cross section through the fill area. The wetland area to be filled should be indicated on the sketch.

The level of detail required in the permit-application sketches is as follows:

1. Vicinity Map (taken from USGS quad map)
   a. location of activity
   b. name of waterbody
   c. route numbers or names of all roads
   d. north arrow
   e. scale

2. Plan View Sketch
   a. name of waterbody
   a. route numbers or names and all roads
   b. hatched area showing the limits of fill replacement
   c. location of each wetland
   d. north arrow
   e. scale

3. Elevation view (or typical cross section)
   a. OHW elevation
   b. other water elevations
   c. riprap
   d. other fill material

For a major road project that is expected to require an Individual Corps Permit, the Corps of Engineers has deemed it necessary to include a sketch showing the plan view and a longitudinal cross section of each culvert of 36 in. diameter or greater that appears in a naturally-occurring waterway. An overall project map should be included to show the location of each such culvert and the location of each wetland impact. For this situation the Corps of Engineers interprets the definition of Waters of the United States to include all naturally-occurring draws.

The permit application should include the quantities of the various fill materials segregated to show both the total volume and volume to be placed below the ordinary high water elevation. The total area of the fill material placed below ordinary high water should also be provided. The wetland-mitigation plan should include a wetland-delineation report and a wetland-monitoring plan.

The designer must review constructability issues where a work causeway or a cofferdam will be required. Construction activities such as bridge pier construction, sewer outfall into a waterway, or earth hauling across a waterway may all require temporary filling of the Waters of the United States. The designer must submit a detailed sketch of each temporary causeways, etc., which must be included with the application. The designer should think through the project construction sequence, so that all construction activities which impact the Waters of the United States will be included in the permit application.

A project that includes both road and bridge construction should have one combined Corps Permit application. Multiple projects in the same contiguous section of roadway should also be submitted in one combined application.

9-2.02(09) Regional General Permit (RGP)

For Section 404 application where an Individual Permit is not required, a Regional General Permit (RGP) will instead be. This permit applies where the Corps has determined the proposed work to have individual and cumulative impacts on Waters of the United States of less than 1 ac. The details and specific applicability criteria of an RGP are described in Figure 9-4A. A project that impacts greater than 0.1 ac and less than 1 ac of wetland, or impacts less than 1 ac of Waters of the United States below the ordinary high water line may be eligible for a RGP. Minor channel shaping at a structure inlet or outlet is not considered channel relocation.

An RGP application should be made for each project that appears to qualify for a RGP. If a project fits the criteria described above and if the wetland or Waters of the United States area being affected is greater than 0.1 ac and less than 1 ac, the IDEM Form #48598 (February 2000) [a.k.a., IDEM long form] must be completed and submitted to the permits coordinator. This form will suffice for submittal to the Corps as the RGP application, the IDEM for the Section 401 Water Quality Certification, and the IDNR as the notice related to 401 and 404 / RGP applications. This form does

not replace the IDNR Construction in a Floodway Permit application. If a project fits the criteria described above and if the wetland area being affected is 0.1 ac or less, the IDEM short form in lieu of Form #48598 (February 2000) should be used. It must be completed and submitted to the permits coordinator. This form will also suffice for submittal to the Corps as the RGP application, the IDEM as the Section 401 Water Quality Certification, and the IDNR as their notice related to 401 and 404 / RGP matters. The short form does not replace the IDNR Construction in a Floodway Permit application. The appropriate form will also serve as the preconstruction notification.

Once an RGP is designated or implied, the designer should prepare a memorandum to the project file stating that the project qualifies for a RGP in that [each eligibility criterion for the RGP should be listed and the level of adherence to that criterion noted]. In addition, the RGP application form with an accompanying 8.5" x 11" copy of the USGS 7.5-min series map should be submitted to the permits coordinator. Also, any wetland-mitigation plan package may be a required supporting document if wetland mitigation is necessary. This single packet will serve as an application/notice to the Army Corps of Engineers, IDEM, and IDNR, but not as an IDNR Construction in a Floodway Permit application. Acknowledgment from the Army Corps of Engineers will be received in either situation. An acknowledgment from IDEM will be received if the long form is used. No acknowledgment from IDEM is anticipated if the short form is used. No response from IDNR is anticipated with respect to 401 or 404 / RGP matters.

9-2.02(10) Nationwide Permit

The Corps will occasionally issue a Nationwide Permit, but only under its discretion, in lieu of a Regional General Permit. The designer should not propose an application specifically for a Nationwide Permit.

9-2.03 Section 401 Water Quality Certification

9-2.03(01) Name

The formal name is IDEM Section 401 Water Quality Certification. The informal name is Section 401.

9-2.03(02) Responsible Federal and State Agencies

The United States Environmental Protection Agency, through the Indiana Department of Environmental Management (IDEM), is the agency with overall responsibility for administering the program, reviewing applications, and issuing approvals.

9-2.03(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator all completed application forms and required sketches showing the location of the impact, nature, and quantity of the fill and excavation in the Waters of the United States. A project vicinity map is also required.

9-2.03(04) Legal References

The legal references are as follows:

1. Federal Water Pollution Control Act of 1972, Section 401, as amended by the Clean Water Acts of 1977 and 1987;

2. 33 USC 1251-1376, DOT Order 5660.1A;

3. 23 CFR 650, Subpart B, 771;

4. 33 CFR 209, 320-323, 325, 328, 329;

5. 40 CFR 121-125, 129-131, 133, 135-136, 230-231.; and

6. 329 IAC 10.

9-2.03(05) Purpose

The purpose is to restore and maintain chemical, physical, and biological integrity of the Waters of the United States through prevention, reduction, and elimination of pollution.

9-2.03(06) Applicability

This certification is required in conjunction with each Individual or Regional Corps Permit. For information on the Section 401 Water Quality Certification for a Regional General Permit, see Section 9-2.02(10).

Figure 9-4B, IDEM Water Quality Section 401 Permit Application, is accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/, as a link to the permitting agency's website for application and instructions. In block No. 4 it should be indicated if a

temporary runaround will be used, and, if appropriate, the possibility of the use of a cofferdam or work causeway.

9-2.04 IDNR Certification of Approval for Construction in a Floodway

9-2.04(01) Name

The formal name is IDNR Certification of Approval for Construction in a Floodway. The informal name is the DNR permit.

9-2.04(02) Responsible State Agency

The IDNR Division of Water is the state agency with overall responsibility for administering the program, reviewing applications, and issuing permits.

9-2.04(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact for the DNR permit. The designer is responsible for submitting to the permits coordinator all completed application forms, required sketches showing the project location, etc.

9-2.04(04) Legal References

The legal references are as follows:

1. IC 14-28-1 (the Flood Control Act);

2. IC 13-2-22 (Construction in a Floodway); and

3. IC 14-3-16 (Public Notice).

The administrative rules are included in 310 IAC 6-1.

9-2.04(05) Purpose

The purpose is to protect a floodway from undue restrictions and other environmental factors and to protect against interference to navigation.

9-2.04(06) Applicability

A DNR permit is required for any construction in a floodway, including wetlands, where the drainage area is at least 50 mi^2 in a rural area or 1 mi^2 in an urban area. A project with more than 100 ft of channel relocation beyond a bridge coping should be reviewed by the Production Management Division's Hydraulics Team to determine if a permit application should be filed.

Figure 9-4C, IDNR Construction in Floodway Permit Application, is accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/, as a link to the permitting agency's website for application and instructions.

9-2.05 Rule 5 Submission

9-2.05(01) Name

The formal name is NPDES Rule 5 (Storm Water Run-Off Associated with Construction Activity). The informal name is Rule 5.

9-2.05(02) Responsible State Agency

The Indiana Department of Environmental Management (IDEM) is the State agency with overall responsibility for administering the program, reviewing applications and issuing approvals for Rule 5 compliance. IDNR, acting as IDEM's agent, coordinates the review and acceptance of each erosion-control plan through the appropriate soil and water conservation districts. Once the S&WCD representative has determined that an erosion-control plan meets the acceptance criteria, a Notice of Intent (NOI) is sent to IDEM. A typical NOI includes the S&WCD acceptance notice, a publisher's affidavit, and the processing fee.

9-2.05(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact for Rule 5 Submission. The designer is responsible for submitting to the permits coordinator the completed application form, required half-sized plan sheets including the title sheet showing the project location, etc. The erosion-control plan should include a legend of standard practices with a different color highlighting each practice. The color highlighting should be included on the plans to indicate where each practice will be applied. The work type should be clearly described on the title sheet.

9-2.05(04) Legal References

The legal references are as follows:

1. IC 13-1-3-4;

2. IC 13-1-3-7;

3. IC 13-7-7;

4. IC 13-7-10-1; and

5. 327 IAC 15-5-1.

9-2.05(05) Purpose

The purpose is to reduce pollutants, principally sediment from soil erosion, in stormwater discharges into surface waters of the State from a construction site.

9-2.05(06) Applicability

A Rule 5 Submission is required for construction activities where the area of grading, excavation, or other land disturbance impacts 1 ac or more of land area. Any earth exposed counts toward the 1 ac. Rule 5 applies to each INDOT or local-agency project regardless of community size or funding type. Chapter Thirty-seven discusses INDOT practices for temporary erosion and sediment control during construction.

The designer should determine if a body of water is designated as Outstanding State Resource or designated as Exceptional Use. These are listed in Figure 9-2A.

If the project's affected water is one of these locations, the designer should supply a list of names and addresses of the affected property owners with the erosion control plan to the Production Management Division's permits coordinator. The coordinator will then request an individual NPDES Construction Permit. Construction affects on other waters will not require an individual Permit.

If an Individual Corps Permit is required, IDEM issues a public notice for 30-day comment. The timeframe from IDEM's receipt of the NOI/request for an Individual Corps Permit until the end of the process can be 120 days.

Figure 9-4D, IDEM Stormwater Runoff Rule 5 Permit Application, is accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/, as a link to the permitting agency's website for application and instructions.

Once the designer receives the Notice of Intent (NOI) letter with respect to a Rule 5, the permit may be shown as received on the Scope/Environmental Compliance Certification/Permit Application Certification form.

9-3.0 SPECIAL CIRCUMSTANCE PERMITS / CERTIFICATIONS

9-3.01 Introduction

1. Tall-Structure Permit. This permit is obtained from the Federal Aviation Administration and INDOT where proposed construction may impact the navigable airspace of a public-use airport.

2. Regulated Drain. Some counties require formal permission before INDOT performs any construction impacting a regulated drain. Each regulated drain must have plans submitted for review and approval by the county drainage board.

3. State Trunkline Right-of-Way Permit. This permit is required from the applicable state adjoining Indiana if an INDOT project requires incidental construction work outside of Indiana's boundaries.

4. IDNR Navigable Waterway. This permit is obtained as a part of the IDNR Certification of Approval for Construction in a Floodway if the Navigable Waterway permit is required.

5. Section 9 Navigable Waterway Permit. This permit is obtained from the U. S. Coast Guard for construction, modification, replacement, or removal of a bridge or causeway over the navigable Waters of the United States. Indiana is in the Second and Ninth districts.

6. Section 10 Navigable Waterway Permit. This permit is obtained from the U. S. Coast Guard for a structure or work (other than a bridge or causeway) affecting the navigable Waters of the United States.

7. U. S. Army Corps of Engineers Levee Permit. A Corp of Engineers Levee permit is required where construction impacts a levee system owned by the Corps.

8. Section 402 National Pollutant Discharge Elimination System (NPDES) Point-Source Permit. This permit is attained from IDEM for a project such as a rest area that involves a

point-source discharge of pollutants into Waters of the United States. An outlet pipe for other than stormwater is required. An individual permit will be required where the discharge points are into water categorized as exceptional use.

9. Class V Injection-Well Permit. This permit is filed with EPA for a project that impacts sinkholes in karst terrain or involves drainage into the sole-source aquifer near South Bend.

9-3.02 Indiana Tall-Structure Permit

9-3.02(01) Name

The formal name is Indiana Tall-Structure Permit. The informal name is Tall-Structure permit.

9-3.02(02) Responsible Federal Agency

The Federal Aviation Administration (FAA) is the Federal agency with overall responsibility for analyzing airspace and issuing determinations.

9-3.02(03) Responsible INDOT Contact and Application Procedure

The Local Programs Division's Office of Aviation, Tall-Structures Project Manager is the responsible INDOT contact person. The designer should submit the relevant information to the Tall-Structures Project Manager.

This information to be submitted includes a completed application form FAA 7460-1, a USGS 7.5-min quadrangle map with a crosshair indicating the location of each obstruction, and other information pertinent to the project. The latitude and longitude of each location measured should be provided to the nearest second (or tenth of a second if practical), the height of each obstruction measured to the nearest 2 ft, rounded up, and the site elevation (AMSL).

Application 9-4E, FAA Form 7460-1 Notice of Proposed Construction or Alteration, including instructions and application, is accessible from the Department's website at www.in.gov/dot/div/contracts/design/dmforms/. The application should be submitted as early in the design phase as possible.

A contact name and telephone number should be provided for both the project manager and the local planning commission that has jurisdiction over the structure site. Separate applications should be prepared for permanent and temporary features, such as construction equipment. All changes in the design height, structure location, or projected letting date should be communicated to the Tall-

Structures Project Manager in a timely manner. If the design height or structure location is changed, a new application should be completed and submitted.

Upon FAA approval, the Tall-Structures Project Manager will provide the designer with a copy of the FAA's Determination of No Hazard to Air Navigation. This Determination will become the Indiana Tall-Structure Permit 60 days after it is issued.

9-3.02(04) Legal References

The legal references are as follows:

1. Federal Aviation Act of 1958;

2. Federal Aviation Regulations (FAR) Part 77;

3. AC 70 / 7460 2K; and

4. Indiana Code IC 8-21-10, Regulation of Tall Structures.

9-3.02(05) Purpose

The purpose is to promote safety in the air and on the ground, and to preserve the navigable airspace at public-use airports.

9-3.02(06) Applicability

A Tall-Structure permit is required for a permanent installation (e.g., high-mast lighting tower) or construction equipment (e.g., crane, derrick) if the installation or equipment extends to a greater height than an imaginary surface extending outward and upward at one of the slopes as follows:

1. 100 to 1 for a horizontal distance of 20,000 ft from the nearest runway of the nearest public-use airport which has at least one runway at least 3,200 ft long. The designer should contact the Tall-Structures Project Manager for information regarding runway lengths or elevations;

2. 50 to 1 for a horizontal distance of 10,000 ft from the nearest runway of the nearest public-use airport whose longest runway is less than 3,200 ft long; or

3. 25 to 1 for a horizontal distance of 5,000 ft from the nearest landing or takeoff area of a public-use heliport.

If the structure itself is an Interstate highway, 17 ft should be added to the design elevation of the pavement before calculating the slope. For a non-Interstate highway, 15 ft should be added.

9-3.03 Regulated-Drain Permit

9-3.03(01) Name

The formal name is Regulated-Drain Permit. The informal name is County Drainage Permit.

9-3.03(02) Responsible Agency

The county drainage board for the affected applicable county has overall responsibility for reviewing the application and issuing approval.

9-3.03(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, a set of plans showing the project location, etc., if the work is one of the counties that requires this permit process. Such counties are listed in Section 9-3.03(06). The designer should provide a set of plans to the county surveyor at the field check phase.

9-3.03(04) Legal References

Regulated Drains are referred to by law in IC 36-9-27. Each county has its own rules and not every county requires approval.

9-3.03(05) Purpose

The purpose is to notify the applicable county of INDOT's proposed construction that may impact a regulated drain.

9-3.03(06) Applicability

The Regulated Drain Permit is required for work in Allen, Elkhart, Hamilton, Lake, or LaPorte county.

Figure 9-4F, Regulated Drain Permit Application, is accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/, as a link to Elkhart, Hamilton, or Lake county's website for application and instructions. The application and instructions for Allen or LaPorte county work is not accessible from a website. The designer must contact one of these local agencies for such information.

Some of the counties listed above require notification of any change in drainage. A Regulated Drain approval typically requires the following:

1. project description;
2. high water and low water elevations;
3. legal description (if not on plans); and
4. set of plans.

9-3.04 State Trunkline Right-of-Way Permit

9-3.04(01) Name

The formal name is State Trunkline Right-of-Way Permit. The informal name is Border State Coordination.

9-3.04(02) Responsible Agency

The state transportation agency representing the affected state that adjoins Indiana is the agency with overall responsibility for reviewing the permit application and issuing the permit.

9-3.04(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, required sketches showing the project location, etc.

9-3.04(04) Legal References

The legal reference is Act 51 of 1951 to authorize construction (Michigan's law).

9-3.04(05) Purpose

The purpose is to coordinate an INDOT project with an adjoining state for incidental construction within the adjoining state.

9-3.04(06) Applicability

The permit is required to perform incidental construction work outside Indiana's boundary, if not performed under special agreement. Sometimes a formal agreement, shared costs, or responsibility of work that exceeds incidental construction is required. For this situation, the State Trunkline Right-of-Way permit will not apply.

An application will typically require the following documentation.

1. From Designer.

    a. set of plans;
    b. description of project; and
    c. completed application form.

2. From Permits Coordinator.

    a. letter to adjoining state; and
    b. entire package to the state's transportation agency that INDOT is applying to.

Figure 9-4G, Trunkline Right of Way Permit Application, is accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/ as a link to Michigan's, Ohio's, or Illinois' website for application and instructions.

9-3.05 IDNR Navigable Waterways

9-3.05(01) Name

The formal name is IDNR Navigable Waterways.

9-3.05(02) Responsible State Agency

The Indiana Department of Natural Resources, Division of Water, is the State agency with overall responsibility for administering the program, reviewing the application, and issuing approval.

9-3.05(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, required sketches showing the project location, etc. Typically, the designer need not take any action to request this permit other than making application for the IDNR Construction in a Floodway Permit.

9-3.05(04) Legal References

The following discusses the legal references for IDNR Navigable Waterways.

Navigable Waterways Act, IC 14-29-1

A. Regulatory Program

The General Assembly charged the Department of Natural Resources with oversight of the State's navigable waters in the Powers and Duties of the Department Act, IC 14-19-1-1 (9), by stating, "... the Department shall ... have general charge of the navigable water of Indiana." To carry out this regulatory responsibility, the Assembly created several permitting programs, including Section 8 of the Navigable Waterways Act. This provision requires that a person obtain a permit from the Department prior to initiating certain activities within a navigable waterway.

Fundamental to the Department's administration of the Act's regulatory program is the definition of navigable waterway and the limit of jurisdictional authority.

1. "Navigable water" is defined by rule in 2 parts:

   a. "navigable" means "a waterway which has been declared to be ‚navigable' or a ‚public highway' by one (1) or more of the following:

      (1) A court.
      (2) The Indiana General Assembly.
      (3) The United States Army Corps of Engineers.
      (4) The Federal Energy Regulatory Commission.
      (5) A board of county commissioners under IC 14-29-1-1.
      (6) The commission following a completed proceeding under IC 4-21.5.

b. "waterway" means "a river, stream, creek, run, canal, channel, ditch, lake reservoir, or embayment."

The determination of whether or not a waterway satisfies both definitions can be time consuming. Therefore, IDNR has prepared a roster of the State's navigable waterways. The roster was printed as a nonrule policy document in the *Indiana Register*, Volume 15, Number 10, (15 IR 2385) on July 1, 1992 under the title "Natural Resources Commission, Information Bulletin #3, Roster of Indiana Waterways Declared Navigable." The roster is not dispositive of whether or not a waterway is navigable, but rather lists waterways where sufficient evidence exists to recognize them as such. A copy of the roster is included in the Appendix.

2. The accepted limit of jurisdiction on a navigable waterway is the ordinary high water mark unless the State's boundary is present. The "ordinary high water mark" is also defined by rule:

a. "ordinary high water mark" means the following:

(1) The line on the shore of a waterway established by the fluctuations of water and indicated by physical characteristics. Examples of these physical characteristics include the following:

(A) A clear and natural line impressed on the bank.
(B) Shelving.
(C) Changes in the character of the soil.
(D) The destruction of terrestrial vegetation.
(E) The presence of litter or debris.

(2) Notwithstanding subdivision (1), the shore of Lake Michigan at five hundred eight-one and five-tenths (581.5) feet, I.G.L.D., 1985 (five hundred eighty-two and two hundred fifty-two thousandths (582.252) feet, N.G.V.D., 1929).

B. Administrative Rule

The Navigable Waterways rule, 310 IAC 21, contains definitions, standards, and permit information relative to the administration of the Navigable Waterways Act.

C. Regulated Activities

For a person, other than a public or municipal water supply utility, the Act requires that a permit be obtained from the Department for the placement, filling, or erection of a permanent structure in; water withdrawal from; or material extraction from; a navigable waterway. Regulated activities include, but are not limited to bridge foundations, piers, seawalls, mineral extraction, etc.

D. Evaluation Criteria

In its assessment of a project's approvability, the Department evaluates a project's impact using the criteria prescribed within the Act:

1. whether or not the project will reasonably impair the navigability of the waterway;

2. whether or not the project will cause significant harm to the environment; and

3. whether or not the project will pose an unreasonable hazard to life or property.

E. Exempted Activities

The Navigable Waterways Act's regulatory program contains a number of exemptions to minimize duplicity of regulation. Specifically, a permit under the Act is not required if a permit has been obtained under any of the State or Federal statutes listed in Figure 9-3A, Navigable Waterways Act Exempted Activities, and the requirements of the Navigable Waterways Act have been applied in the project review.

9-3.05(05) Purpose

The purpose is to protect each waterway that has been designated by the State as navigable.

9-3.05(06) Applicability

The permit is obtained as a part of the IDNR Certification of Approval for Construction in a Floodway if the Navigable Waterways permit is required.

The IDNR Navigable Waterways Roster is accessible from the IDNR's website, at www.in.gov/dnr/nrc/2390.htm

9-3.06 Section 9 Navigable-Waters Permit

9-3.06(01) Name

The formal name is Section 9 Navigable-Waters Permit. The informal name is Coast Guard bridge permit.

9-3.06(02) Responsible Federal Agency

The United States Coast Guard is the Federal agency with overall responsibility for administering the program, reviewing each permit application, and issuing the permit. Indiana is included in the Second and Ninth districts.

9-3.06(03) Responsible INDOT Team

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, required sketches showing the project location, etc.

9-3.06(04) Legal References

The legal references are as follows:

1. Rivers and Harbors Act of 1899, Section 9;
2. 33 USC 401, et seq, as amended and supplemented;
3. 23 CFR part 650, Subpart H; and
4. 33 CFR 114-115.

9-3.06(05) Purpose

The purpose is to ensure that there will be no interference to navigation on the navigable Waterways of the United States.

9-3.06(06) Applicability

The permit is required for the construction, modification, replacement, or removal of any bridge or causeway over a navigable waterway (tidal or non-tidal). See Figure 9-3B for a listing of affected navigable waterways.

9-3.07 Section 10 Navigable-Waters Permit

9-3.07(01) Name

The formal name is Section 10 Navigable-Waters Permit. The informal name is Coast Guard permit.

9-3.07(02) Responsible Federal Agency

The United States Coast Guard is the Federal agency with overall responsibility for reviewing each permit application and issuing the permit.

9-3.07(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, required sketches showing the project location, etc.

9-3.07(04) Legal References

The legal references are as follows:

1. Rivers and Harbors Act of 1899, Section 10;
2. 33 USC 401, et seq, as amended and supplemented;
3. 23 CFR part 650, Subpart H; and
4. 33 CFR 114-115.

9-3.07(05) Purpose

The purpose is to protect and preserve the navigable Waterways of the United States against any degradation in water quality.

9-3.07(06) Applicability

The permit is required for a structure or work (other than a bridge or causeway) affecting a navigable waterway (tidal or non-tidal). See Figure 9-3B for a listing of affected navigable waterways. Examples of such work include dredging, channelization, and filling.

9-3.08 U. S. Army Corps of Engineers Levee Permit

9-3.08(01) Name

The formal name is U. S. Army Corps of Engineers Levee Permit. The informal name is Corps Levee Permit.

9-3.08(02) Responsible Agencies

The United States Army Corps of Engineers is the Federal agency with overall responsibility for administering the program, reviewing each permit application, and issuing the permit. The local levee authority is a partner in this process. The approval of the local levee authority is required before making application to Army Corps of Engineers.

9-3.08(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, required sketches showing the project location, etc.

9-3.08(04) Legal References

The regulations for maintenance and operation are included in the *Code of Federal Regulations*, as promulgated in Chapter II - Corps of Engineers, Department of the Army, Section 208.10 - Flood Control Regulations for local flood protection works; maintenance and operation of structures and facilities. Such regulations were issued under authority of Sec. 3, 49 Stat. 1571, as amended; 33 USC 701c (9 F.R. 9999, Aug., 17, 1944); 9 F.R. (10203, Aug. 22, 1944).

9-3.08(05) Purpose

For a project that affects a regulated levee, a permit from the Army Corps of Engineers is necessary before any work can be constructed which may affect the levee. The purpose of the levee-permit program is to ensure continuous levee system integrity. The actual permit form may vary, depending on to whom it will be initially sent.

For a legal levee within the jurisdiction of a local levee authority (e.g., Evansville Levee Authority), the permit application plus a set of mostly complete plans and select specifications should be sent through the permits coordinator to the levee authority. The permit form should be obtained from the

local levee authority prior to application submittal. The levee authority may suggest or require changes to the project plans. These changes must be evaluated and coordinated on as required. After the levee authority accepts and approves the project plans, it forwards them to the Army Corps of Engineers for final approval. Army Corps of Engineers' acceptance and approval of a levee permit application is generally ensured once the local levee authority approves the plans. A formal approval document is received from the local levee authority and the Army Corps of Engineers. The Army Corps of Engineers will rarely not accept a set of plans already approved by a local levee authority. However, the designer must account for that possibility when determining the timing for the permit-application submittal.

For a legal levee that exists outside of the jurisdiction of a levee authority, the permit application plus a set of mostly complete plans and select specifications should be sent through the permits coordinator directly to the Army Corps of Engineers. The Army Corps of Engineers may suggest or require changes to the project plans. These changes must be evaluated and coordinated as required. The Army Corps of Engineers will ultimately accept and approve the project's plans, and it will send a notice to INDOT once final approval is granted.

Numerous embankments that serve as unofficial levees have been constructed and are not part of the Army Corps of Engineers' levee system or part of some other levee authority's levee system. Although the designer may need to alter one of these embankments to achieve an effective design, some minor coordination should be accomplished before simply breaking the embankment's integrity. The designer should check with the local drainage authority and the Army Corps of Engineers to ensure that the embankment is not part of either of those parties' flood control systems. Also, the designer may need to check with the Production Management Division's Hydraulics Team and the Office of Real Estate to determine the effects of breaking the embankment on adjacent lands. Only after these types of issues have been investigated, may the designer, if necessary, propose a cut into an apparent flood-control embankment that is not part of a legal, flood-control, levee system.

9-3.08(06) Applicability

The permit is required where construction affects a levee system owned by the Corps. Figure 9-4A, U.S. Army Corps of Engineers Section 404 Permit and Levee Work Permit Application, is accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/, as a link to the permitting agency's website for application and instructions

9-3.09 Section 402 National Pollutant Discharge Elimination System (NPDES) Point-Source Permit

9-3.09(01) Name

The formal name is the National Pollutant Discharge Elimination System (NPDES - Point Source) Permit. The informal name is the NPDES Rule 2 Permit.

9-3.09(02) Responsible Federal and State Agencies

The United States Environmental Protection Agency is the ultimate agency with oversight responsibility for enforcement, management, and implementation of the permit program. The Indiana Department of Environmental Management is the State agency that has the responsibility for the daily execution of the permit program (e.g., establishing program procedures, reviewing permit application, issuing permit).

9-3.09(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, supporting documents, required sketches showing the project locations, etc.

9-3.09(04) Legal References

The legal references are as follows:

1. The Federal Water Pollution Control Act (1972), Section 402, as amended by the Clean Water Acts of 1977 and 1987;

2. 33 USC 1251-1376, DOT Order 5660.1A;

3. 23 CFR 650, Subpart B, 771;

4. 33 CFR 209, 320-323, 325, 328, 329; and

5. 40 CFR 121-125, 129-131, 133, 135-136, 230-231.

9-3.09(05) Purpose

The purpose is to restore and/or maintain the chemical, physical, and biological integrity of the Waters of the United States through prevention, reduction, and elimination of pollution.

9-3.09(06) Applicability

The permit is required for each point-source discharge (other than that addressed by the Section 404 Permit and/or a Rule 5 submission) into the Waters of the United States (e.g., sewage treatment plant at a rest area) where an outlet pipe for other than stormwater is required. An individual permit will be required where the discharge point is into waters categorized as exceptional use. See Section 9-2.05(06).

Stormwater runoff from mainline pavement, shoulders, ramps, etc., which does not enter a combination sewer, is not under jurisdiction of this permit program. There is some question on whether or not storm runoff from a rest-area parking area is within the permit program's jurisdiction. The Office of Environmental Services's Environmental Policy Team leader should be queried as required to determine the permitting requirements of this program for each individual rest-area project.

9-3.10 Class V Injection Well Permit

9-3.10(01) Name

The formal name is Class V Injection Well Permit.

9-3.10(02) Responsible Federal Agency

The United States Environmental Protection Agency has the responsibility for enforcement, management, and implementation of the permit program.

9-3.10(03) Responsible INDOT Contact

The Production Management Division's permits coordinator is the responsible INDOT contact. The designer is responsible for submitting to the permits coordinator the completed application form, supporting documents, required sketches showing the project locations, etc.

9-3.10(04) Legal References

The legal reference is The Safe Drinking Water Act (SDWA) of 1974.

9-3.10(05) Purpose

The purpose is to restore or maintain the chemical, physical, and biological integrity of the nation's karst environments and eco-systems through control, prevention, reduction, mitigation, or elimination of pollution sources.

9-3.10(06) Applicability

1. Karst Conditions: The permit is filed with the United States Environmental Protection Agency (EPA). It is required for a project in karst terrain where a sinkhole is modified to accept a direct discharge of roadway runoff. If the runoff passes through a natural drainage ditch or swale before entering a sinkhole which is not modified, the permit is not required.

   Application should be made during the design stage when other permit applications are filed.

2. Sole Source Aquifer (South Bend region only): A project located in the South Bend region as identified by EPA may impact the region's sole source aquifer. If so, application for the permit is required if a dry well or retention basin is used that may permit infiltration of surface water into the ground water. A compliance certificate should be filed with EPA early in the design phase if the project is located in a sole-source aquifer area, in addition to the permit. Screening of such a project by EPA is necessary to determine the level of impact to the sole-source aquifer.

Figure 9-4J is an editable version of the application, which may be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/. See Figure 9-4K for the Class V Well Inventory form application instructions.

9-4.0 APPLICATIONS FOR PERMITS / CERTIFICATIONS

The permits listed in the List of Figures for this Chapter have applications and instructions which are accessible from the Department's website www.in.gov/dot/div/contracts/design/dmforms/ . All such applications and instructions are referenced to this Section.

Notice of Intent
327 IAC 15-5
Developers' Continuing Responsibility

Outstanding State Resource Waters

1. Blue River in Washington, Crawford, and Harrison Counties from river kilometer 91.77 to river kilometer 18.52

2. Cedar Creek in Allen and DeKalb Counties from river kilometer 22.06 to its confluence with the St. Joseph River

3. Indiana Dunes National Lakeshore waters

4. Lake Michigan, Indiana portion

5. Wildcat Creek, North Fork, in Carroll and Tippecanoe Counties from river kilometer 69.41 to river kilometer 7.76

6. Wildcat Creek, South Fork, in Tippecanoe County from river kilometer 16.44 to river kilometer 0.00

Exceptional-Use Waters

1. Bear Creek in Fountain County from the bridge on County Road 450No to its confluence with the Wabash River

2. Bear Creek small tributary in Fountain County within the Portland Arch Nature Preserve which enters Bear Creek at the sharpest bend and has formed the small natural bridge called Portland Arch

3. Big Pine Creek in Warren County downstream of the State Road 55 bridge near the Town of Pines Village to its confluence with the Wabash River

4. Blue River from the confluence of its West and Middle Forks in Washington County downstream to its confluence with the Ohio River

5. Blue River, South Fork, in Washington County from the Horners Chapel Road bridge downstream to its confluence with Blue River

6. Clifty Creek in Montgomery County within the boundaries of Pine Hills Nature Preserve

7. Fall Creek in Warren County from the Old County Road 119 bridge in T. 22N, R. 8W, Sec. 21, NW qtr., downstream to its confluence with Big Pine Creek

8. Indian Creek in Montgomery County from the County Road 650W bridge downstream to its confluence with Sugar Creek

9. Lost River and all surface and underground tributaries upstream from the Orangeville Rise (T. 2N, R. 1W, Sec. 6) and the Rise of Lost River (T. 2N, R. 1W, Sec. 7), and the mainstream of the Lost River from the Orangeville Rise

10. Mud Pine Creek in Warren County from the bridge on the county road between Brisco and Rainsville to its confluence with Big Pine Creek

11. Rattlesnake Creek in Fountain County from the bridge on County Road 450N to its confluence with Bear Creek

IDEM RULE 5 SUBMISSION
Outstanding State Resource Waters and Exceptional-Use Waters

Figure 9-2A

State Regulatory Programs	
Code	**Title**
IC 14-21-1	Division of Historic Preservation and Archaeology Act
IC 14-28-1	Flood Control Act
IC 14-29-3	Sand and Gravel Permits Act
IC 14-29-4	Construction of Channels Act
IC 14-34	Surface Coal Mining and Reclamation Act
IC 14-37	Oil and Gas Act

An exemption is also authorized if a project has obtained a permit under any of the following federal programs.

Federal Regulatory Programs	
Code	**Title**
16 USC 1451 et seq	Coastal Zone Management Act
33 USC 1344	Clean Water Act
42 USC 9601 et seq	Comprehensive Environmental Response, Compensation, and Liability Act.

An exemption granted under the Navigable Waterways Act does not circumvent any other State, federal, or local permitting requirement. The responsibility to obtain all other permits rests solely with the applicant.

NAVIGABLE WATERWAYS ACT
EXEMPTED ACTIVITIES

Figure 9-3A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
CLASS V WELL INVENTORY FORM

1. Name of Owner/Operator:
   Address of Owner/Operator:

   Telephone:

2. Location of wells. Street Address or Legal Description of Site:
   County:
   Township:
   City or Town:
Type and number of wells: Drywell, Septic tank, Other,

3. Purpose of wells:

4. Nature of fluid entering wells:

5. Well-closure description:

6. Injection Rate: Maximum, Minimum,
   Injection Volume: Maximum, Minimum,
   Injection Pressure: Maximum, Minimum,
Wells Registered with: State ☐ County ☐ Others: ☐
Does site have access to sewer hook-up? Yes ☐ No ☐ Surface Discharge:

7. Provide a sketch of the wall construction on the back of this form.

8. Prepared by: Date:

Class V Well Inventory Form Application and Instructions

Figure 9-4K

Office of Water Quality

Application Form and Instructions for
Authorization to Discharge Dredged or Fill Material
to a Water of the State

Note to applicants:

This form may be used to request either a water quality certification pursuant to section 401 of the Clean Water Act or an NPDES permit pursuant to 327 IAC 5. It may also be used to request a review of a proposed project by IDEM to determine whether the project will violate water quality standards. Applicants with discharges covered by an effluent limitation guideline should not use this application but instead contact Mr. Steve Roush (317) 232-8706 for the appropriate application form.

Applicants should also contact the Indiana Department of Natural Resources (DNR) regarding potential permit requirements associated with construction in a floodway or a public freshwater lake. You can reach the DNR Division of Water at 317-232-4160 or toll free at 1-877-WATER55.

Revised June 6, 2001

Instructions for Completing the Application

Address all applications or questions to:
Indiana Department of Environmental Management
Water Quality Standards Section
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015
1-800-451-6027 or 317-233-8488

The numbers below correspond to the section numbers on the application form.

Print clearly or type.

Attach additional 8.5" x 11" sheets if necessary.

1. Provide the applicant's name, address, and telephone number. Applicants MUST provide a contact name.

2. Provide the agent's address and telephone information (an agent is anyone representing the applicant on the project, such as an attorney or consultant). Applicants are not required to have an agent.

3. Provide specific project information relating to the location of the proposed project. Include the Universal Transverse Mercator (UTM) coordinates including the datum (e.g. 1927 North American). UTM coordinates can be obtained from the United States Geological Survey (USGS) 7.5-Minute Series Topographic Quadrangle maps.

4. Provide the proposed start date and the anticipated completion date. If you have started your project before obtaining authorization, you may be in violation of federal and/or state law. Give a narrative description of the proposed project. Describe the purpose of the project; what goal or outcome will be met by the construction of the project.

5. Include all impacts with the appropriate unit of measure. If you can avoid impacts to wetlands and other waterbodies, you may be able to avoid the requirement to obtain authorization from IDEM. Minimization of the impacts may decrease any compensatory mitigation requirements that might otherwise apply and increase the chances of receiving authorization. If the compensatory mitigation involves the creation or restoration of wetlands or other waterbodies, IDEM will require separate compensatory mitigation plan. If you need guidance on the information required in a complete mitigation plan, contact IDEM.

6. Drawing/Plan requirements. All applicants must submit drawings/plans consistent with the specifications under item six.

7. **For all projects involving impacts to wetlands**, a wetland delineation using the procedures established in the U.S. Army Corps of Engineers Wetland Delineation Manual, Technical

Report Y-87-1 (January 1987) is **required**. Photographs aid the department in deciding if a site investigation is necessary and how best to locate the impact areas when site investigations are necessary.

Instructions are continued immediately after the application form.

***Only the Application Pages need to be mailed to IDEM.**

1. APPLICANT INFORMATION		**2. AGENT INFORMATION**	
Name of Applicant:		Name of Agent:	
Mailing address (Street/ PO Box/ Rural Route, City, State, Zip):		Mailing address (Street/ PO Box/ Rural Route, City, State, Zip):	
Daytime Telephone Number:		Daytime Telephone Number:	
Fax Number:		Fax Number:	
E-mail address (optional):		E-mail address (optional):	
Contact person (required):		Contact person:	
3. PROJECT LOCATION			
County:		Nearest city or town:	
U.S.G.S. Quadrangle map name (Topographic map):		Project street address (if applicable):	
Quarter:	Section:	Township:	Range:
Type of aquatic resource(s) to be impacted (lake, river, stream, ditch, wetland, etc. Include name if applicable):		Project name or title (if applicable):	
		UTM North:	UTM East:
Other location descriptions or driving directions:			
4. PROJECT PURPOSE and DESCRIPTION (*Use additional sheet(s) if required*)			
Has any construction been started? YES NO		Anticipated start date:	
If yes, how much work is completed?			

Project purpose and description:

5. Project Information: Applicants must answer all the following questions (*Use additional sheet(s) if required*).

What are the linear feet of impacts to the waterbody below the ordinary high water mark (OHWM) and/or bank clearing?

What is the acreage or square footage of wetlands or other water resources that are proposed to receive a discharge of material (ie. fill), to be mechanically cleared, or to be excavated?

What is the area of wetlands or other water resources on the site, in acreage or square feet?

Describe the type, composition and quantity (in cubic yards) of fill material to be placed in the wetland or below the OHWM of the water to receive the material (wetland or other water to be filled).

Describe the type, composition and quantity (in cubic yards) of material proposed to be removed from the wetland or below the OHWM of the water resource.

Describe the alternative project locations and/or design configurations that you considered or implemented to avoid and/or minimize impacts to wetlands and other waterbodies to the greatest extent possible.

Describe any proposed compensatory mitigation for unavoidable impacts.

6. **Drawing/Plan Requirements** (applicants must provide the following)

a. Top/aerial/overhead view of the project site.

b. Cross sectional view.

c. North arrow, scale, property boundaries.

d. Include wetland delineation boundary (if applicable). Label the impact wetlands as I-1, I-2, I-3, etc. and the mitigation areas as M-1, M-2, etc..

e. Location of all surface waters, including wetlands, erosion control measures, existing and proposed structures, fill and excavation locations, disposal area for excavated material, including quantities, and wetland mitigation site (if applicable).

f. Approximate water depths and bottom configurations (if applicable).

g. Provide plans on 8" x 11"-inch paper, unless directed otherwise.

7. **Documentation Requirements** (applicants must provide the following)

a. A wetland delineation for projects with wetland impacts (approved by Corps of Engineers if a Section 404 permit is required).

b. Photographs of the project site. Indicate where they were taken on the overhead view of the project plans.

8. **Additional information that MAY be required** (IDEM will notify you if needed)

a. Erosion control and/or storm water management plans.

b. Sediment analysis.

c. Compensatory mitigation plan including type, size, location, methods of construction, planting & monitoring plans, and criteria for success.

d. Species surveys for fish, mussels, plants and threatened or endangered species.

e. Any other information IDEM deems necessary to review the proposed project.

9. Permitting Requirements

a. Does this project require the issuance of a Department of the Army Section 404 Permit from the US Army Corps of Engineers? If no, you do not need to answer Part b.

b. Have you applied for an Army Corps of Engineers Section 404 permit? If yes, please supply the Corps of Engineers ID Number, the Corps of Engineers District, the project manager, and a copy of any correspondence with the Corps. **If no, contact** the Army Corps of Engineers regarding the possible need for a permit application. (See instruction #9.)

c. Have you applied for, received, or been denied any other federal, state, or local permits, variances, licenses, or certifications for this project? Please give the permit name, agency from which it was obtained, permit number, and date of issuance or denial.

10. Adjoining Property Owners and Addresses

List the names and addresses of landowners adjacent to the property on which your project is located and the names and addresses of other persons (or entities) potentially affected by your project. Use additional sheet(s) if required.

Name Address City State Zip	Name Address City State Zip
Name Address City State Zip	Name Address City State Zip
Name Address City State Zip	Name Address City State Zip

11. Fee Submittal

If applying for authorization under an IDEM NPDES permit, please enclose with the application a check or money order for $50.00 made payable to Indiana Department of Environmental Management (IDEM).

12. Signature - Statement of Affirmation

I certify that I am familiar with the information contained in this application and, to the best of my knowledge and belief, such information is true and accurate. I certify that I have the authority to undertake and will undertake the activities as described in this application. I am aware that there are penalties for submitting false information. I understand that any changes in project design subsequent to IDEM's granting of authorization to discharge to a water of the state are not authorized and I may be subject to civil and criminal penalties for proceeding without proper authorization. I agree to allow representatives of the IDEM to enter and inspect the project site. I understand that the granting of other permits by local, state, or federal agencies does not release me from the requirement of obtaining the authorization requested herein before commencing the project.

Applicant's Signature: _____ Date: _____

Print Name: _____ Title: _____

Instructions continued

8. Applicants are not required to submit the information specified in this section unless directed to do so by the department. However, applicants may submit the information if they anticipate that such information will be required.

9. Some projects involving impacts to isolated waterbodies, including wetlands, may not require the issuance of a Department of the Army permit. These activities are still subject to the provisions of State law. Please provide documentation from the Corps as to whether a Section 404 permit will be required. Your application may not be processed until this information is provided. The U.S. Army Corps of Engineers can be contacted at 502-315-6733 for the Louisville Corps District or at 313-226-2218 for the Detroit Corps District.

10. Adjacent property owner information must be provided for the purpose of providing public notice. IDEM requires the names and addresses of all property owners adjoining the property in which the project is to occur.

11. A permit fee is required for the process on IDEM NPDES permits. The application will not be reviewed until the application fee is submitted to IDEM.

12. The applicant must sign and date the application.

Where to get additional information

For more information, contact IDEM at the address below. Please contact the DNR or respective Corps District at the proper address below for questions regarding their programs.

IDEM - Office of Water Quality

Water Quality Section
P.O. Box 6015, IGCN Room 1255
Indianapolis, IN 46206-6015
317-233-8488 or toll-free at 1-800-451-6027

http://www.in.gov/idem/water/planbr/401/401home.html

Indiana Department of Natural Resources (DNR)
Division of Water
402 W. Washington Street, Room W200
Indianapolis, IN 46204
317-232-4161 or toll free at 1-877-Water55 (1-877-928-3755)

http://www.IN.gov/dnr/water/

United States Army Corps of Engineers
Detroit District
P.O. Box 1027
Detroit, MI 48231-1027
313-226-2218

http://www.lre.usace.army.mil/functions/rf/dtwhome.html

United States Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-0059
502-315-6733

http://www.lrl.usace.army.mil/orf/default.htm

Indiana Department of Environmental Management
Office of Water Quality
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

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CHAPTER TWELVE

INTERIM DESIGN MEMORANDA

As new policies, procedures, directives, or criteria are developed, it is desirable to provide this information quickly to the designer. Because the *Design Manual* will only be updated on an annual basis, this information often needs to be published before it can formally be incorporated into the *Design Manual*. To expedite these changes, this information will be issued to the designer as INDOT Design Memoranda. The user may insert hardcopies of these Memoranda in this Chapter until the *Manual* is updated.

12-1.0 Access to Current Design Memoranda

Current Design Policy and Technical Advisory documents which have not yet been incorporated into the *Design Manual* are located on the Department's website at http://www.in.gov/dot/div/contracts/standards/memos/memos.html.

12-2.0 Design Memorandum Search Index

An MSAccess search index is available to help find design memoranda policy changes, technical advisories, news bulletin articles, etc. The index is not guaranteed to be all-inclusive, and it may include some outdated memoranda, but it can be helpful in finding policy and procedure information based on key words. The database file may be downloaded from www.in.gov/dot/div/contracts/design/forms.html.

CHAPTER 103

Plans Development

Design Memorandum	Revision Date	Publication Date*	Sections Affected
12-03	Feb. 2012	Jan. 2013	14-2.01(12)
12-06	Apr. 2012	Jan. 2013	14-3.03
12-17	July 2012	Jan. 2013	14-3.03
12-19	Aug. 2012	Jan. 2013	14-1.02, Figures 14-1E, 14-1E(1), 14-1E(2), 14-1E(3)

*Revisions will appear in the next published edition of the *Indiana Design Manual*.

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LIST OF FIGURES

CHAPTER FOURTEEN

PLAN PREPARATION

Other Parts of this *Manual* provide the designer with uniform criteria and procedures for the design of a highway facility. A design must be incorporated into the construction plans so that it can be clearly understood by contractors, material suppliers, and Department personnel assigned to inspect the construction of the project. An example is that if more than one plan and profile sheet is required, information overlaps of approximately 100 ft should be shown from the previous sheet to the next sheet. To ensure a consistent interpretation of the construction plans, individual sheets should have a standard format and content, and the sequence of plan assembly should be the same. This Chapter provides the general information in conjunction with the Project Development Process (PDP) necessary to prepare a complete set of construction plans for a road, bridge, traffic-signs, signalization, or lighting project. Chapter Eighty-five discusses criteria for the preparation of right-of-way plans. In addition to the information provided in this Chapter, the *INDOT Typical Plan Sheets* provides sample construction-plans sheets and guidance on what information should appear on each sheet.

14-1.0 PLANS DEVELOPMENT

14-1.01 Responsibilities

Figure 14-1A, Sheet Preparation Responsibilities for Road, Bridge, or Traffic Project, illustrates who is responsible for preparing the details for an in-house designed project. For consultant-designed plans, the consultant will be responsible for the preparation of all plans sheets. Minor, or baby, projects related to signs, lighting, or signals should be combined into one generic traffic project, which is associated with the lead project.

The designer will initially complete all plans sheets, computation sheets, quantity estimates, and cost estimates. A second qualified individual will independently review these documents. The qualifications of the reviewer should be commensurate with the item to be reviewed. For example, a second drafter should be qualified to check the preliminary drafting, but an engineer will be required to review the structural details and computations for a bridge design.

At a number of design stages the plans will be submitted to various Department units for review. Section 14-2.0 identifies the construction-plans sheets that should be completed at each design stage.

Prior to these submissions, the project manager is responsible for ensuring that all appropriate information has been incorporated onto the plans or is included with the plans; the plans are consistent; all comments from previous submittals have been addressed; all calculations have been checked; and the overall content satisfies the Department's criteria.

14-1.02 Project Development

Chapter Two illustrates the steps the designer should follow in preparing a set of construction plans. Using this process will ensure that all appropriate information will be addressed in the construction documents. The following discusses the project development relative to the plan sheets.

14-1.02(01) Project Initiation

The Office of Planning and Programming is responsible for preparing the Engineer's Report. This Report provides the scoping information the designer needs to initiate the project design.

Prior to beginning design on an existing facility, the designer should review the as-built plans or the final design plans for that previous work. Final design plans are on file, on microfilm, in the Planning Division's Research and Documents Library. The actual as-built plans or microfilm are located in the appropriate district office. The district office is responsible for correcting the final design plans to reflect the as-built conditions.

Although the as-built plans are an important resource, the designer will conduct a field review or have a survey conducted for each road or bridge project. Section 14-3.0 discusses how to incorporate the survey data into the construction plans. For most traffic signing, signalization, or lighting work, a survey will not be performed. However, a field review will be required.

If the design requires a deviation from an INDOT *Standard Drawing*, it may be handled by either of the methods as follows.

1. A detail is included in the plans.

2. Reference is made to an INDOT *Standard Drawing*, which is not applicable to the situation, but is warranted anyway. For example, Standard Drawing 610-DRIV-05 is applicable if the mainline shoulder is paved and 8 ft or greater in width. In a restricted situation, it may be appropriate to have the drive constructed in accordance with 610-DRIV-04 instead. In this situation, it will be sufficient to add a note in the Pavement Quantities and Approach Table's Remarks column, as follows: *Construct in accordance with Standard Drawing 610-DRIV-04.*

The designer of a mother project should coordinate the combining of multiple projects into one contract. The pay items should be consistent (i.e., if one has QC/QA pavement, the other must also use QC/QA pavement if not otherwise warranted). If there is no mother project (i.e., two independent bridge replacement projects), the INDOT designer or project manager should coordinate the combining of the projects into one contract.

14-1.02(02) Field Check Stage

The designer is responsible for preparing and distributing plans for each field check. This will consist of the following:

1. Scheduling Field Check. The designer is responsible for setting the field check date. The designer must coordinate this effort with the project manager and the district Office of Construction's area engineer so that all the appropriate personnel can attend.

2. Notification and Plan Distribution. The designer is responsible for preparing the field check notification letter and submitting electronic plans so that they are received by all parties on the distribution list at least two weeks prior to the field check. The designer should strive for all plans to be distributed electronically. Utilities or other parties not able to accept electronic plans may require the transmission of paper copies. See Figure 14-1B, Field-Check Notification. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

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> For work in Gibson, Posey, Vanderburgh, or Warrick county, a copy of the plans and notification letter should be sent to EUTS (Evansville Urban Transportation System). This information is shown on the distribution list on the Designer Forms webpage, at www.in.gov/dot/div/contracts/design/dmforms/.

4. Field Check Report. After the field check has been completed, the designer will be responsible for preparing a report of the meeting and listing the comments from all individuals involved in the field check. Copies of this report will be electronically distributed to all those involved in the field check and to those individuals listed in the distribution in Figure 14-1B.

14-1.02(03) Final Tracings Submittal

The construction project number should be shown in the box in the upper left hand corner of the Title Sheet and the lower right hand corner of all other plan sheets. For right-of-way plans, the right-of-way project number should be shown.

The designer will electronically transmit the Final Tracings to the project manager. The project manager will submit the Final Tracings to the Contract Administration Division. All submissions should be submitted electronically into ERMS. This submittal should include Figure 14-1C, Contract-Preparation Documents to Constracts Administration Division memorandum. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

Other items to be submitted are as follows:

1. one set of marked-up Final Check Plans in PDF format;

2. final cost estimate (on Estimator), with a separate estimate prepared for each Des number, using the most recent bid history and pay item list files;

3. Recurring Special Provisions Menu in Microsoft Excel, covering all Des numbers in the contract. The Menu may be found on the Department's website, at www.in.gov/dot/div/contracts/standards/rsp/index.html.

4. modified recurring special provisions and unique special provisions in Microsoft Word.

5. Figure 14-1C, the Contract-Preparation Documents to Constracts Administration Division memorandum which includes information on the status of permits, right-of-way, etc. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/;

6. Figure 10-2B, Utility Coordination Certification, and Figure 10-2D, Utility Coordination Certification waiver. Both appear on the dmforms website;

7. Figure 7-4A, Summary of Commitments, should be complete at the time of submittal of Figure 14-1C. The Summary should include all environmental-document, regulatory-agency, property-acquisition, and context-sensitive commitments. The Summary of Commitments Form appears on the dmforms website;

8. permits or permit information. See Section 9-1.03 for additional information;

9. subsurface investigation, or geotechnical summary;

10. Level One checklist;

11. design-exceptions summary;

12. Scope/Environmental Compliance Certification/Permit Application Certification form. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

13. design computations and quantity calculations;

14. project correspondence files;

15. original survey books and electronic survey files on diskette or CD-ROM;

16. Bridge Search Data form. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

17. Quality Assurance form. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

18. Figure 14-1D, Asbestos Certification (for new bridge construction, bridge replacement, or bridge rehabilitation project), with original to the appropriate district bridge inspector; a copy to the Environmental Services Office's Environmental Policy Team leader; and a copy to be placed in the design calculations document. An editable version of the Asbestos Certification may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/;

19. Geotechnical Review of Final Check Prints form. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/;

20. Limited Review Certification. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/;

21. consultant-project output files, if project is consutant-designed;

22. the map of the official detour route, where applicable, as developed by the district Office of Traffic, should be provided to the Contract Administration Division's Office of Contracting for incorporation into the Contract Information book;

23. Traffic-Control-Plan Checklist. See Figure 82-7A; and

24. Traffic Management Plan (TMP) / Map, where applicable.

Maps of unofficial detour routes should not be provided. Also, the output from the pipe-material selection program should not be provided.

The Scope/Environmental Compliance Certification/Permit Application Certification form, design computations, quantity calculations, project correspondence files, and survey books are maintained by the Research and Documents Library Team as a reference file for the project.

If the contract-documents submission has been uploaded into ERMS and transitioned to CSREVIEW, and an additional document is required, it should be uploaded into ERMS.

If a submitted contract document has been uploaded into ERMS and transitioned to CSREVIEW and it requires revision, the procedure described below should be followed.

A new file should not be uploaded into ERMS. The original document should be revised, showing changes or additions highlighted in yellow, or deletions highlighted in red and struck through. The revised document should be e-mailed to the Contract Administration Division, Office of Estimating's planner.

If a new or revised document is to be submitted within 8 weeks of the letting date, it should first be e-mailed to the district construction engineer for approval. Upon such approval, he or she will then e-mail it to the Office of Estimating's planner.

Before a new user can access the FTP Site, he or she must have prior approval to access the site. A first-time user of ERMS must enroll in ERMS and designate the FTP Site as one of the selections in his or her profile. A current enrollee must modify his or her selections by adding the site to the profile.

1. Instructions for the FTP Upload of Documents.

    a. Login through the INDOT Web Portal (IWP).

    b. Once logged into IWP, click on the link for Design Submittals – FTP.

    c. Enter e-mail address in the top textbox. Currently, no e-mail will automatically be sent. However, an automatic e-mail service is being constructed.

    d. Click on the Browse button to open the file selection window. One or multiple files can be selected to load into the system. Once all desired files are selected, click on the Open button.

e. The lower right of the upload form shows the status of the upload of the files. Wait until it indicates the upload to be complete.

f. Once the files have uploaded completely, click on the arrow numbered 2 for step two.

g. Once all of the filenames have been sent to the step two box, highlight the first file in the list.

h. Information can be added to the files through either of the following methods.

(1) Complete all of the required fields (those in red) and the desired optional fields. After this information is completed, click on the Apply button. Highlight the next file in the list and repeat the process for entering the information, and again click on the Apply button. Continue this procedure for all files until all of the information is entered. Once each file includes the correct information, click on the step three arrow to complete the process.

(2) Complete all of the required fields (those in red) and the desired optional fields. After this information is completed, check the box next to Apply to All Files. Click on the Apply button. That set of information is now applied to each file in the list. Uncheck the box next to Apply to All Files. Review each file, highlight it individually, change the information that must be changed for each specific document, and click on the Apply button after each change. If the Apply button is not clicked, the changes will not take effect. Once each file includes the correct information, click on the step three arrow to complete the process.

2. File-Uploading Considerations.

1. The files must be fully uploaded before proceeding to the step 2 box. Otherwise the upload will be cancelled and the files will not be correct.

2. Files should not be uploaded more than once. Once the files are uploaded, they are kept on the server with their information until a background service runs and collects the files to place them into ERMS.

3. Files being uploaded more than once will show mistakes in their information. They will remain in the FTP until the Help Desk cleans and resets the FTP. If files are uploaded into ERMS through the FTP and they do not appear in ERMS

by the end of the day, submit a Help Desk request and the Help Desk will address the situation.

4. The title field for the required information is forced to the name of the file. Therefore, the name of the file should reflect its desiredERMS title.

5. The size of each file should not be greater than 40 megabytes. If a file becomes too large, there are issues with consultants and contractors who are trying to download the file from the system.

6. Not more than 180 files should be uploaded at one time.

3. Final Tracings Checklist. Figure 14-1E, Final Tracings Checklist, is available on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

Figure 14-1C, Contract-Preparation Documents to Contract Administration Division memorandum, should be completed by the project manager with the aid of the designer. The project manager or designer should transmit plans and environmental permits, along with right-of-way, utilities, and other pertinent information to the appropriate district construction engineer so that the construction engineer can assist in completion of the Contract Requirements Worksheet portion. The plans, permits, and information should be transmitted to the construction engineer in a timely manner such that the construction engineer can provide information including possible new or revised pay items or quantities. Once completed, the entire memorandum should be transmitted to the Planning Division's Research and Documents Library Team with the Final Tracings submittal. The construction engineer's recommendations should be incorporated into the Final Tracings submittal.

The ERMS I.D. required on the memorandum should preferably be the contract number. If the contract number is not yet assigned, the I.D. should be the Des number.

The project manager is responsible for the complete, accurate, and timely submittal of the Contract-Preparation Documents to Contract Administration Division Office of Estimating memorandum. If a project manager is not assigned to the work, the responsibility is that of the designer.

The editable version of the memorandum is on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

It is the responsibility of the designer handling a mother project to be certain that the tracings for all included projects are brought together and submitted to the project manager.

The Contract Administration Divsion's Office of Contracting enters the preliminary data on the project into TRANSPRT at this time. The information is processed by the Des number. If there

is more than one Des number, the data must be entered for each Des number and the cost estimates segregated by the Des number.

The Contracts Administration Division's Office of Contracting along with the Research and Documents Library Team prepares the original tracings for letting. Contract numbers and project numbers are checked, reference points are checked, Des numbers are checked, and a memorandum is prepared for the signer of the plans. The plans are signed and dated by the project designer and the Production Management Division director after the project is awarded.

14-1.02(04) Plans Revision Prior to Letting

Plans revisions are the changes made to a set of plans up to one week prior to letting. At this point, original plans sheets, other than the Title sheet, may be replaced with new sheets and numbered exactly as the original deleted sheets, with the original sheets discarded. New sheets that were not in the original plan numbering, that are inserted into an original set of plans will be numbered with a numeric extension as follows.

1. A new sheet inserted after 22 and before 23, should be numbered as 22-1.
2. Three new sheets inserted after 13 and before 14, should be numbered as 13-1, 13-2, and 13-3.
3. A new sheet added at the end of a 40-sheet set of plans should be numbered as 40-1, and not 41.

A change is made to the tracings with a revision note placed in the revision block on the title sheet (bridge project) or index sheet (road project). This revision note should include the date of the revision, the revised sheet numbers, and a short explanation of the change. A note should also be placed on the revised sheet or sheets in a location that will not restrict its visibility.

1. Erasures are permitted from the time the tracings are turned in to the Research and Documents Library Team until the plans are printed for distribution to potential bidders or others. This is approximately 5 weeks before the letting date. Within this 5-week period, revisions may only be made to the tracings with the approval of the appropriate district construction engineer. Such revisions are to be shown in clouds. Although with electronic drafting it is common for the designer to delete a sheet and substitute a new one in its place, the designer should still use clouds to assist plans users in finding the changes on the new sheet.

2. Revise the special provisions, noting all changes, if needed.

3. Revise quantities and construction cost estimate if needed.

4. Submit through ERMS the revised tracings, special provisions package, quantity computations, and the construction cost estimate using Estimator.

5. No changes are permitted within the week prior to the letting date.

The letting date, and not the plan signing date, controls when and how revisions can be made to the plans.

14-1.02(05) Contract Information Book Certification

Within 48 hours after receipt from the Contract Administration Division, the designer should review the plans and Contract Information book. The designer should complete Figure 14-1F, the Contract Information Book Certification form, and e-mail the completed form to the contact person identified on the form. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

14-1.02(06) Construction Change

A construction change is made to a set of plans following the project letting and subsequent awarding to a contractor. Each construction change must be routed through the project manager to the Research and Documents Library Team for processing. A construction change is processed as follows.

1. Plans Sheets. Where a change is made to the tracings, a revision note should be placed in the revision block on the Title Sheet for a bridge project, or the Index Sheet for a road project. This revision note should include the date of the revision, the revised sheet numbers, and a short explanation of the change. A note should also be placed on the revised sheet or sheets in a location that will not restrict its visibility. No erasures may be made to the original tracings as they are considered a legal contract document at the time of letting.

   If space allows, the original item to be revised should be hatchmarked through and the revision should be made on the same sheet. The revision should be placed on the sheet in a location that will not restrict visibility, and should be shown in a cloud. If the revision is too large to be shown on the original sheet, the deleted sheet number should be noted in the revision block. This deleted sheet should remain in the original set of plans.

   a. Replacing an Existing Plans Sheet. If an existing plans sheet is to be replaced, the replacement sheet should be numbered with an alphabetic extension (number-letter) to indicate that it is a replacement sheet. The deleted sheet should be

identified in the revision block and should remain in the plans for future reference. Clouds must be used on the replacement sheet to indicate the changes made. The replacement sheet number should also be identified in the revision block. Examples of the number-letter extension are as follows.

(1) Sheet 2 is deleted, and sheet 2-A will take its place.
(2) Sheet 23 is deleted, and sheet 23-A will take its place.
(3) Sheet 17-A is deleted, and sheet 17-B will take its place.
(4) Sheet 15-1 is deleted, and sheet 15-1-A will take its place.

The number followed by a letter indicates that an existing sheet has been replaced.

b. Inserting a New Plans Sheet. If a new sheet is to be inserted into the original plans after the project is let and awarded, the added sheet should be given a numeric extension (number-number) to indicate that it is an added sheet. A new sheet is numbered according to the sheet preceding the insertion. The added sheet should be identified in the revision block. Examples of the number-number extension are as follows.

(1) Sheet 15-3 is inserted after sheet 15-2 and before sheet 16.
(2) Sheet 7-1 is inserted after 7-B and before sheet 8.
(3) Sheet 40-3 is inserted after 40-2 at the end of the set of plans.
(4) Sheet 5 is revised and two new sheets are added. The sheet numbers are 5-A (the revision to sheet 5), 5-1, and 5-2 (the two new sheets).

If a construction change is submitted electronically (through ERMS), the project manager must make certain that the Research and Documents Library Team receives the change. The Research and Documents Library Team will then prepare a Construction Change Memorandum for distribution. It will provide the district with three full-size sets of plans and the contractor with four full-size sets of plans. The remainder of the distribution will be made by e-mail, ERMS, or CD. Copies may be made at the recipient's own convenience.

2. Research and Documents Library Team. A memorandum will be prepared by the Research and Documents Library Team to the district construction engineer (see Figure 14-1G, Construction Change memorandum). An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/. Six sets of full-size plans should accompany this memorandum to the district Office of Construction. Quantity revisions are computed and transmitted by the designer with the memorandum for use by the project's field personnel in preparing Form IC-626.

3. Distribution. A half-size set of plans and a copy of the memorandum should be distributed to the following:

   a. the Federal Highway Administration, if applicable;
   b. the contractor;
   c. the project engineer;
   d. Contract Administration Division's Office of Contracting;
   e. Office of Real Estate, if right of way or railroad is involved;
   f. project manager;
   g. consultant, if applicable;
   h. Planning Division's Bridge Inventory Team, if a bridge project;
   i. Planning Division's Research and Documents Library Team;
   j. district manager of Office of Real Estate and Right-of-Way;
   k. Production Division's load rating engineer, if revision involves a bridge;
   l. data specialist, Office of Construction Technical Support;
   m. district director (letter only);
   n. district manager of Office of Consultant Services (letter only)

14-1.02(07) Shop Drawings and Falsework-Review Procedure

The following procedure should be implemented for submittal and review of shop drawings, falsework drawings, or related documents as described below. Regardless of the submittal process described, it is the intent that the contractor communicates directly with the project engineer or supervisor to keep him or her informed of the status of submittals. If the district has concerns about the structural integrity of shop drawings certified by a professional engineer, it should contact its construction management field engineer for further assistance.

1. Structural Members and Related Work. Shop drawings for the following work are to be submitted by the fabricator or supplier, for review and approval. Shop drawings must be in accordance with the applicable specifications. Work which does not require certification by a professional engineer for submittal is as follows:

   a. structural steel or structural concrete members;
   b. expansion joints type M;
   c. expansion joints type S-S; or
   d. elastomeric bearings.

2. Mechanically-Stabilized Earth Retaining Wall. The shop drawings and calculations are to be submitted by the contractor or fabricator directly to the designer of record for review and approval. The shop drawings must be certified by a professional engineer.

The designer will attach a cover letter and transmit the approved shop drawings to the fabricator and two sets to the district Office of Construction for further distribution.

3. Precast-Concrete Structure. The shop drawings and design calculations for a 3-sided or oversized-box structure are to be submitted by the contractor directly to the Office of Roadway Services. The Office of Roadway Services will forward the shop drawings to the designer of record for review and approval. The designer of record will forward the review and approval back to the Office of Roadway Services for final concurrence. The shop drawings must be certified by a professional engineer. Roadway Services will distribute the approved shop drawings to the contractor and district Office of Construction manager.

4. Traffic-Control Work. For an IPOC project, shop drawings are to be submitted to the Office of Roadway Services for review and concurrence. For a non-IPOC project, shop drawings are to be submitted to the designer for review and concurrence.

5. Falsework or Temporary Bridge. Drawings are to be submitted to the project engineer or supervisor. Each drawing must include the contract number and contractor's name, and must be certified by a professional engineer. Work which requires drawings submittal is as follows:

   a. cofferdam;
   b. temporary deck falsework;
   c. coping falsework;
   d. falsework for a reinforced-concrete slab superstructure;
   e. falsework for a hammerhead-pier cap; or
   f. temporary bridge or runaround.

The submittal for a temporary bridge must also include design calculations.

The project engineer or supervisor will review the drawings only for compliance with the specifications and the specific project conditions. The Division of Construction Management's field engineer is available for assistance. Questions should be directed through the district Office of Construction area engineer.

6. Permanent Metal Deck Forms. The shop drawings are to be submitted by the contractor to the District Office of Construction for review only for compliance with the specifications and the specific project conditions. Shop drawings submitted by the contractor must be certified by a professional engineer. The Division of Construction Management maintains a deck-forms calculation spreadsheet that can be of assistance in review of the shop drawings.

7. Foundation Seal or Deck-Pour Sequence. A request for the use of a foundation seal not shown on the plans is to be submitted to the Division of Construction Management for review and approval. The submittal must include the contract number and contractor's name, and must indicate the location and dimensions of the seal. The Division of Construction Management will distribute the approved request.

   A request to revise the planned deck-pour sequence is to be submitted to the Division of Construction Management for review and approval. The submittal must include the contract number, contractor's name, and the original and proposed alternate sequence and pour rate. The Division of Construction Management will distribute the approved request.

8. Stream Crossing or Work Bridge. A proposal for this work is to be submitted to the District Construction office for review and approval. If the proposal varies from the contract's environmental-permit conditions, the contractor must obtain approval for the change from the appropriate agency.

9. Miscellaneous Work. Shop drawings for miscellaneous work not described above, i.e., post-tensioning plan, non-standard manhole, etc., should be submitted through the project engineer or supervisor. He or she should work with the district Office of Construction and the Division of Construction Management to determine the approval process for the work.

   Shop drawings and calculations should be submitted in the contract's measurement units.

14-2.0 PLANS SUBMISSIONS

14-2.01 Road Plans, New Construction or Reconstruction Project

14-2.01(01) Grade-Review Meeting

A grade-review meeting should be held with the project manager prior to the Stage 1 plan-review submittal. The meeting is primarily for a Major project and is to be held at the discretion of the project manager. The following plans sheets and overall sheets must be prepared for the grade-review meeting.

1. Typical Cross Sections. These should include the following:

   a. lane and shoulder widths;

b. profile grade;

c. cross slope;

d. curbs;

e. sidewalk locations and widths;

f. bicycle facilities;

g. side slopes;

h. shoulder corrugations, if warranted; and

i. ditches, in cut and fill sections.

2. Overall Plan View. A sheet showing the overall plan view of the existing topography and preliminary geometrics is required. The overall plan view should be to a scale which is legible for review and discussion at the meeting.

3. Overall Proposed Profile Sheet. A sheet showing the overall proposed profile with the existing ground is required. The overall proposed profile should be to a scale which is legible for review and discussion at the meeting. More than one sheet may be required.

4. Interchange Layout or Overall Layout Sheet. A sheet showing the overall plan view of the existing topography and preliminary geometrics for each interchange is required. The overall plan view should be to a scale which is legible for review and discussion at the meeting. More than one sheet may be required.

14-2.01(02) Interchange-Geometrics Submission to FHWA

For a project which includes at least one interchange requiring Federal oversight, the proposed horizontal alignment for the interchange may be required prior to the Stage 1 review submission. The following must be considered for Quality Assurance.

1. Geometrics. The plans sheets for the interchange geometrics should be graphically completed including stationing, curve data, bearings, etc. The design speed for each ramp should be shown.

2. Ramp Grades. Investigate ramp grades in as much detail as required to determine their effect on the proposed horizontal alignment.

3. Traffic Elements. The traffic elements to be considered to determine their effect on the interchange alignment are as follows:

   a. traffic counts and turning movements;

   b. consideration of signing;

   c. consideration of signals at ramp terminals; and

   d. consideration of illumination (high mast or conventional).

4. Design Information. Include all applicable design information (e.g., economic analysis, drainage analysis).

14-2.01(03) Stage 1 Review Submission [Rev. Jan. 2011]

Plans should be approximately 25% complete at this stage.

Place the proposed design information in the computer-aided details file for this submittal. This information will be submitted in pdf format. However, the plans need not be in final form. The designer should place notes on the plans which explain situations or items which are not readily apparent, and which may influence the proposed design. The notes are to be removed in later submissions.

The following sheets and information must be reviewed for Quality Assurance and should be included with the review submission:

1. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01), and indicate apparent or possible design exceptions. Also, identify discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Abbreviated Engineer's Assessment. Provide a written scope of the project requirements. This will be a short description of the criteria proposed for use in the design of the project.

   a. If an Abbreviated Engineer's Assessment has been prepared, a copy should be included with the submission.

b. If an Abbreviated Engineer's Assessment was not prepared, the designer should provide a brief written description of the project. The description will, at a minimum, include the information as follows:

(1) project location;
(2) project need and purpose;
(3) existing facility;
(4) traffic data;
(5) identification of proposal;
(6) cost estimate;
(7) environmental issues;
(8) right-of-way impact;
(9) traffic maintenance during construction; and
(10) concurrence. For an INDOT project, signed by the district production director or the district planning director. For an LPA project, signed by the Project Sponsor.

3. Level One Checklist and Design Computations. The designer should submit a Level One checklist, including computations for the mainline and each S-line. The designer should include computations for the required intersection sight distance at each public road, including each local-service road or frontage road within the project limits. The designer should also submit documentation of the intersection sight distance provided at each public road. Level One Criteria verification is not required for maintenance of traffic at this time.

It is not necessary to submit a Level One checklist for an S-line that does not exceed the work necessary to build the appropriate public-road approach, including the required taper distance to account for transitioning to the existing pavement width. This does not relieve the designer of making the project satisfy all Level One design elements for such an S-line, e.g., maximum grade, vertical stopping sight distance, and intersection sight distance.

The computations for the Level One items and intersection sight distance are to be initialed and dated by the designer and reviewer before submission. The items to be included are as follows:

a. Level One checklist;

b. project-length computations including guardrail lengths and other contributing factors; and

c. design computations for determining geometrics.

4. Index and Title Sheet. At this project stage, information on the title sheet should include the following:

a. project numbers;

b. description (des) number;

c. location map;

d. project location map including north arrow and scale;

e. description of the project work type and location;

> *** PRACTICE POINTER ***
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> The location description should be simple and should follow the description on the schedule. For example, *Bridge replacement on State Road 67 over Fall Creek, located 8 miles southwest of the south junction with State Road 39, in Section 13, T-11-N, R-2-W, Ray Township, Morgan County, Indiana.* A legal description should not be used.

f. design data including design speed, project design criteria, functional classification, terrain, traffic data, urban or rural area, and access control.

g. applicable reference point (does not apply to local agency project);

h. signature blocks, but not filled in at this stage;

i. gross and net project lengths, not including incidental construction or lengths along S-lines;

j. an index of plan sheets at this stage. Sheet numbers will change for future submittals;

k. list of utility owners and addresses;

l. bridge structure information;

m. latitude and longitude; and

n. appropriate version of Standard Specifications.

5. Typical Cross Sections. Typical cross sections should show only the basic configuration and design features. These include the following:

a. lane and shoulder widths;

b. profile grade, construction centerline, paper-relocation line, and survey-line locations;

c. basic design features including curbs, sidewalk locations and widths, pavement and shoulder cross slopes, side slopes, ditches, shoulder configurations (if warranted), bicycle facilities, etc.; and

d. clear-zone width for 4R project, or obstruction-free-zone width for 3R project.

6. Plan and Profile Sheets. These sheets will include only the preliminary design information. The details that should be addressed include the following:

a. existing topography;

b. beginning and end of project;

c. horizontal alignment (e.g., horizontal curve data, PC, PI, PT, bearings);

d. vertical alignment and its relationship to grade-controlling features;

e. preliminary drainage design;

(1) include mainline culverts;

(2) include ditch grades only if they must be known to establish the profile grade;

(3) need not show storm sewers;

f. preliminary public-road approach and drive locations;

g. alignment-controlling features (e.g., high-water levels, existing crossroads and bridges, regulated drains, drainage structures, railroads, underdrain criteria, traffic-maintenance considerations, cemeteries, historical buildings, parks, ADA requirements, etc.);

h. proposed guardrail limits, only if they affect the project limits; and

i. survey reference ties and benchmark data.

7. Details. These should include only the superelevation-transition diagrams.

8. Interchange. If the project includes at least one interchange, the general layout of the interchange should be shown, including the following:

a. geometrics;

b. preliminary ramp grades;

c. horizontal and vertical alignments;

d. traffic elements; and

e. design information.

9. Cross Sections. The preliminary cross sections should include the following:

a. templates of the typical sections placed on the existing cross sections;

b. profile-grade elevations; and

c. mainline drainage structures.

10. Design Information. In addition to the plans, the designer should include copies of the preliminary hydraulic analysis for each mainline culvert, if applicable, and results of economic analyses that may have been completed for alternative grade lines. The preliminary cost estimate should be developed for the major pay items with percentages for the minor pay items. The hydraulic analysis should be signed and sealed by a professional engineer licensed in Indiana.

11. Certification. Provide a current copy of the Scope/Environmental Compliance Certification/Permit Application Certification form with this submission.

12. Quality Assurance Form.

13. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.01(04) Geotechnical Investigation Request Submittal

Upon approval of the Stage 1 review submission, the Geotechnical Investigation will be requested. Anticipated pavement sections and intended treatment should be provided. The sheets to be included with this request are as follows:

1. title sheet;

2. Typical Cross Sections;

3. roadway plan and profile;

4. bridge General Plan;

5. Layout;

6. Details. This should show approximate location of a noise wall, retaining wall, or high-mast-lighting tower; and

7. cross sections.

14-2.01(05) Preliminary Field Check Meeting [Rev. Aug. 2011]

A preliminary field check meeting should be held after the Stage One review submission and prior to the Stage Two review submission. The preliminary field check meeting is not part of a review submittal. Plan sets should be distributed a minimum of two weeks prior to the meeting (see Figure 14-1B, Field-Check Notification).

To hold the Preliminary Field Check meeting, plans should be approximately 40% complete. The following plans sheets and information must be included for Quality Assurance.

1. Previous Reviews. Incorporate comments from the previous reviews.

2. Conformance. The designer should check the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01). Apparent or possible design exceptions should be identified. Discrepancies from the Level Two design criteria listed

in Section 40-8.02(02) should also be identified. The required documentation for all Level One and Level Two design exceptions should be prepared.

3. Title and Index Sheet.

4. Plat Sheet. A preliminary Plat No. 1 should be included for a project on a Department-maintained route requiring right of way. See Section 85-2.0.

5. Plan and Profile Sheets. In addition to the information described in Section 14-2.03(02), show the following:

   a. project limits;

   b. elevations and grades of ditches so that accurate right-of-way requirements can be determined;

   c. construction limits;

   d. proposed right of way, including temporary right of way;

   e. public-road approach and drive locations;

   f. approximate roadside barrier or guardrail locations;

   g. new sidewalks, bicycle lanes, etc., if not shown on the Details sheets; and

   h. conceptual storm-sewer layout which includes the trunk line and outlet locations.

6. Details Sheets. Include preliminary layouts for the details as follows:

   a. roadway and shoulder layout for guardrail;

   b. modified approaches, signs, sign structures, lighting, signals, where applicable. Traffic items should be submitted in a separate set of plans;

   c. intersection layout details including right- and left-turn lanes with the turning movements indicated;

   d. retaining walls;

   e. special drainage structures;

f. superelevation-transition diagrams;

g. weigh station and associated facilities;

h. rest area and associated facilities; and

i if shoulder corrugations are warranted, and the plans include details for non-standard public-road approaches, drives, etc., each detail should show the extent of corrugations installation required in conjunction with the construction illustrated by the detail. If applicable, the INDOT *Standard Drawings* should be used as a guide in determining the limits of corrugations installation relative to the feature shown in the detail.

7. Traffic-Maintenance Details. The conceptual traffic-maintenance scheme and phasing should be outlined. Level One criteria verification is not required at this time. Plans should be developed to satisfy the PDP Manual's Project Constructability Review 1.

8. Cross Sections. The preliminary draft should include the following:

a. profile-grade elevations;

b. templates of the typical sections placed on the existing cross sections;

c. drainage structures;

d. approaches and drives; and

e. buildings.

9. Design Information. The activities which should occur include the following:

a. Geotechnical coordination;

b. unique special provisions initiation;

c. preliminary woody-revegetation determination; and

d. pavement design request submittal.

14-2.01(06) Preliminary Right-of-Way Plans Preparation

See Chapter Eighty-five for criteria and information that should be included with the Right-of-Way Plans. The designer should review the instructions for Quality Assurance.

14-2.01(07) Stage 2 Review Submission [Rev. Aug. 2011]

Plans should be approximately 55% complete at this stage.

Plans for this submittal should be close to their final form and should be legible and consistent with the quality desired for public viewing at a public-information meeting, if required. The procedure for such meeting should be in accordance with Section 14-02(06). The designer should review the *INDOT Typical Plan Sheets* document to determine what information should be included on each sheet. Review the following sheets and information for Quality Assurance and include them with this submission.

1. Previous Reviews. Include the marked-up plans from the Stage One submittal, changes made from the Preliminary Field Check meeting, and comments from the construction review with this submission. Include revisions to the plans due to Geotechnical Report recommendations, if completed. Include responses to preliminary field check questions.

2. Conformance. The designer should check the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01). Apparent or possible design exceptions should be identified. Discrepancies from the Level Two design criteria listed in Section 40-8.02(02) should also be identified. The required documentation for all Level One and Level Two design exceptions should be prepared.

3. Index and Title Sheet. Finalize the title sheet and index sheet for the roadway plans.

4. Plat Sheets. Plat sheets, if required, should be consistent with the plans and finalized.

5. Plan and Profile Sheets. Right of way should be finalized and consistent with the detail sheets. Additional information to be shown is as follows:

    a. drainage features (e.g., storm sewers, pipe structures, ditch grades, preliminary inlet spacing for storm-sewer trunk line design, etc.) and proposed drainage notes; and

    b. permanent erosion protection, including paved side ditches, riprap, and sodding limits.

6. Structure Data Table. The table should be in a preliminary form and should include structure numbers and locations.

7. Approach Table. The table should be in a preliminary form and should include approach geometrics.

8. Cross Sections.

9. Design Information. Information to be included is as follows:

   a. hydraulics and storm-sewer calculations, signed and sealed by a professional engineer licensed in Indiana; and

   b. cost estimate. The preliminary cost estimate should be refined for the major pay items with percentages shown for the minor pay items.

10. Level One Checklists and Design Computations. If there are no changes to the plans which affect Level One criteria since the prior submission, it is acceptable to copy the previous Level One Checklist and add a statement that no changes have been made to the plans that affect Level One criteria. The statement should be initialed and dated for the current submission. The plans must be developed to satisfy the PDP Manual's Project Constructability Review 2.

    The designer should submit a Level One checklist, including computations for the mainline, each S-line, and each traffic-maintenance phase. The designer should include computations for the required intersection sight distance at each public road, including each local-service road or frontage road within the project limits. The designer should also submit documentation of the intersection sight distance provided at each public road. This requirement also applies to the traffic-maintenance phases.

11. Certification. Include a current copy of the Scope/Environmental Compliance Certification/Permit Application Certification form.

12. Quality Assurance form.

13. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.01(08) Right-of-Way Plans Preparation, if done by others

Chapter Eighty-five provides the criteria and information that should be included with a set of right-of-way plans. The designer should review the instructions for Quality Assurance as follows.

1. Previous Reviews. Incorporate all revisions made during the previous plan submissions.

2. Checklist for Right-of-Way Plans. Complete the checklist shown in Figure 85-2F.

3. Plan Sheets. The required sheets and information are as follows:

    a. title sheet;

    b. Index and General Notes sheet;

    c. plat sheet;

    d. Location Control Route Survey Plat;

    e. plan and profile sheets;

    f. Details sheets;

    g. Approach Table;

    h. all sheet cross references; and

    i. all project-information boxes, including right-of-way project number and sheet numbers.

4. Initiate right-of-way engineering.

5. Quality Assurance form.

14-2.01(09) Hearing Plans Preparation, if required

If a public-information meeting or hearing is required, provide plans and documents to the Office of Public Hearings for Certification of the Hearing Process. The public-information meeting may be a requirement due to the amount of right of way being taken or deemed necessary by the project manager. The meeting will be held after the Stage 2 plans have been reviewed.

An opportunity for a public hearing will be afforded if a project satisfies at least one of the criteria as follows:

1. more than 0.5 ac of permanent right of way is required;

2. the layout of the improved facility's function is to be substantially changed;

3. it may have an adverse impact on abutting property;

4. it may have a significant social, economic, environmental, or other effect;

5. a ramp within the project limits is to be closed for 7 days or longer;

6. there is impact on a wetland;

7. it involves a significant floodplain encroachment;

8. there is impact on a resource eligible for or included in the National Register of Historic Places; or

9. FHWA has determined that an opportunity should be afforded.

If an opportunity for a public hearing need not be afforded, a public notice must be made available for comment on Section 106 findings.

The following sheets and information should be provided.

1. Stage 2 plan sheets and the revisions from the Stage 2 review.

2. Environmental requirements are satisfied by one of the following:

    a. the Environmental Impact Statement is complete and the Record of Decision (ROD) has been issued;

    b. the Environmental Assessment is complete and a Finding of No Significant Impact (FONSI) is made by FHWA; or

    c. the Categorical Exclusion is complete and concurred in by FHWA.

3. Updated Scope/Environmental Compliance Certification/Permit Application Certification form.

4. Traffic-Maintenance Plan. In preparation for a public information meeting, the designer may be asked to perform the activities as follows.

    a. Displays. Prepare displays that can be used in a coordination meeting or a public information meeting. These include, but are not necessarily be limited to,

sketches of the typical cross section for each phase of the construction, and composite drawings showing all ramp closures with traffic-flow arrows indicating the number of lanes to be open during each construction phase.

b. Transportation Management Plan (TMP). Address the requirements of a TMP that has been developed for the project.

c. Queues. Analyze the capacity constraints due to lane closures, including anticipated queues and user costs. This can be done using the QUEWZ software discussed in Chapter Eighty-one.

14-2.01(10) Final Plans Right-of-Way Plans Preparation

Chapter Eighty-five provides the criteria and information that should be included with a set of right-of-way plans. This submission is not required for a local public agency project. The designer should review the instructions for Quality Assurance, and perform the following:

1. include the marked-up Preliminary Right-of-Way Plans with this submission, if required;

2. incorporate all revisions made during the Preliminary Right-of-Way Plans submission review;

3. complete all project-information boxes, including right-of-way project number and sheet numbers;

4. complete all sheet-numbers cross references; and

5. review the plans against the checklist shown as Figure 85-2F.

14-2.01(11) Final Field Check Meeting [Rev. Jan. 2011]

A Final Field Check meeting should be held after the Stage Two review submission and prior to the Stage Three review submission. The Final Field Check meeting is not part of a review submittal. The meeting is to be held at the discretion of the project manager for each major project. The meeting should not be required for a minor project. Plans sets should be distributed a minimum of two weeks prior to the meeting (see Figure 14-1B, Field-Check Notification).

To hold the Final Field Check meeting, plans should be approximately 80% complete. The following sheets and information must be included for Quality Assurance.

1. Previous Reviews. Incorporate comments from the previous reviews.

2. Plans Sheets. The plans should be nearly complete. Changes resulting from the public information meeting, geotechnical recommendations, and pavement-design recommendations should be incorporated onto the plans. Legends on sheets should be completed and checked for accuracy and consistency with Section 14-3.04. The designer should include the information on the sheets as follows.

   a. Title Sheet. Complete the Design Data block.

   b. Index and General Notes Sheet. Check the general notes to ensure that they are current and accurate. Revise the index as necessary.

   c. Plan and Profile Sheets.

      (1) Ensure that structure notations are completed; sodding, riprap, and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items identified.

      (2) Update all property lines based on right-of-way engineering. Add the station-and-offset callout for each right-of-way or property-line break point.

   d. Details Sheets. Ensure that all details are completed and included. This includes details for traffic maintenance and traffic-design elements (e.g., intersections, signals, signing, and lighting). This also includes details and notes for temporary erosion and sediment control. The plans must be developed to satisfy the PDP Manual's Project Constructability Review 3.

   e. Tables. Complete all data tables including the following:

      (1) Structure Data Table;

      (2) Approach Table;

      (3) Underdrain Table;

      (4) Other miscellaneous tables such as guardrail, paved side ditches, sodding, right-of-way markers, monuments, mailboxes, etc.; and

      (5) Earthwork Summary table.

e. Cross Sections. Design information should be essentially complete. This includes final structure indications, earthwork areas and volumes, and benching areas and volumes.

3. Computations. Include computations for erosion- and sediment-control features design.

14-2.01(12) Stage 3 Review Submission [Rev. Aug. 2011]

Plans should be approximately 95% complete at this stage.

The purpose of this submittal is to ensure that the plans are complete and satisfy the criteria provided in the Engineering Assessment studies. The following should be completed and reviewed for Quality Assurance. Include responses to Final Field Check questions.

1. Previous Reviews. Include the marked-up plans from the Stage 2 submittal and changes made from the Final Field Check meeting with this submission. Right-of-way changes made after Final Right-of-Way Plans are submitted should be processed in accordance with Section 85-3.03.

2. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and indicate approved dates for design exceptions.

3. Plans Set. If a Final Field Check meeting is not held at the discretion of the project manager, all of the plans requirements of Section 14-2.01(10) should be incorporated.

   a. Erosion Control Plan. Include the completed set.

   b Road Summary Sheets. The content and requirements are described below. For a large project for which the standard-sized Summary tables cannot accommodate all of the items, multiple custom Summary sheets should be used to accommodate all the necessary information. The Summary sheet frames, in DXF format, can be downloaded from http://www.in.gov/dot/div/contracts/test/choose.html. The Pavement Quantities and Approach Table, Structure Data, Paved Side Ditch Summary, Riprap Ditch and Sodding Table, Underdrain Table, Guardrail Summary Table with guardrail-related pay items, Sign Summary Table, Pipe Material Selection, and mailbox approaches information including required HMA quantities should be completed. The Structure Data tables should be updated to include Service Life, Site Designation, and pH for pipes.

   c. Cross Sections. The project engineer or supervisor will require the elevations for existing cross sections in order to calculate the final earthwork quantities.

If the project was designed from an electronic survey, the design calculations should include a data table created from the electronic cross-sections which indicates all existing cross-section elevations.

An example data table is shown as Figure 14-2A.

4. Quantities. Finalize all quantities.

5. Reports. Ensure that the recommendations from the Geotechnical Report and other reports regarding peat, hazardous waste, special waste, etc. have been incorporated into the plans, specifications, and cost estimate.

6. Cost Estimate. Conduct a detailed review to ensure that all necessary pay items have been included. Finalize the construction cost estimate using Estimator.

7. Level One Checklists and Design Computations. If there are no changes to the plans which affect Level One criteria since the prior submission, it is acceptable to copy the previous Level One Checklist and add a statement that no changes have been made to the plans that affect Level One criteria. The statement should be initialed and dated for the current submission.

8. Certification Form. Include a copy of the Scope/Environmental Compliance Certification/ Permit Application Certification form.

9. Special Provisions. Complete the special provisions menu, and include special provisions for non-standard pay items.

10. Rule 5. If required, and not previously submitted in accordance with Section 9-1.02, complete the Rule 5 Submission as described in Chapter Thirty-seven.

11. Underground-Storage-Tanks Removal. If this work is required, the designer should coordinate such activity with the Office of Environmental Services manager. The designer should complete Figure 14-2B, Underground Storage Tanks Removal information request. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/. If a final field check is not required, the coordination should take place six months prior to the Ready for Contract date.

This coordination is to ensure that required pay items such as excavation and handling of contaminated soil are included in the contract.

12. Quality Assurance form.

13. INDOT All Project Commitments Report. This should include all known resolutions.

14. Proprietary Material. If a proprietary material is specified that is not listed the INDOT Approved Materials List on the Department's website, at http://www.in.gov/indot/div/M&T/appmat/appmat.htm, nor in Figure 17-1B, then a Proprietary Material Use Public Interest Finding for the use of the material should be prepared. An editable version of this document appears on the Department's website, at http://www.in.gov/dot/div/contracts/design/dmforms/.

15. Environmental Consultation Form. Summarization 7-3C should be completed at this submission. An editable version of this document appears on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

16. Traffic-Control-Plan Checklist. See Figure 82-7A for details.

14-2.01(13) Final Tracings Submission

Plan should be 100% complete at this stage. The construction project number should be shown in the box in the upper left-hand corner of the title sheet and the lower right-hand corner of all other sheets.

The project manager will submit the Final Tracings package to the Contracts Administration Division's Office of Contracting. The submittal should include the items listed in Section 14-1.02(03).

14-2.02 Road Plans, Rehabilitation Project with No Additional Right of Way Required

14-2.02(01) Grade-Review Meeting

A grade-review meeting should be held with the project manager prior to the Stage 1 plan review submittal. The meeting is for a major project and is at the discretion of the project manager. The following plan sheets and overall sheets must be prepared for the grade-review meeting;

1. Typical Cross Sections. This should include the following:

   a. lane and shoulder widths;

   b. profile grade;

c. cross slopes;

d. curbs;

e. sidewalk locations and widths;

f. bicycle facilities;

g. side slopes;

h. shoulder corrugations, if warranted;

i. ditches;

j. detailed pavement design showing intended pavement treatment, such as resurfacing, crack and seating, rubblizing, replacement, etc.;

k. underdrains, with locations shown relative to pavement; and

l. clear-zone width, if 4R project.

2. Overall Plan View. A sheet showing the overall plan view of the existing topography and preliminary geometrics is required. The overall plan view should be to a scale which is legible for review and discussion at the meeting.

3. Overall Proposed Profile Sheet. A sheet showing the overall proposed profile with the existing ground is required. The overall proposed profile should be to a scale which is legible for review and discussion at the meeting. More than one sheet may be required.

4. Interchange Layout or Overall Layout Sheet. A sheet showing the plan view of the existing topography and preliminary geometrics of each interchange is required. The overall plan view should be to a scale which is legible for review and discussion at the meeting. More than one sheet may be required.

14-2.02(02) Stage 1 Review Submission

See Section 14-2.01(03).

14-2.02(03) Geotechnical Investigation Request Submittal

See Section 14-2.01(04).

14-2.02(04) Preliminary Field Check Meeting

See Section 14-2.01(05).

14-2.02(05) Stage 2 Review Submission

See Section 14-2.01(07).

14-2.02(06) Public-Information Meeting

See Section 14-2.01(09).

14-2.02(07) Final Field Check Plans Submission Meeting

If a final field check is required, see Section 14-2.01(11).

14-2.02(08) Stage 3 Review Submission

See Section 14-2.01(12).

14-2.02(09) Final Tracings Submission

See Section 14-2.01(13).

14-2.03 Road Plans, Partial 3R Project

14-2.03(01) Preliminary Plans

1. Title Sheet. This is the first page and should include the information as follows:

    a. contract and Des numbers;
    b. traffic data;
    c. design data as follows:

(1) design speed;
(2) project design criteria: Partial 3R (non-freeway);
(3) functional classification;
(4) rural or urban setting;
(5) terrain; and
(6) access control;

d. project description information as follows:

(1) route number;
(2) county name and congressional township, range, and section;
(3) limits described from Department-maintained route intersections and by Reference Post system; and
(4) length (gross and net);

e. location map, including information as follows:

(1) civil boundaries;
(2) county, township lines, corporate limits;
(3) nearby Department-maintained routes and major local roads;
(4) north arrow; and
(5) project limits, with stations and highlighted graphics;

f. paving exceptions, with stations;
g. station equations;
h. current INDOT *Standard Specifications* effective year;
i. certification block; and
j. state location map.

2. Construction Plans Index. The Construction Plans Index is a tabulation and description of the numbered design drawings to be included in the plans document.

3. Strip Map. This is a line drawing which shows the following:

a. route number;
b. beginning and ending stations and reference posts and station equations. Consistent units should be used throughout the plans;
c. stations and reference posts for intersecting streets, county roads, city or town limits, and intersecting county lines and railroad crossings, bridges, and paving exceptions;
d. north arrow;

e. location of all recommended construction signs;
f. existing utility lines within construction limits; and
g. civil townships.

4. Typical Cross Sections. These are composed of the basic parts as follows.

   a. Illustration.

      (1) Existing conditions and dimensions (i.e., pavement width, material type, thickness cross-slope, curb, shoulder, ditches, etc.).

      (2) Proposed construction and dimensions (i.e., HMA courses with binder grading, overlay cross-slope, widening, curb shoulders, ditches, shoulder corrugations if warranted, etc.).

   b. Legend showing labels and corresponding items. The descriptions shown in the pay item names should be used where applicable.

   c. Title block.

      (1) Route number.
      (2) limits of section and exceptions.

   d. Supplemental information block (i.e., curve data for superelevation).

5. Typical Approach Details. The INDOT *Standard Drawings* should be used. Existing field conditions not in accordance with the details shown on the *Standard Drawings* will require details to be shown on the plans.

6. Miscellaneous Details. These include all other details not covered by the strip map, typical section, or INDOT *Standard Drawings*.

7. Special Provisions. The designer should follow the guidelines for preparing special provisions described in Section 19-2.0. The designer should not specify the use of proprietary or experimental products or construction methods.

14-2.03(02) Assessing Preliminary Pavement Design

Once the project has been assessed to be a partial 3R project, the designer should determine an approximate pavement thickness for developing preliminary typical cross sections.

14-2.03(03) Preliminary Field Check [Rev. Jan. 2011]

The preliminary field check should occur at a point before development of preliminary plans. The preliminary field check should be scheduled with the district-office entities involved with plan development. The arrangements for scheduling the preliminary field check should be made while plan development is still proceeding, if possible. Copies of preliminary plan documentation should be made available for review prior to the preliminary field check.

The persons who should attend the preliminary field check are as follows:

1. District Personnel.

    a. Design Team leader.
    b. Office of Construction area engineer.
    c. Office of Construction field engineer.
    d. Subdistrict manager or unit foreman.
    e. Designer.
    f. Traffic engineer.
    g. Utilities/railroads engineer.

2. Other Personnel.

    a. Local government agency if applicable.
    b. Local utilities if applicable.
    c. Planning Division's Office of Pavement Engineering manager, if AADT $\geq$ 5000 or trucks percentage $\geq$ 10%.

3. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.03(04) Right of Way

Right-of-way acquisition should not be required. If it is required, the designer should return to the Engineering Assessment phase to consider the project as full 3R, 4R, or possibly new construction.

14-2.03(05) Public Hearing

Public involvement should not be required. If it is, the designer should see Chapter Eight.

14-2.03(06) Utilities and Railroads

The portions of the project limits which may affect existing utilities should also be addressed early in the PPD phase. The designer should stay in contact with the district Utilities/Railroads Team leader to ensure that existing utilities are relocated to avoid delays in the project development. To accomplish this, the district Utilities/Railroads Team leader should have final check prints as early as possible.

If one or more railroad crossings are within the project limits, the district Utilities/Railroads Team leader should be advised. See Chapters Eleven and Forty-seven.

14-2.03(07) Calculations

The calculations must follow a systematic and logical methodology. All calculations should be reviewed for accuracy. Systematic calculations make review and verifying quantities considerably more efficient. All calculations should be submitted with the final documents and should remain the property of the Department.

14-2.03(08) Returned Correspondence

Once input from the district offices of Highway Management, Roadway Services, Construction, and Traffic has been received with suggested changes following the preliminary field check, it may be necessary to arrange and conduct a final field check. See Section 14-2.02(07) for the personnel list who should attend this field check.

14-2.03(09) Final Pavement Design

If the current AADT $\geq$ 5,000 or the trucks percentage $\geq$ 10%, a request for a final pavement design should be submitted to the Planning Division's Office of Pavement Engineering. If the AADT < 5,000 or the trucks percentage < 10%, the designer performs the final pavement design.

14-2.03(10) Final Check Prints [Rev. Jan. 2011]

The final check prints should now be completed. These documents are outlined below.

1. Transmittal Letter. This document should include the following:

a. date;
b. To, Thru, From personnel;
c. contract number;
d. route number;
e. county;
f. Des number;
g. project description and location;
h. estimated contract completion date or number of work days;
i. estimated costs; and
j. letting date.

2. Proposal Book Cover Sheet. This sheet should include the contract number and letting date.

3. Contract Information Book Cover Sheet. This sheet should include the following:

a. contract number;
b. letting date; and
c. certifications (approval signatures and seals).

4. Contract Requirements Worksheet. The designer should place project identification information on this sheet. The designer should coordinate with the district construction engineer to acquire appropriate necessary information. The designer will then transmit it the Contract Administration Division's Office of Contracting. The identification information should include the following:

a. contract number;
b. letting date;
c. district;
d. project number;
e. route number;
f. description, including work type;
g. location;
h. county; and
i. effective dates of Standard Specifications and List of Approved Materials.

5. Table of Contents. This should indicate the documents to be identified as follows:

a. contract number;
b. map of official detour;
c. Proposal;
d. Schedule of Pay Items;

e. construction plans and number of pages; and
f. special provisions.

6. Estimate of Quantities and Cost Estimate. All pay items, including undistributed items, should be referenced in the plans. All pay items are to be worded using the nomenclature shown in the INDOT *Standard Specifications* and authorized-estimating-software listing. The sequence, or order of the pay items, should be numerical by INDOT *Standard Specifications* reference number.

7. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.03(11) Review of Final Check Prints

After the designer has assembled the final check prints, a copy may be circulated among other designers for review and comment. The final check prints are then forwarded to the district Design Office manager for additional review and comments. Upon completion, the designer will make the appropriate revisions.

A set of the final check prints is to be sent to the appropriate district offices of Program Management, Construction, Roadway Services, or Traffic, as required. They are expected to review and return the set to the district Office of Design within one to two weeks. A cover letter should be sent with the set indicating what is expected and when it should be returned.

1. Office of Program Management Preliminary Review. A copy of the contract documents is supplied for its use in coordinating local-agency agreements and detours, and updating the production schedule.

2. Construction Review. The area engineer should review the contract documents and indicate errors, inconsistencies, and constructability. The area engineer completes the remaining information required on the Contract Requirements Worksheet such as the field-office requirements or the need for a profilograph, and also establishes the earliest date to begin work and the contract completion time.

3. Roadway Services Review. The Office of Roadway Services reviews the contract documents and suggests additional changes or corrections. The review pertains to small drainage structures or pipes, wedge and level, patching, guardrail, and ditch work.

4. Traffic Review. The Office of Traffic reviews the contract documents and suggests additional changes or corrections pertaining to traffic maintenance or traffic safety. It also verifies and coordinates the locations and impacts to signal loops, detector housings, no-passing zones, pavement markings, etc.

5. Discussion with Design Office manager. After the other Offices have reviewed the contract documents and have offered suggested changes, the designer is to meet with the Design Office manager to discuss the changes and suggestions. The Design Office manager will then decide which corrections are to be made. The designer will then make the appropriate changes.

6. Office of Program Management Final Review. After all changes are made, a copy of the contract documents is sent to the Office of Program Management for final review. The manager may suggest more changes.

7. Office of Testing Review. The materials engineer may suggest changes to the Plant Laboratory recurring special provision.

14-2.03(12) Shelf-Ready Project

The final check prints are considered shelf-ready after they have been reviewed by the Design Office manager. The documents, now final plans, are to be kept on file until funds are appropriated and a letting date has been established.

14-2.03(13) Signatures and Seals

Once funds are appropriated and a letting date has been established, the final plans should be reviewed and updated. The final plans should then be signed and sealed by the appropriate individuals as shown in Section 14-1.02(03).

14-2.03(14) Contract-Documents Package

Upon receipt of the approved final plans by the Office of Program Management, they are ready to be transmitted as contract documents to the Contract Administration Division's Office of Contracting for processing. The package should consist of the following.

1. Plans.

    a. 11 in. x 8½ in. Plans-Sheets Format. The original construction plans and cross sections with one photocopied set should be transmitted. If the cross sections are in the 36 in. x 24 in. format, only the originals of the cross sections should be sent.

b. 36 in. x 24 in. Plan-Sheets Format. The original construction plans and cross-sections and two sets of prints of the construction plans without cross-sections prints should be transmitted.

2. Estimate of Quantities and Cost Estimate. The estimate of quantities and cost estimate should be generated using the authorized estimating software. The transmittal should consist of a diskette and one hard copy of both the estimate of quantities and cost estimate.

3. Special Provisions. One hardcopy of the prepared Special Provisions Menu with completed recurring special provisions and unique special provisions should be transmitted. A diskette including the unique special provisions should be provided.

4. Detour Map. A map of the official detour and a map of an unofficial local detour, if required, with the approved unofficial-local-detour documents should be transmitted.

The approved package should be sent to the Contract Administration Division's Office of Contracting, where the documents will be processed and prepared for letting. This step should be completed at least 14 weeks prior to the contract letting date.

14-2.03(15) Review Process

1. Pre-Letting. The Office of Contracting may require additional information or further corrections to be made in order for the contract documents to be properly processed. The designer should promptly address these concerns. All responses from the designer should be directed to the district construction engineer.

2. Post-Letting. Following the contract award, a preconstruction conference will be held. The designer should be available upon request to answer questions.

14-2.04 Bridge Plans, New Construction or Replacement Project

14-2.04(01) Hydraulics Submittal

Submittal of hydraulics information will be required a minimum of 60 days prior to the Stage 1 Review submittal. In preparing this submittal, consider the following.

1. All preliminary plotting should be completed and checked.

2. For a new bridge over a waterway, a structure replacement, or a bridge on a new alignment, provide a Layout sheet with the contours plotted on the plan view. For a consultant-designed project, provide the cross sections used in the model.

3. For a crossing with roadway overflow, include the road plan and profile sheets so that the road profile can be reviewed.

4. For a larger-waterway crossing, include a Details sheet of the plan view with the contours plotted to the survey limits. This information will be used by the Department for review (consultant project) or the hydraulic analysis (in-house project).

5. If the project is consultant-designed, include the hydraulic analysis, scour computations, and recommendations for review. If the bridge requires an IDNR permit, the modeling check list should to be included. The consultant needs to provide documentation that contact was made with the county surveyor's office to determine if the stream is a regulated drain.

6. The plans sheets will be for information purposes only, except for the Layout sheet which will include the preliminary structure geometrics.

7. A Quality Assurance form is required.

8. The hydraulic analysis and scour calculations should be signed and sealed by a professional engineer licensed in Indiana.

14-2.04(02) Stage 1 Review Submission [Rev. Jan. 2011]

Plans should be approximately 25% complete at this stage.

Place the proposed design information in the computer-aided details files for this submittal. This information will be submitted in pdf format. However, the plans need not be in final form. The designer should add notes to the plans explaining situations or items which are not readily apparent, and which may influence the proposed design. The notes should be removed for later submissions.

The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and indicate apparent or possible design exceptions.

Also, indicate discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Abbreviated Engineering Assessment. Provide a written scope of the project requirements. This will be a short description of the design criteria proposed for use in the design of the project.

   a. If an Abbreviated Engineering Assessment has been prepared, a copy should be included with the submission.

   b. If an Abbreviated Engineering Assessment was not prepared, the designer should provide a brief written description of the project. This description will, at a minimum, include the information as follows:

      (1) project location;
      (2) project need and purpose;
      (3) existing facility;
      (4) traffic data;
      (5) identification of proposal;
      (6) cost estimate;
      (7) environmental issues;
      (8) right-of-way impact;
      (9) traffic maintenance during construction; and
      (10) concurrence. For an INDOT project, signed by the district production director or the district planning director. For an LPA project, signed by the Project Sponsor.

3. Level One Checklist and Computations. Include the information and computations as follows.

   a. Level One Checklist. The designer should submit a Level One checklist, including computations, with each submission, for the mainline, each S-line, and each traffic-maintenance phase. The designer should include computations for the required intersection sigh distance at each public road, including each local-service road or frontage road within the project limits. The designer should also submit documentation of the intersection sight distance provided at each public road. This requirement also applies to the traffic-maintenance phases.

      The computations for the Level One items and intersection sight distance are to be initialed and dated by the designer and reviewer before submission.

   b. design computations for determining the structure size and geometrics;

c. project-length computations including guardrail lengths and other contributing factors; and

d. waterway-opening calculations for each stream crossing.

4. Economic Analysis. Include a copy of structural economic analyses that may have been conducted to determine the most economic structural alternative. Guidelines for this analysis are listed in Section 59-5.0. A cost estimate should be provided for the selected alternative.

5. Title and Index Sheets. These should include the information as follows:

a. project number;

b. description (des) number (include all des numbers akin to the project);

c. bridge file number;

d. county location map;

e. project location map including north arrow and scales;

f. description of the project work type and location;

> ** *PRACTICE POINTER* **
>
> The location description should be simple and should follow the description on the schedule. For example, *Bridge replacement on State Road 67 over Fall Creek, located 8.00 miles southwest of the south junction with State Road 39, in Section 13, T-11-N, R-2-W, Ray Township, Morgan County, Indiana.* A legal description should not be used.

g. design data including design speed, project design criteria, functional classification, terrain, and traffic data;

h. applicable reference point (does not apply to local-agency project);

i. signature blocks; the blocks will not be completed at this stage;

j. latitude and longitude; and

k. an index of plan sheets, as separate sheet 2, at this stage. Sheet numbers will change for future submittals.

6. Typical Cross Sections. Typical cross sections should only show basic configuration and design features. This will include the following:

a. lane and shoulder widths;

b. profile grade, construction centerline, paper-relocation line, and survey line locations; and

c. basic design features including curbs, sidewalks, pavement and shoulder cross slopes, side slopes, ditches, shoulder corrugations if warranted, etc.

7. Road Plan and Profile Sheets. At this project stage, these sheets will only include the preliminary design information. Some of the details that should be addressed include the following:

a. plotting of existing topography should be complete;

b. beginning and end of project;

c. horizontal alignment (e.g., horizontal curve data, PC, PI, PT, bearings);

d. vertical alignment and its relationship to grade-controlling features;

e. preliminary drainage design including mainline culverts;

f. preliminary public-road approach and drive locations;

g. approximate construction limits; and

h. proposed guardrail limits.

8. Layout Sheet. This should include the preliminary design information for the following:

a. existing-ground contours;

b. horizontal alignment;

c. vertical alignment;

d. drainage structures;

e. public-road approach and drive locations;

f. approximate construction limits;

g. plan view showing bridge centerline station and skew;

h. proposed structure geometrics (span lengths and clear roadway widths in the title block);

i. channel protection;

j. utility owners;

k. existing structure data; and

l. hydraulic data.

> ** *PRACTICE POINTER* **
>
> The scour elevation to be shown on the Layout sheet should be the scour elevation for Q_{500}.

9. Channel-Change Layout Sheet. Include this sheet if the extent of the channel change is beyond the general layout. The sheet should include the preliminary design information for the following:

a. stream profile;
b. new channel geometrics;
c. channel typical cross section; and
d. slope protection.

10. General Plan Sheet. This should include the information as follows:

a. plan view;
b. elevation view;

c. typical bridge cross section;
d. design data. A note should be included which reads as follows:

(1) Superstructure and substructure designed for HL-93 loading, in accordance with the AASHTO *LRFD Bridge Design Specifications, ___th Edition*, [current-edition year], and its subsequent interims.

Substructure foundation designed for HS-25 loading, in accordance with the AASHTO *Standard Specifications for Highway Bridges, ___th Edition,* [current-edition year], and its subsequent interims; or

(2) Designed for HS-25 loading, in accordance with the AASHTO *Standard Specifications for Highway Bridges, ___th Edition,* [current-edition year], and its subsequent interims ; or

(3) Designed for HS-20 loading, in accordance with the AASHTO *Standard Specifications for Highway Bridges, ___th Edition,* [current-edition year], and its subsequent interims.

e. suggested substructure type; and
f. minimum vertical clearance.

11. Cross Sections. The preliminary cross sections should include the following:

a. templates of the typical sections placed on the existing cross sections;
b. profile grade elevations; and
c. drainage structures.

12. Design Information. In addition to the plans, the designer should include copies of the preliminary hydraulic analysis for each mainline culvert, if applicable, and results of economic analyses that may have been completed for alternative grade lines.

13. Preliminary Cost Estimate. This should be developed for the major pay items with percentages shown for the minor pay items.

14. Certification. Provide a current copy of the Scope/Environmental Compliance Certification/Permit Application Certification form with this submission.

15. Quality Assurance form.

16. INDOT All Project Commitments. Report. This should include all known resolutions.

14-2.04(03) Geotechnical Investigation Request Submittal

Upon approval of the Stage 1 Review Submission, the Geotechnical Investigation will be requested. The plans sheets to be included with this request are as follows:

1. title sheet;

2. Typical Sections sheet, including tabulation of subgrade-treatment information;

3. Details sheets. If the project requires a MSE wall, include a preliminary wall layout;

4. roadway plan and profile sheets;

5. Layout sheet;

6. General Plan sheet. Include the anticipated foundation loads. If the structure requires pile loads in excess of 70 tons, the required pile capacity should be shown; and

7. Cross Section sheets.

14-2.04(04) Preliminary Field Check Meeting [Rev. Aug. 2011]

A Preliminary Field Check meeting should be held after the Stage One review submittal and prior to the Stage 2 review submittal. Plans sets should be distributed a minimum of three weeks prior to the meeting (see Figure 14-1B, Field-Check Notification).

To hold the Preliminary Field Check meeting, plans should be approximately 35% complete. The following sheets and information must be included.

1. Previous Reviews. Incorporate comments from previous reviews.

2. Index and Title Sheet.

3. Typical Cross Sections.

4. Plat Sheet. Include a preliminary Plat No. 1 (does not apply to local-agency project).

5. Road Plan and Profile Sheets. In addition to the information described in Section 14-2.04(02), show the following:

a. elevations and grades of ditches so that accurate right-of-way requirements can be determined;

b. construction limits;

c. proposed right of way including temporary right of way;

d. public-road approach and drive locations;

e. drainage features (e.g., storm sewers, pipe structures, ditch grades); and

f. permanent erosion protection, including paved side ditches, riprap, or sodding limits.

6. Details Sheets. Include the preliminary layouts for the details as follows:

a. roadway and shoulder layout for guardrail;

b. special elements where applicable (e.g., modified approaches, signs, signals);

c. intersection layout details including right- and left-turn lanes with the turning movements indicated; and

d. superelevation transition diagrams.

If shoulder corrugations are warranted, and the plans include details for a non-standard public-road approach, drive, etc., each detail should show the extent of corrugations installation required in conjunction with the construction illustrated by the detail. If applicable, the INDOT *Standard Drawings* should be used as a guide in determining the limits of corrugations installation related to the feature shown in the detail.

7. Traffic-Maintenance Details. The proposed traffic-maintenance scheme and phasing should be outlined.

8. Road Summary Sheet. This preliminary sheet should include the following:

a. approach table with type, location, geometric data, and types of materials; and

b. Structure Data table with location, size, and type for each structure.

9. Cross Sections. See the information regarding cross sections in Section 14-2.04(02). Finalize the cross sections according to the revisions from the Stage 1 review plans. Also show the public-road approaches and drives.

10. Design Information. In addition to the plans, the designer should complete the following:

    a. initiate unique special provisions;

    b. preliminary woody-revegetation determination; and

    c. submit a request for the final pavement design to the Office of Pavement Engineering.

14-2.04(05) Preliminary Right-of-Way Plans Preparation

See Chapter Eighty-five for criteria and information that should be included with Right-of-Way Plans.

14-2.04(06) Stage 2 Review Submission [Rev. Jan. 2011]

Plans should be approximately 50% complete at this stage.

Plans for this submittal should be close to their final form. The plans sheets for this submittal should be legible and consistent with the quality desired for public viewing. The right-of-way plans should be consistent with the requirements of Chapter Eighty-five. The following sheets and information must be reviewed for Quality Assurance and should be included with this submission.

1. Previous Reviews. This submission should include the following:

    a. marked-up plans from the previous submission;

    b. document changes made from the Preliminary Field Check meeting;

    c. revisions to the plans due to the Geotechnical Report, if completed; and

    d. responses to field check questions.

2. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and indicate apparent or possible design exceptions. Indicate discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

The required documentation for all Level One and Level Two design exceptions should be prepared.

3. Title and Index Sheets. Finalize the title sheet for right-of-way plans, and include the right-of-way index in a separate sheet 2.

4. Plat Sheets. All plat sheets, if required should be consistent with the plans and finalized.

5. Soil Borings Sheet. Ensure the information is accurate from the Geotechnical Report. Each boring log should include an elevation at each break in the soil strata. The elevations should be shown along the vertical grid so that the elevation of each soil sample can be ascertained. Logs for roadway borings should not be included on this sheet.

> ** *PRACTICE POINTER* **
>
> Copies of the boring logs included in the Geotechnical Report may be scanned and placed onto the Soil Borings sheet, provided they are still legible once the plans are reduced to half-size.

6. Road Plan and Profile Sheets. Right-of-way should be finalized and consistent with the Details sheets. The sheets should include the information as follows:

   a. drainage features (e.g., storm sewers, pipe structures, ditch grades, preliminary inlet spacing for storm-sewer trunk line design, etc.) and proposed drainage notes; and

   b. permanent erosion protection, including paved side ditches, riprap, and sodding limits.

7. Layout Sheet. The Layout sheet should be essentially complete.

8. General Plan Sheet. The General Plan sheet should be essentially complete.

9. Road Summary Sheet.

   a. Structure data table is in preliminary form and should include structure numbers and locations.

b. Approach table is in preliminary form and should include the approaches' design information.

10. Cross Sections.

11. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate. The Department's cost-estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will consist only of major pay items with a percentage added to consider minor pay items. If practical, the traffic-related pay items should be segregated.

12. Level One Checklists and Design Computations. If there are no changes to the plans which affect Level One criteria since the prior submission, it is acceptable to copy the previous Level One Checklist, and add a statement that no changes have been made to the plans that affect Level One criteria. The statement should be initialed and dated for the current submission.

    The designer should submit a Level One Checklist, including computations for the mainline, each S-line, and each traffic-maintenance phase. The designer should include computations for the required intersection sight distance at each public road, including each local-service road or frontage road within the project limits. The designer should also submit documentation of the intersection sight distance provided at each public road. This requirement also applies to the traffic-maintenance phases.

13. Foundation Review Form.

14. Permit Information. This should be provided as required.

15. Certification. Provide a current copy of the Scope/Environmental Compliance Certification/Permit Application Certification form with this submission.

15. Quality Assurance Form.

16. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.04(07) Hearing Plans Preparation (if necessary)

See the requirements listed in Section 14-2.01(08)

14-2.04(08) Final Right-of-Way Plans Preparation

Chapter Eighty-five provides the criteria and information that should be included with a set of right-of-way plans. This submission is not required for a local public agency project. The designer should review the instructions for Quality Assurance, and perform the following:

1. include the marked-up Preliminary Right-of-Way Plans with this submission, if required;

2. incorporate all revisions made during the Preliminary Right-of-Way Plans submission review;

3. complete all project-information boxes, including right-of-way project number and sheet numbers;

4. complete all sheet-numbers cross references; and

5. review the plans against the checklist shown as Figure 85-2F.

14-2.04(09) Stage 3 Review Submission [Rev. Sept. 2011]

Plans should be approximately 95% complete at this stage.

For this submittal, finalize the plans and include all roadway, traffic, and bridge details, and check the computations. Complete the following and review these elements for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Conformance. Review the plans for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and identify approval dates of design exceptions.

3. Pavement Design. Incorporate the final pavement design into the typical cross section and final quantities.

4. Computations and Quantities. Include the computations and quantities with this submission as follows:

    a. final approach drainage design;
    b. superstructure design;
    c. end bent or abutment design;

d. interior substructure design;
e. bridge-seat elevations;
f. screeds at copings, profile grade, each beam line, and each construction joint;
g. superstructure quantities;
h. end-bent or abutment quantities;
i. interior substructure quantities;
j. pavement, curb, sidewalks, and related quantities;
k. drainage-structure quantities;
l. riprap, sodding, and seeding quantities;
m. earthwork quantities;
n. traffic-related items and designs as discussed and revised from Field Check Plans;
o. traffic-maintenance quantities;
p. miscellaneous roadway quantities;
q. updated construction cost estimate;
r. completed special provisions; and
s. erosion- and sediment-control features design.

5. Reports. Ensure that the recommendations from the hearing comments, Geotechnical Report, or other reports regarding peat, hazardous waste, special wastes, etc., have been incorporated into the plans, specifications, and cost estimate.

6. Plans. The plans should be nearly complete at this stage and should include the following.

a. Title and Index Sheets. Complete the Design Data block and update the index as necessary.

b. Typical Cross Sections. Add the final pavement design information.

c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap, and paved side ditch locations are indicated; earthwork balances are shown; and removal items identified. Right-of-way station offsets from the final right-of-way plans should be incorporated.

d. Details Sheets. Ensure that all details are completed and included with this submission. This includes details for the following:

(1) reinforced-concrete bridge approach bill of materials and details;
(2) temporary erosion control;
(3) traffic-maintenance details; and
(4) traffic-design elements (e.g., intersections, signals, signing, or lighting).

e. Bridge Sheets. Finalize the design for these sheets as follows.

(1) Soil Borings sheet.
(2) Layout sheet. Ensure that the riprap and slopewall quantities are shown and the earthwork summary is completed.
(3) General Plan sheet.
(4) End Bent or Abutment Details.
(5) Interior Substructure Details.
(6) Superstructure Details.

f. Tables. Complete all data tables including the following:

(1) Bridge Summary Table;
(2) Structure Data Table;
(3) Approach Table;
(4) Underdrain Table;
(5) Paved Side Ditch and Sodding Table;
(6) Guardrail Table; and
(7) Sign Summary Table.

g. Cross Sections. Design information should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

7. Level One Checklists and Design Computations. If there are no changes to the plans which affect Level One criteria since the prior submission, it is acceptable to copy the previous Level One Checklist and add a statement that no changes have been made to the plans that affect Level One criteria. The statement should be initialed and dated for the current submission.

The designer should submit a Level One Checklist, including computations for the mainline, each S-line, and each traffic-maintenance phase. The designer should include computations for the required intersection sight distance at each public road, including each local-service road or frontage road within the project limits. The designer should also submit documentation of the intersection sight distance provided at each public road. This requirement also applies to the traffic-maintenance phases.

8. Rule 5 Submission. If required and not previously submitted, submit in accordance with Section 9-1.02.

9. Limited Review and Certification Form.

10. Quality Assurance Form.

11. Bridge Load Rating. For each bridge on an INDOT route, a copy of the bridge plans, excluding cross sections, with a cover letter indicating the designer's name, design firm (if applicable), telephone number or e-mail address, and other necessary information should be transmitted to the Production Management Division's load rating engineer. This requirement will not apply to a box, three-sided, or local public agency structure.

    The load rating engineer will run the available bridge load rating program and will notify the project manager of the results within 30 days.

    If the analysis shows an inventory rating less than 1.0, the project manager will transmit the information to the designer to review, comment, and revise the design and plans, as necessary, or resolve rating-input errors.

    The project manager should submit to the load rating engineer a copy of changes or revisions to the bridge plans, including those due to a cost-reduction proposal that may affect the load capacity rating after the load rating is completed.

    The project manager will provide the bridge inspection engineer with the structural calculations including computer output if the bridge is one of the types as follows:

    a. post-tensioned concrete beams; *
    b. segmental concrete; *
    c. three-sided structure; **
    d. oversize box culvert; ** or
    e. other as requested by the Bridge Inventory Team.

    * The designer will notify the bridge inspection engineer of this structure type as soon as practical after receipt of design approval.

    ** No submission of final check prints will be made for this structure type. Calculations will be furnished after shop plans are approved.

12. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.04(10) Final Tracings Submission

See the requirements listed in Section 14-1.02(03).

14-2.04(11) Bridge within Limits of Road Project

Plans for a bridge which is complementary to plans for road work must be developed as described below. Each structure which is assigned a bridge file number must also be assigned a Des number.

1. INDOT-Route Project.

   a. New or Replacement Beam or Slab Bridge. A separate set of plans should be developed for each bridge. However, plans for an overflow structure may be included in the set for the main-channel structure.

   b. New or Replacement Three-Sided, Box, or Pipe Structure. These may be incorporated into the road plans. The structure file number and Des number for each such structure included in the road plans should be shown on the title sheet.

   A separate set of plans with only one title sheet may be developed for one or more of these structures.

2. Local-Public-Agency Project. Bridge plans may be incorporated into road plans or developed as a separate set per the requirements of the local public agency. However, the structure file number and Des number for each structure included in the road plans should be shown on the road title sheet.

14-2.05 Bridge Plans, Rehabilitation Project

14-2.05(01) Preliminary Field Check and Inspection Report

Based on the initial inspection of the structure, prepare the Inspection Report. The Report should include, but should not be limited to, the following:

1. existing condition status;
2. rehabilitation recommendations;
3. tabulation of design criteria;
4. cost estimate;
5. quantity computations;
6. color photographs; and
7. environmental-permit requirements.

The Report may also include a detailed account of past repairs, a design exception request, and justification for a survey to verify geometric information.

Section 72-2.05 provides the Department's procedures for the initial Field Inspection and the suggested format and content of the Bridge Inspection Report.

If potential scour problems were identified on the initial inspection, the Hydraulics Team should be contacted.

If the project will include foundation work, the Office of Geotechnical Engineering should be contacted.

14-2.05(02) Scope-of-Work Approval

Once the Inspection Report has been determined by the reviewer to be satisfactory, approval of the Scope of Work is recommended. The designer will be requested to make a Preliminary Plans Submission upon Scope-of-Work Approval.

14-2.05(03) Preliminary Plans Submission [Rev. Jan. 2011]

After receiving Scope-of-Work Approval, begin preparation of the preliminary plans. Information on these plans will include the following.

1. Title and Index Sheets. At this stage, these sheets should include the information as follows:

    a. project number, bridge file number, and Des number;

    b. project description;

    c. county location map;

    d. project layout map including north arrow and scale;

    e. design data including design speed, project design criteria, functional classification (rural or urban setting), type of terrain, and traffic data;

    f. signature blocks; these blocks will not be completed at this stage; and

    g. an index of plan sheets, as separate sheet 2, at this stage. Sheet numbers may change for future submittals.

2. Traffic-Maintenance Details. The proposed traffic-maintenance scheme and phasing should be outlined.

3. Layout. A Layout sheet is not required unless the rehabilitation project is significant enough to warrant a full survey.

4. General Plan. This sheet should include the following:

   a. plan view;
   b. elevation view;
   c. typical bridge cross section;
   d. design data relative to structural elements;
   e. related general notes; and,
   f. general rehabilitation recommendations (e.g., legend, material notes, required stormwater- pollution-prevention retrofits).

5. INDOT All Project Commitments. Report. This should include all known resolutions.

Preliminary plans will be sent to the Production Management Division's Railroads and Utilities teams for their use. Preliminary Plans may be utilized in the application of relevant environmental permits. Upon approval of the Preliminary Plans, the designer will be requested to submit the Final Plans.

14-2.05(04) Final Plans Submission [Rev. Jan. 2011]

This submittal will include the following:

1. all revisions to the Preliminary Plans;
2. all necessary plans details required to adequately define the required repairs;
3. final quantities computations;
4. final design computations;
5. special provisions; and
6. final construction cost estimate; and
7. INDOT All Project Commitments Report. This should include all known resolutions.

The Final Plans should also include specific measures proposed by the Railroads, Utilities, Environmental, Geotechnical, or Hydraulics team.

A submission to obtain a bridge load rating analysis should be made as described in Section 14-2.04(09), item 12.

14-2.05(05) Final Field Check

After reviewing the Final Plans and finding them substantially complete and correct, a Final Field Check will be scheduled. The purpose of this Field Check will be as follows:

1. confirm the condition of the structure and appropriateness of the plans; and

2. allow the district representative to review the traffic-maintenance scheme and construction procedures.

14-2.05(06) Final Tracings Submission

All revisions resulting from the Final Field Check and Final Plans review will be completed for this submission.

14-2.05(07) Bridges within Limits of Road Project

Plans for multiple bridge rehabilitations which are complementary to plans for road work may be combined into one set of bridge plans. The structure file numbers and Des numbers for all such structures should be shown on the title sheet.

14-2.06 Traffic Plans, Signing Project

Separate traffic-signs plan sheets, including Title sheet, Index, and General Notes sheet, etc., are provided for each road project where a separate Des number is used for the traffic-signs portion of the project. This occurs if the project is 1 mi or longer, or for a major project including an interchange.

> ** *PRACTICE POINTER* **
>
> Existing traffic-signs plans for a non-Interstate route are not required unless instructed otherwise.

14-2.06(01) Preliminary Plans

Preliminary plans will consist of plan sheets with the information as follows:

1. mainline geometry and all intersecting roadways;
2. North arrow on each sheet; and
3. mainline and each intersecting roadway labeled, and centerline stationing.

14-2.06(02) Preliminary Field Check Plans Submission [Rev. Jan. 2011]

For this submittal, the plans should include the sheets as follows.

1. Title Sheet. Include the layout map and show the project location on the location map.

2. Index and General Notes Sheet. The index blocks should be completed to indicate the sheet numbers for the plans at this stage. The sheet numbers will change for future submittals.

3. Signs Plans Sheets. These sheets should include the information as follows:

    a. plan view of the roadway;

    b. route numbers and street names;

    c. right-of-way limits;

    d. north arrow;

    e. stationing, identification number, and message of all existing sheet signs, ground-mounted panel signs, and overhead panel signs;

    f. stationing and identification number of each proposed sign;

    g. proposed panel-sign messages; and

    h. the applicable legend; see Section 14-3.04.

4. Sign Summary Table. The sign location (station) and type (sign code) should be shown. However, the sign size, summary, and post size need not be completed at this stage.

5. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.06(03) Final Field Check Plans Submission [Rev. Jan. 2011]

The plans should be in their final form. However, some changes still may occur. Plans should include the following.

1. Title Sheet. This sheet should be essentially complete except for signatures.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes.

3. Existing Signs Plans Sheets. These sheets will provide the stationing, identification number, and message for each existing sign.

4. Proposed Signs Plans Sheets. In addition to the criteria for Preliminary Field Check plan sheets, these sheets should include the information for overhead-sign lighting as follows:

    a. service point;
    b. cable duct;
    c. cable duct marker; and
    d. handhole.

5. Sign Layout Sheets. These sheets should include the following:

    a. size of sign;
    b. sign border;
    c. corner radii;
    d. height of message or legend;
    e. stationing and identification number;
    f. code for route shield;
    h. size of arrow and degree of slant; and
    g. notation for special color combinations (e.g., black copy on yellow background).

6. Cross-Sections. These sheets should include the following:

    a. for each box truss, monotube span, tri-cord, or cable-span structure, the full roadway cross section;

    b. for each cantilever structure, half cross section from the lane lines for a multilane facility or the centerline for a 2-lane facility to the front slope;

    c. for each ground-mounted panel sign, the cross section from the edge of the traveled way to the right-of-way line;

d. Cross section sheets for each ground-mounted panel sign will include the following:

(1) size of sign;
(2) sign message;
(3) size and length of posts;
(4) horizontal clearance from the edge of traveled way;
(5) vertical clearance from the edge of traveled way or ground line;
(6) footing dimensions;
(7) identification number; and
(8) stationing.

e. Cross section sheets for each overhead-sign structure will include the following:

(1) size of sign;
(2) legend;
(3) luminaire and spacing, if required;
(4) structure dimensions;
(5) identification number;
(6) stationing; and
(7) type of roadside protection.

7. Details Sheets. The details sheets to be included are as follows:

a. completed Sign Summary Table;
b. proposed route-marker-assembly details;
c. sheet sign details;
d. traffic sign details;
e. foundation details; and
f. any special design details.

8. Other Documents. Other documents that should be included with this submission may include structure and foundation calculations, special provisions, and cost estimates.

9. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.06(04) Final Check Prints Submission

The purpose of this submittal is to ensure that the plans are complete. Those items which were revised at the Final Field Check should have been addressed. All quantities should be finalized

and a bound copy of the computations should be included with the submittal. Conduct a detailed review to ensure that all necessary pay items have been included and that a special provision is provided for each non-standard pay item. A finalized cost estimate should also be included.

14-2.06(05) Final Tracings Submission

The Final Plans submittal will include all necessary revisions from the Final Check Prints submittal. Section 14-1.02(03) discusses what is required for the Final Tracings submission.

14-2.07 Traffic Plans, Signalization Project

14-2.07(01) Preliminary Plans

Preliminary plans will consist of plan sheets with the information as follows:

1. mainline geometry and all intersecting roadways;
2. north arrow on each sheet;
3. outline of signalized intersections; and
4. centerline stationing.

14-2.07(02) Preliminary Field Check Plans Submission [Rev. Jan. 2011]

For the Preliminary Field Check submittal, the plans should include the following.

1. Title Sheet. Include the layout map and show the project location on the location map.

2. Index and General Notes Sheet. The index block should be completed to indicate the sheet numbers for the plans at this stage. The sheet numbers will change for future submittals.

3. Signalization Plan Sheets. These sheets should include the information as follows:

    a. plan view of the intersection including intersection geometrics, curbs, shoulders, and building lines;

    b. route numbers and street names;

    c. right-of-way limits;

d. north arrow;

e. commission number for signal (State highway only);

f. all existing features (e.g., controller cabinets, signal poles, mast arms, foundations, sidewalks, curbs, pavement markings, utilities, etc.);

g. proposed signal installations (e.g., types of signal supports, location of controller cabinet, pavement markings, lane restrictions, intersection dimensions, roadway width, position and direction of signal heads, phase diagram, detector locations, conduit locations, number of wires in each cable run, power service location, detector housing, hand holes, disconnect hangers, etc.);

h. other applicable information includes the location of any pertinent signs, panel sign messages, approaches near the intersection, bus stops and loading zones, drainage structures, curb ramps, and utilities;

i. the applicable legend; see Section 14-3.04; and

j. posted speed limit.

4. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.07(03) Final Field Check Plans Submission [Rev. Jan. 2011]

For this submittal, the plans should be in their final form. However, some changes still may occur. Plans will include the following.

1. Title Sheet. This sheet should be essentially complete except for signatures.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes.

3. Signalization Plan Sheets. Include all revisions from the Preliminary Field Check and finalize the sheets.

4. Details Sheets. All necessary details sheets should be included with this submission.

5. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.07(04) Final Check Prints Submission

The purpose of this submittal is to ensure that the plans are complete. Those items which were revised at the Final Field Check should have been included. All quantities should be finalized in the Estimate of Quantities, with a bound copy of the computations included in the submittal. Conduct a detailed review to ensure that all of the necessary pay items have been included and that a special provision is provided for each non-standard pay item. A finalized cost estimate should also be included.

The Details sheets should include the following:

1. intersection alignment and proper number of lanes;
2. all approaches with posted speeds clearly identified;
3. all drives;
4. all property lines;
5. all right-of-way lines;
6. all edges of pavement and shoulders;
7. locations of curbs, sidewalks, and curb ramps;
8. all pertinent pavement markings, including lane lines, crosswalk lines, and stop lines;
9. all existing and proposed guardrail locations;
10. underground and overhead utilities locations;
11. Legend, Phase Diagram, and Loop Tagging Table; and
12. route number including street name, if any.

Traffic diagrams should not be included.

14-2.07(05) Final Tracings Submission

The Final Plans submittal will include all necessary revisions from the Final Check Prints submittal. Section 14-1.02(03) discusses what is required for the Final Tracings submission.

14-2.08 Traffic Plans, Lighting Project

The lighting-plans portion to accompany plans for a road or bridge project should be submitted as a separate set of plans, including the title sheet, Index and General Notes sheet, etc.

14-2.08(01) Preliminary Plans

Preliminary plans will consist of plan sheets including the information as follows:

1. mainline geometry and all intersecting roadways;
2. north arrow on each sheet;
3. mainline and all intersecting roadways labeled; and
4. centerline stationing.

14-2.08(02) Preliminary Field Check Plans Submission [Rev. Jan. 2011]

For the Preliminary Field Check submittal, the plans should include the following.

1. Title Sheet. Include the layout map and show the project location on the location map.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes. The index block should be completed to indicate the sheet numbers for the plans at this stage. The sheet numbers will change for future submittals.

3. Plan Sheets. These sheets should include the information as follows:

    a. plan view of the roadway;
    b. route numbers and street names;
    c. right-of-way limits;
    d. north arrow;
    e. stationing and identification number of proposed light standards;
    f. identification of overhead-sign lighting, if required;
    g. applicable legend; see Section 14-3.04; and
    h. service point location and type.

4. Design Data. The following design data to be included is as follows:

    a. initial lamp lumens;
    b. average maintained illumination;
    c. lamp lumens depreciation factor;
    d. luminaire dirt depreciation factor;
    e. uniformity ratio;
    f. mounting height;
    g. luminaire classification; and
    h. pavement classification.

5. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.08(03) Final Field Check Plans Submission [Rev. Jan. 2011]

For this submittal, the plans should be in final form. However, some changes still may occur. Plans will include the following.

1. Title Sheet. This sheet should be essentially complete except for signatures.

2. Index and General Notes Sheet. This sheet should include a list of all utilities and a complete list of general notes. The index block should be completed to indicate the sheet numbers for the plans.

3. Lighting Plans Sheets. In addition to the criteria for Preliminary Field Check plans sheets, these sheets should include the following:

    a. cable duct;
    b. circuit number;
    c. cable duct marker, if required;
    d. handhole, if required; and
    e. main breaker and circuit breaker rating.

4. Summary Table. This should include the following:

    a. luminaire or tower number;
    b. connection type;
    c. circuit connection;
    d. pole set-back distance from edge of traveled way, taper, or ramp;
    e. mast-arm length (conventional lighting);
    f. luminaire effective mounting height (E.M.H.); and
    g. top foundation elevation with respect to the edge of traveled way.

5. High-Mast Tower Plans. These should include the details as follows:

    a. pole data schedule;
    b. highway illumination tower detail;
    c. high-mast tower miscellaneous details;
    d. external winch concrete pad;
    e. lightning rod typical details; and
    f. tower retrofit details, if required.

6. Other Documents. Other documents may include the following:

    a. voltage drop and breaker rating calculations;

b. design calculations;
c. special provisions; and
d. cost estimates.

7. INDOT All Project Commitments Report. This should include all known resolutions.

14-2.08(04) Final Check Prints Submission

The purpose of this submittal is to ensure that the plans are complete. Those items which were revised at the Final Field Check should have been included. All quantities should be finalized and a bound copy of the computations should be included with the submittal. Conduct a detailed review to ensure that all of the necessary pay items have been included and that a special provision is provided for each non-standard pay item. A finalized cost estimate should also be included.

14-2.08(05) Final Tracings Submission

This submittal will include all necessary revisions from the Final Check Prints submittal. Section 14-1.02(03) discusses what is required for this submission.

14-2.09 Sidewalk and Curb Ramps Project

The plans should consist of the information as follows.

1. Title Sheet.
    a. Project type as sidewalk
    b. Brief project-location description
    c. Des number and project number
    d. Latitude and longitude

2. Index Sheet.
    a. Plans-sheets index
    b. Utilities information
    c. Revision block

3. Traffic-Maintenance Details. These should be included as needed.

4. Typical Cross Section Sheet.

    a. Sidewalk width and cross slope of 2%

b. Location of sidewalk relative to adjacent travel lane
c. Widths of travel lanes

5. Plan and Profile Sheets.
   a. Existing curbs and separations
   b. Protruding objects such as fire hydrants or utility poles, with horizontal and vertical clearances
   c. Longitudinal grade
   d. Profile Grade survey (PG)
   e. Widths of all existing and proposed sidewalks

6. Cross Sections. These should be included as needed

14-3.0 DRAFTING GUIDELINES

14-3.01 Drafting Methods

All project drafting will be performed using Microstation. The *INDOT CADD System User Guide* provides information on the Department's Microstation system. For a consultant not using INDOT's Microstation system, Chapter Sixteen, once developed, will provide the Department's criteria for translating the CADD files to the Department's system.

The Department's preferred practice is to use only Microstation drafting. However, for a small in-house or consultant-designed project, manual drafting may be acceptable. For a manually-drafted project, the designer/drafter should use the criteria described in the *INDOT CADD System User Guide,* and Chapter Fifteen, once it is developed, for line weights, topography symbols, plotting accuracy, etc.

Where manual plotting is used, the drafter must consider line weights and text sizes to ensure that, once the plans size is reduced, the plans will still be readable. The minimum text should be at least 5/8 in. height. Letters should be open and formed with a dense but not wide line.

14-3.02 Plotting Survey Data

The designer is responsible for plotting all survey data received as an electronic file. The *INDOT CADD System User Guide* discusses how to plot the survey data. Each consultant should plot the survey data according to the procedures provided with the CADD software package.

In plotting survey data, the following accuracies should be used to show elements on the plans sheets.

1. Show horizontal alignment data (e.g., curve information, equations, reference-point tie-ins, section corner tie-ins) to the nearer 0.01 ft.

2. Show existing roadway elevations used for pavement tie-ins and vertical clearance computations to the nearer 0.1 ft. Show benchmark elevations to the nearer 0.01 ft.

3. Horizontal pluses, offsets, physical feature dimensions, and locations, etc., may be shown to either the nearer 0.05 ft or 0.01 ft. The nearer 0.01-ft accuracy is preferred.

4. The survey should be plotted for 300 ft beyond the project limits. At a minimum, the survey should be plotted for 150 ft beyond the project limits.

14-3.03 Sheet Size [Rev. Jan. 2011]

The plans-sheet sizes which may be used are as follows.

1. 8½ in. by 11 in. This size should be used for a partial 3R or other type of project that does not require a significant amount of detail. The sheets are placed into the Contract Information book.

2. 24 in. by 36 in. This size should be used for all other projects.

3. 11 in. by 17 in. Plans sheets should not be initially developed, and final tracings should not be submitted, in this size. Plans sheets of 24 in. by 36 in., if reduced to this size, will not be exactly at half scale. Such plans sheets may be reduced to this size during the development or construction processes for use convenience. Final tracings submitted in this size will be rejected and a resubmission as 24 in. by 36 in. sheets will be required.

14-3.04 General Guidelines

The following provides general guidelines for plotting survey data and design details on the plan sheets.

14-3.04(01) Dimensions

In dimensioning, the following should be considered.

1. Measurement Units. Show all dimensions in english measure. Do not use dual metric and english units. Each unit symbol should be lower-cased and exponentiated, if required, in accordance with english-units customary practice. A period should follow only the symbols in. and gal.

2. Bridge Plans. Show all bridge-plans detail dimensions including span lengths, floor slab widths, etc., in feet and inches. Show all non-structure dimensions on the General Plan and Layout sheets in feet.

3. Road Plans. Road-plans sheets will be prepared using feet and decimals of a foot.

4. Traffic Plans. Traffic-plans sheets will use either feet and inches, or feet and decimals of a foot, depending upon the element shown. However, if the large majority of the dimensions of a drawing or detail are all in one unit method or the other, show all dimensions using one method.

5. Common Units. Where all or most of the units are shown in one set of dimensions (e.g., either feet or inches), a footnote may be added to the sheet stating this fact. For example, *All dimensions are in inches (in.) except as noted.* Remove the ft or ', or the in. or " symbol from the plans to improve the sheet clarity.

6. Spacing. Provide a space between the value and abbreviation symbol (e.g., 12 ft or 12.25 ft or 6 in.). Do not provide a space between the value and punctuation symbol (e.g. 12' or 6"). Provide a hyphen between a feet-and-inches value using punctuation symbols (e.g. 12'-6").

7. Value Less Than 1. For a decimal value, place a zero before the decimal marker (e.g., 0.75 ft). For a fractional value of less than one inch in a feet-and-inches value using punctuation symbols, include a zero ahead of the fraction (e.g. 12'-0½").

8. Large Number. For a number larger than three digits, use a comma to separate blocks of three digits (e.g., 12,000 ft^2). For plan dimensions, it will be satisfactory to either insert or omit the comma as desired.

14-3.04(02) Symbols and Legends

Chapter Fifteen, once it is developed, will provide the Department's electronic-drafting symbol library. These symbols should be used in the preparation of manually- or electronically-drafted plans. To obtain a copy of this library, the designer should contact the CADD Support Team.

Figure 14-3A, Recommended Plans Legends, provides the legends that may be used on plans. Chapter Fifteen will describe traffic symbols and legends that should be used within a set of plans. A circle with either a letter or number inside it may be used to indicate various construction items or materials. Where additional items are similar but with different thicknesses, layers, weights, etc., use an alphanumeric combination [e.g., (A1) 14-in. Plain Cement Concrete Pavement, (A2) 10-in. Plain Cement Concrete Pavement]. The legend should be consistent throughout a set of plans (i.e., each number or letter applies to an individual item throughout a set of plans). Do not renumber the legends on each sheet to account for the unused legends. List the legends used on a sheet in an open area on the sheet.

14-3.04(03) Text

Chapter Fifteen, once it is developed, will provide the Department's criteria for text sizes, fonts, and line weights. For each sheet type, use uniform text sizes and line weights. For example, all of the text for notations in the plan view should be of the same size and weight. However, the text for the summary table may be in a different text size. The font type should be uniform throughout the plans.

Words should not be abbreviated so should therefore be completely spelled out. However, this is not always practical. Figure 14-3B, Plans Abbreviations, provides the common abbreviations that should be used where it is necessary to abbreviate words. Spell out the words for those terms not listed in Figure 14-3B.

14-3.04(04) Plan Notes

Specific plan notes (e.g., dimensions, clarifications) should be placed directly on the applicable sheet. General notes which apply to the whole project or several sheets should be placed on the Index and General Notes Sheet. The types of notes that are acceptable for placement in the plans are as follows:

1. a specific reference to a drawing on a sheet;
2. a note with an arrow drawn to a part of a drawing it complements;
3. utility owners;
4. soil-borings information;
5. cross references to other plan sheets or INDOT *Standard Drawings*;
6. hydraulic data;
7. earthwork table or balance information;
8. bridge-seat calculation procedure;
9. legends;
10. screed instructions;

11. benchmark data;
12. traffic-signal diagram description;
13. Sign Summary description notes;
14. all tables; and
15. Structure Data sheet remarks.

Notes which describe the particular work, material requirements, construction requirements, method of measurement, or basis of payment are considered to be specifications and should not be included on a set of plans. These notes should be included in the INDOT *Standard Specifications*, recurring special provisions, or unique special provisions. Chapter Nineteen provides guidance on the use and preparation of these specifications.

14-3.04(05) Miscellaneous

The following provides guidelines which the designer should consider in preparing a set of plans.

1. Stationing. An english-units station of 100 ft is used, which is shown to two decimal places (e.g., 1 + 00.00). Show tic marks at 100-ft intervals. The tic marks are shown on the survey left side of the centerline. Indicate a full station at every 500-ft interval with plus stations at 100-ft intervals. For an example, see *INDOT Typical Plan Sheets.*

   For example, Sta. 12+27.96 indicates a point 27.96 ft forward of english-units Sta. 12+00. The location of the first even-hundred station on a new alignment is arbitrary.

2. Cross-Section Intervals. Use 50-ft cross-section intervals where the alignment is maintained over existing embankments and through rolling terrain. A larger interval may be used where uniform templates are used over flat terrain. Provide additional cross-section intervals where there are abrupt changes in either the typical section or the existing ground.

3. Angles. Express angles in degrees, minutes, and seconds.

4. North Arrow. Provide a uniform north arrow on the finished set of plans. Chapter Fifteen illustrates the appropriate north arrow that should be used.

5. Reduction. A full-sized set of mylar (reproducible) plans is required for construction and contract letting. Section 14-3.03 discusses the sheet sizes that are used by the Department. Scales used for drafting the full-size sheets are no longer accurate once the plans are reduced. Once the plans are reduced, readability of the plans may become critical. The minimum text sizes that should be used are provided in the *INDOT CADD System User Guide,* and Chapter Fifteen, once it is developed

6. Limits. The limits of plan coverage on a road-project plans sheet will vary according to the plan and profile scale selected and type of plans sheet selected. Section 14-3.05 discusses the scales that should be used.

7. Plans Sheets. The Department's typical plans sheets can be obtained from the INDOT CADD library.

8. Alignment Placement. Where the horizontal alignment is on tangent, the centerline or survey line should parallel the top border and be centered vertically in the plan-view space. Where the horizontal alignment is on a curve, tangents should be angled to produce reasonable balance. Keep an entire curve on the same sheet.

9. Soil-Boring Logs. In plotting soil-boring logs for a bridge project, elevations should be shown along the vertical grid for each boring log so that the elevation of each soil sample can be ascertained. Road-boring logs should not be included in the plans.

   Boring logs may be scanned and placed onto the Soil Borings sheet, provided such logs are legible when reduced to half-size.

10. Project Block. Each sheet will have a project block along the bottom of the sheet. The project block will vary from sheet to sheet. These are illustrated in the *INDOT Typical Plan Sheets* document. The following information, from left to right, should be included in the project block.

    a. Design Information. In the lower left-hand corner of each plan and profile sheet, include the horizontal-alignment references. For most other sheets, this area will be left blank.

    b. Engineer's Seal. The engineer's seal is required on each sheet along with the signature of the engineer and date signed. The seal location may vary within the plans sheet depending on which engineer prepared the sheet.

    c. Signatures. The signature block will include the signatures for the design engineer, designer, drafter, and checkers.

    d. Sheet Title. Each sheet should be labeled.

    e. Scales. Where applicable, identify the scales used on the drawing in the lower right-hand corner.

f. File Numbers. Show all applicable files and references including contract number, bridge file, Des number, survey book number, etc., in the lower right-hand corner.

g. Sheet Numbering. Provide the sheet number and the total number of sheets for the set in the lower right-hand corner of each sheet. Number all sheets sequentially including the title sheet. Sheets that are added after the sheet numbers have been placed should be designated as described in Section.14-1.02(04), and identified in the index. The additional sheets are not included in the total number of sheets. The sheet numbering should be the last thing the designer does prior to submitting the final tracings to the Research and Documents Library Team.

h. Survey Lines. If there are multiple survey lines, indicate the line designation with the sheet title (e.g., Plan and Profile Line "S-1-A").

14-3.04(06) Title Sheet [Rev. Jan. 2011]

The information block should be in accordance with the format shown in Figure 14-3C. Part V includes geometric design tables which reflect the scope of project construction. The applicable design criteria in such tables are based not only on traffic volume characteristics, but also on road classification, rural or urban setting, type of terrain, and access control. The information block will have all of these design controls defined in one location. A person looking at the plans will immediately know which geometric design table and what design criteria were used in the project development.

In the signatures box, the words Indiana Department of Transportation should be shown under the Approved for Letting signature line, as shown in Figure 14-3C(1). Nothing else should be shown.

14-3.05 Scales

The following provides the recommended drawing scales that should be used in developing a set of plans. The selected scales should be shown in the project block on each sheet. Where scales are not used, this should be shown in the project block.

14-3.05(01) Road Project

For a road project, use the following scales.

1. Title Sheet. For the location map, a 1" = 2000' scale should be used. A location map for an urban area may use a 1" = 1000' scale for better clarity. For a longer project, a scale of 1" = 4000' may be necessary.

2. Typical Sections. The scale for the typical-section figures, commonly ¼" = 1'-0", is at the designer's discretion. The scale selected should adequately show the necessary features. Although not desirable, the scale may vary from typical section to typical section. The vertical scale may be exaggerated to adequately show the pavement cross section.

3. Right-of-Way Sheets. The appropriate scale will depend on the plat sheet used. The following will apply.

    a. Route Survey Plat. Use a scale of 1" = 200'.

    b. Plat No. 1. For a rural area, use a scale of 1" = 400'. For an urban area, use 1" = 100'. For a spot improvement project (e.g., small structure replacement, sight distance improvement, etc.), a scale of 1" = 200' may be used.

    c. Plat No. 3. For a rural area, use a scale of 1" = 400'. For an urban area, use 1" = 100'. For an intermediate area, a scale of 1" = 200' may be used.

4. Plan and Profile Sheets. Plan and profile views will be shown together on one sheet, with the plan view on top and profile view on the bottom. The following scales are used.

    a. Plan View, Rural. A scale of 1" = 50' should be used. For a longer rural project, a 1" = 100' scale may be used.

    b. Plan View, Urban. Depending upon the complexity of the location and work to be accomplished, a scale of 1" = 20' or 1" = 50' should be used.

    c. Profile View, Horizontal. This will be the same scale as the plan view.

    d. Profile View, Vertical. The vertical-profile scale will be 1" = 5' or 1" = 10' depending on the complexity of the project and the plan-view scale selected. A 1" = 10' scale will be used with a plan-view scale of 1" = 100'. A 1" = 5' scale will be used with a plan-view scale of 1" = 50' or 1" = 20'.

    Other scales, as necessary, may be used to provide better clarity or more practical layouts. If a detail cannot be adequately viewed in the selected scale, show the element on a Details sheet.

5. Superelevation-Transition Sheet. The selected scale is left to the designer's discretion. Select a scale which will adequately show the necessary features.

6. Details Sheet. The selected scale will vary based on the complexity of the detail and room available on the sheet. The following provides the scales that are commonly used.

   a. Construction Details. Use a plan-view scale of 1" = 20'.

   b. Intersection or Approach Details. Use a plan-view scale of 1" = 20'.

   c. Spot-Elevation Sheet. Use a plan-view scale of 1" = 20'.

   d. Signing Details. The plan-view scale will be 1" = 50' for an urban area or 1" = 100' for a rural area.

   e. Signal Details. The plan view scale will be 1" = 20'.

   f. Pavement Markings. The preferred plan-view scale is 1" =50'. Where significant detail is required, use a plan-view scale of 1" = 20'.

   g. Traffic-Maintenance Details. Use a plan-view scale of 1" = 50' or 1" = 100'.

   The designer may select an alternative scale for one of the above details based on the complexity of the detail and space available on the sheet. For those details not listed, the designer will determine the scale as required.

7. Cross Sections. The horizontal and vertical cross-section scales will be 1" = 10'. A larger scale may be used where a greater cross-section width or height is required.

14-3.05(02) Bridge Project

Many of the sheets for a bridge project (e.g., index and title sheet, Typical Cross Sections, Right-of Way Plat, Plan and Profile sheets, cross sections) will use the same scales as listed in Section 14-3.05(01) for a road project. The scales for the structural details will vary according to the complexity of the drawing and space available on the sheet. The designer should select a scale which will adequately show the necessary detail and still allow the detail to be readable at a reduced scale. The scale for the Layout sheet should be 1" = 30', 1' = 40', or 1" = 50'. For a complex urban project or a project in a steep rural area, a 1" = 20' scale may be used.

14-3.05(03) Traffic Project

For a traffic-signs, signalization, or lighting project, the following scales should be used.

1. Title Sheet. For the location map, a 1" = 2000' scale should be used. The location map for an urban area may use a larger scale for better clarity. For a longer project or for a project scattered throughout a district, it may be necessary to use a scale of 1" = 5000' or smaller.

2. Plans Sheets. The selected scale will depend upon the type of project selected.

    a. Traffic-Signs Sheets. The plan-view scale will be 1" = 50' for an urban area. For a rural area, depending on the project complexity, the scale will be 1" = 100' or 1" = 200'.

    b. Signalization Sheets. The plan-view scale for signalization at an intersection will be 1" = 20'. Where details are required for work between intersections (e.g., interconnect details), the scale may be 1" = 100' or 1" = 50'.

    c. Lighting Sheets. The plan-view scale will be 1" = 50' in an urban area. For a rural area, depending on the project complexity, the scale will be 1" = 100' or 1" = 200'.

3. Details Sheets. The selected scales will be determined depending on the complexity of the detail and space available on the sheet.

4. Cross Sections. Where cross sections are required, the horizontal and vertical cross-section scales will be 1" = 10'. A larger scale may be used where a greater cross-section width or height is required.

14-3.06 Plans-Dimensions Accuracy

The accuracy of plan dimensions should be consistent with data upon which they are based. Accuracy for dimensions to be shown on plans is as follows.

14-3.06(01) Road or Traffic Plans

The following accuracies should be observed.

1. Stationing. Show all stationing to the nearest hundredth of a foot (i.e., 0 + 00.01). This will include PVI, PC, PI, PT, equation stations, etc.

2. Angle. An angle or bearing should be shown to the nearest second (i.e., 0º 00′ 01″).

3. Horizontal-Alignment Data. Figure 14-3D, Horizontal-Curve Data on Plans Sheets, provides the order and rounding accuracy that should be used to describe curve data.

4. Vertical-Profile Data. The following vertical-alignment accuracies should be used.

   a. PVI. Stationing. Show each PVI at an even station.

   b. Vertical-Curve Length. Round the length to the nearer 10 ft.

   c. PVI Elevation. Show the elevation to the nearer 0.01 ft.

   d. Grade. Show each vertical grade to the nearer 0.001%.

   e. Vertical Clearance. Show each vertical clearance to the nearer 0.01 ft.

5. Elevation. The following elevation accuracies should be used.

   a. Bench Mark. Show the elevation to the nearer 0.01 ft.

   b. Flow-Line Elevation. Show each elevation to the nearer 0.01 ft.

   c. Pavement Elevation. For existing pavement, show each elevation to the nearer 0.01 ft.

   d. Ground Line. Show the existing ground line to the nearer 0.01 ft.

   e. Other. Show all other vertical elevations, breaks in ditch grades, pipe invert elevations, etc., to the nearer 0.01 ft.

6. Contour Interval. The contour interval will be in 1-ft increments. Each fifth contour should be emphasized and identified. Intermediate contours will not be identified unless they represent a high or low contour. In rugged terrain or on a steep slope, the intermediate contour lines may be removed for clarity.

7. Topography Features. Show the location of all proposed features to the nearer 0.1 ft, or the nearer 0.01 ft where practical.

8. Typical-Cross-Section Elements. The following will apply.

   a. Width. Show all typical-cross-section elements in increments of 6 in. This includes lane or shoulder widths, ditch widths, bench widths, median widths, sidewalks, etc.

   b. Cross Slope. Show each cross slope to the nearer 0.1%, including superelevation rates.

   c. Pavement Depth. HMA pavement-course density should be shown to the nearer 10 lb/yd^2. Show all other pavement elements (e.g., concrete-pavement thickness, aggregate or subbase depth, special-subgrade-treatment depth, underdrain dimensions, etc.) to the nearer inch.

8. Cross-Sections Elements. Show the profile-grade elevation to the nearer 0.01 ft.

9. Miscellaneous Features. For the following features, show the dimensions to nearer increment indicated as follows:

   a. drive location to the nearer 1 ft;
   b. culvert location to the nearer 1 ft;
   c. guardrail to the nearer 0.1 ft
   d. ditch-grade break to the nearer 1 ft.

14-3.06(02) Bridge Plans

In addition to the plan accuracies discussed for road plans, use the following accuracies on bridge plans.

1. Bridge Elements. Bridge elements should be shown in increments of 3 in. (e.g., footing length, span length, beam spacing, pier height, etc.). Where increments of 3 in. are not practical, use 2-in. or 1-in. increments.

2. Reinforcing Bars. Where practical, show the length of each straight bar to the nearer 3 in. For a bent bar, show the individual dimensions to the nearer ½ in. The total length of a bent bar should be rounded to the higher inch. Show spacing of reinforcing bars to the nearer 2 in.

3. Dimensions. Use the following accuracy.

a. Concrete Details. These should be shown in increments of 1 in. (e.g., deck thickness, column section, wall thickness, cap dimension, footing width, pile spacing, etc.). Where increments of 1 in. are not practical, use ½-in. increments.

b. Camber and Deflection Details. Show these to the nearer 0.001-ft increment.

c. Structural-Steel Details. For designations, dimensions, and properties of structural shapes, see ASTM A 6M and the AISC english-shape tables. Other dimensions on Details sheets (e.g., plate width, plate length, splice detail, hole spacing, steel-shoe-assembly size, etc.) should be dimensioned to the nearer 1/8 in. Plate thickness may be shown to the nearer 1/16-in. increment.

d. Precast Prestressed-Concrete Members. Show all cross-section dimensions for these elements to the nearer ¼ in.

e. Manufactured Items. Accuracy for detailed dimensions for these items (e.g., expansion joints, bearing devices, etc.) should be in accordance with industry standards.

f. Horizontal Alignment Tie-Up. Show these dimensions to the nearer 0.01 ft.

4. Elevation. Show each structure elevation, including top-of-bearing-plate elevation, to the nearer 0.01 ft, except as follows.

a. Top-of-Pile Elevation. Where a pile is encased in a concrete cap, show the top-of-pile elevation to the nearer 0.1 ft. Where superstructure beams are attached to the piling, show the top-of-pile elevation to the nearer 0.01 ft.

b. Existing Structure. Show each existing-structure elevation or concrete-removal-line elevation to the nearer 0.1 ft.

c. Ground Elevation. Show each of these (e.g., berm, channel clearing, upper limit of wet excavation, etc.) to the nearer 0.01 ft.

5. Bridge Quantities. Chapter Seventeen provides the rounding criteria for bridge quantities that are also shown on bridge plans.

14-3.07 Plans-Sheets Organization

To provide consistency from project to project, the plans sheets should be assembled in the sequence listed below for the applicable project type. Not all plans sets will include all sheets,

and some sheets can be combined together (e.g., Details sheets). For a project type not listed below, the sequence shown for a road project should be used.

14-3.07(01) Road Project

The recommended plans-sheets sequence is as follows:

1. Title sheet;

2. Index and General Notes;

3. Typical Cross Sections;

4. Plat No. 1 or Plat No. 3;

5. Geometric Tie-Up sheet;

6. Traffic Maintenance Details. A sheet is not required for an official-detour route. A diagram thereof should be included in the Contract Information book;

7. Plan and Profile;

8. Superelevation-Transition Diagram

9. Details sheets, in the order as follows:

    a. Construction Details;
    b. Intersection Details;
    c. Spot Elevation Details;
    d. Channel Details;
    e. Geometric Details;
    f. Right-of-Way Details;
    g. Grading Plan;
    h. Drainage Details;
    i. Erosion Control Details (plan view);
    j. Retaining Wall Details; and
    k. Wetland Mitigation Details.

10. traffic-work details, in the order as follows:

    a. Signs (if separate traffic-sign plans are not required);

b. Signals;
c. Lighting (if separate lighting plans are not required); and
d. Pavement Markings.

11. miscellaneous tables;

12. Approach Table;

13. Underdrain Table;

14. Guardrail Summary Table;

15. Structure Data Table;

16. Pipe Materials sheet; and

17. cross sections.

14-3.07(02) Bridge Project

The recommended plans-sheets sequence is as follows:

1. index and title sheet;

2. Typical Cross Sections;

3. Traffic Maintenance Details. A sheet is not required for an official-detour route. A diagram thereof should be included in the Contract Information book;

4. Road Plan and Profile;

5. Superelevation-Transition Diagram;

6. Roadway Details, in the order as follows:

   a. Construction Details;
   b. Intersection Details;
   c. Spot-Elevation Details;
   d. Geometric Details;
   e. Right-of-Way Details;
   f. Grading Plan;

g. Drainage Details; and
h. Erosion-Control Details (plan view);

7. traffic-work details, in the order as follows:

a. Signs (if separate traffic-sign plans are not required);
b. Signals;
c. Lighting (if separate lighting plans are not required); and
d. Pavement Markings.

8. Soil Borings;

9. Channel Change Layout;

10. Layout;

11. General Plan;

12. structure-details sheets, in the order as follows:

a. Coping Offsets and Tie-up Dimensions;
b. Abutment/Bent/Pier Details and Bill of Materials;
c. Framing Plan and Girder Elevation;
d. Structural-Steel Details or Precast-Concrete Beam Details;
e. Jacking Frames;
f. Bearing Details;
g. Floor Details;
h. Corner Details and Floor Bill of Materials;
i. Railing Details;
j. Expansion Joint Details; and
k. Screeds (optional).

13. Reinforced-Concrete Bridge Approach Details;

14. Bridge Summary;

15. miscellaneous tables;

16. Approach Table;

17. Underdrain Table;

18. Guardrail Summary Table;

19. Structure Data Table;

20. Pipe Materials sheet; and

21. cross sections.

14-3.07(03) Traffic-Signs Project

The recommended plans-sheets sequence is as follows:

1. title sheet;
2. Index and General Notes;
3. Signing Plan;
4. Sign Layout;
5. cross sections;
6. Footing Details; and
7. Structural Details.

14-3.07(04) Signalization Project

The recommended plans-sheets sequence is as follows:

1. title sheet;
2. Index and General Notes;
3. Signal Plan; and
4. Signal Details.

14-3.07(05) Lighting Project

The recommended plans-sheets sequence is as follows:

1. title sheet;
2. Index and General Notes;
3. Lighting Plan; and
4. cross sections.

SHEET	Road, Bridge, or Traffic Project Manager	Traffic Signs Team	Traffic Signals Team	Highway Lighting Team
Title	X			
Index and General Notes	X			
Typical Sections	X			
R/W Plats	X			
Geometric Tie-Up Sheet	X			
Plan and Profile	X			
Superelevation Transition	X			
Details	X			
Construction Details	X			
Intersection Details	X			
Spot Elevation Details	X			
Channel Details	X			
Geometric Details	X			
Right-of-Way Details	X			
Grading Plan	X			
Drainage Details	X			
Erosion Control Details	X			
Traffic Details				
Signs	X	X		
Signals			X	
Lighting				X
Pavement Markings	X	X		
Traffic-Maintenance Details	X	X	X	X
Soil Borings	X			
Layout	X			
Bridge Structure Details	X			
Bridge Summary	X			
Miscellaneous Tables	X	X	X	X
Approach Table	X			
Underdrain Table	X			
Structure Data Table	X			
Pipe Materials	X			
Sign Structure Table	X			
Guardrail Summary Table	X			
Cross Sections	X			

SHEET-PREPARATION RESPONSIBILITIES
FOR ROAD, BRIDGE, OR TRAFFIC PROJECT

Figure 14-1A

FIELD CHECK NOTIFICATION

, 20

Preliminary ☐ Final ☐ Field Check Notification

Work Type:
Route:
Des No.
PE Project No.
R/W Project No.
CN Project No.
Bridge File:
Over
Location: , ☐mi ☐ km of , in County

A Preliminary ☐ Final ☐ Field Check for this project has been scheduled for . The meeting will be held at at the project site. Anyone wishing to provide input into the design of this project should plan to attend.

Utilities with facilities within the limits of this project should review the plans to determine if their existing facilities are accurately shown. Utilities that believe that their facilities will need to be adjusted should attend this meeting. This meeting could provide opportunities for design changes that could eliminate some utility conflicts. Utilities will be contacted by the INDOT Utilities and Railroads Division's Utilities Team leader at a later date concerning the project schedule and relocation coordination. The Team leader can be contacted at (317) 232-5308.

Project Manager

The distribution of this notification is as follows:

INDOT CENTRAL OFFICE DISTRIBUTION					
Recipient	PFC	FFC	Letter	Plans	X-Sec.
Environmental Policy Manager, Environmental Services Div. (C)	X	X	X	X	
Geotechnical Design Engineer, Geotechnical Services Div.	X	X	X	X 2 sets	X 2 sets
Major-Project Manager, Project Management Div. (C)	X	X	X	(2)	(2)
Railroads Team Leader, Utilities and Railroads Div. (C)	X		X	X	
Acquisition Team Leader, Real Estate Div.	X	X	X	(3)	
Real Estate Administrative Services Team Leader, Real Estate Div.	X	X	X		
Real Estate Property Mgmt. Team Leader, Real Estate Div.	X		X	X (4)	
Utilities Team Leader, Utilities and Railroads Div. (C) (5)	X	X	X		
Field Engineer, Construction Management Div.	X		X		
INDOT DISTRICT DISTRIBUTION					
Bridge Inspection Engineer (11)	X	X		X	
Construction Engineer	X	X	X	X 2 sets	
Design Office Manager (D) (6)	X	X	X	X	X
Environmental Scoping Mgr. (D)	X	X	X	X	
Highway Maintenance Director	X	X	X		
Planning and Programming Director	X	X	X		
Production Director	X	X	X		
Program Coordinator	X	X	X		
Railroads Team Leader (D)	X		X	X	
Real Estate and R/W Pgm. Dir. (D)	X	X	X	X	
System Assessment Mgr. (D)	X	X	X		
Testing Office Mgr. (D)	X	X	X	X	X
Traffic Operations Mgr.	X	X	X	(7)	
Utilities Team Leader (D)	X	X	X	X	X
NON-INDOT DISTRIBUTION					
City officials (8)	X	X	X		
County Road Spvsr. or Hwy. Engr.	X	X	X	(9)	
FHWA Area Engineer	X	X	X	(10)	
U.S. Fish and Wildlife Service	X	X	X		
Utility companies	X	X	X	X	X

Notes:

(C) Central-Office-developed project only
(D) District-developed project only

(1) only for project other than Interstate-route bridge rehabilitation
(2) only if plans do not change from initial submittal
(3) only if additional right of way is required
(4) 2 sets plans if additional right of way is required
(5) only if Major Moves or Major New project
(6) only if district-developed, or if signs, pavement markings, signals, or lighting are involved
(7) only if traffic project
(8) only if metropolitan area is affected
(9) only if legal drains, etc., are involved
(10) only if project requires FHWA oversight
(11) only if bridge project

[CONSULTANT LETTERHEAD]

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Preliminary ☐ Final ☐ Field Check Notification

Work Type:
Route:
Des No.
PE Project No.
R/W Project No.
CN Project No.
Bridge File:
Over
Location: , ☐mi ☐ km of , in County

Our firm is under contract with the Indiana Department of Transportation for the design of the referenced project. A Preliminary ☐ Final ☐ Field Check for this project has been scheduled for . The meeting will be held at at the project site. Anyone wishing to provide input into the design of this project should plan to attend.

Utilities with facilities within the limits of this project should review the plans to determine if their existing facilities are accurately shown. Utilities that believe that their facilities will need to be adjusted should attend this meeting. This meeting could provide opportunities for design changes that could eliminate some utility conflicts. Utilities will be contacted by the INDOT Utilities and Railroads Division's Utilities Team leader at a later date concerning the project schedule and relocation coordination. The Team leader may be contacted at (317) 232-5308.

Project Manager

The distribution of this notification is as follows:

INDOT CENTRAL OFFICE DISTRIBUTION					
Recipient	PFC	FFC	Letter	Plans	X-Sec.
Environmental Policy Manager, Environmental Services Div. (C)	X	X	X	X	
Geotechnical Design Engineer, Geotechnical Services Div.	X	X	X	X 2 sets	X 2 sets
Major-Project Manager, Project Management Div. (C)	X	X	X	(2)	(2)
Railroads Team Leader, Utilities and Railroads Div. (C)	X		X	X	
Acquisition Team Leader, Real Estate Div.	X	X	X	(3)	
Real Estate Administrative Services Team Leader, Real Estate Div.	X	X	X		
Real Estate Property Mgmt. Team Leader, Real Estate Div.	X		X	X (4)	
Utilities Team Leader, Utilities and Railroads Div. (C) (5)	X	X	X		
Field Engineer, Construction Management Div.	X		X		
INDOT DISTRICT DISTRIBUTION					
Bridge Inspection Engineer (11)	X	X		X	
Construction Engineer	X	X	X	X 2 sets	
Design Office Manager (D) (6)	X	X	X	X	X
Environmental Scoping Mgr. (D)	X	X	X	X	
Highway Maintenance Director	X	X	X		
Planning and Programming Director	X	X	X		
Production Director	X	X	X		
Program Coordinator	X	X	X		
Railroads Team Leader (D)	X		X	X	
Real Estate and R/W Pgm. Dir. (D)	X	X	X	X	
System Assessment Mgr. (D)	X	X	X		
Testing Office Mgr. (D)	X	X	X	X	X
Traffic Operations Mgr,	X	X	X	(7)	
Utilities Team Leader (D)	X	X	X	X	X
NON-INDOT DISTRIBUTION					
City officials (8)	X	X	X		
County Road Spvsr. or Hwy. Engr.	X	X	X	(9)	
FHWA Area Engineer	X	X	X	(10)	
U.S. Fish and Wildlife Service	X	X	X		
Utility companies	X	X	X	X	X

Notes:

(C) Central-Office-developed project only
(D) District-developed project only

(1) only for project other than Interstate-route bridge rehabilitation
(2) only if plans do not change from initial submittal
(3) only if additional right of way is required
(4) 2 sets plans if additional right of way is required
(5) only if Major Moves or Major New project
(6) only if district-developed, or if signs, pavement markings, signals, or lighting are involved
(7) only if traffic project
(8) only if metropolitan area is affected
(9) only if legal drains, etc., are involved
(10) only if project requires FHWA oversight
(11) only if bridge project

CONTRACT-PREPARATION DOCUMENTS TO
CONTRACT ADMINISTRATION DIVISION
Office of Estimating

Des No.:		Route:
Contract No.:		Letting Date:
Project No.:	PE	County:
	RW	Bridge File:
	CN	Over:

Location:

It is recommended that tracings for the above noted project be accepted. The following items accompany the tracings.

☐ Final Design Book
☐ Final Cost Estimate, Disk ☐ CES ☐
☐ Detour Map
☐ Final Special Provisions, ☐ Disk ☐ ERMS
ERMS Title: FTSplProv[Des No.]Contracts
If not in ERMS, why?

☐ Detail Packet
☐ Permit Certification Form
☐ Design Calculations

Federal Highway Administration Oversight. Required? YES ☐ NO ☐

Asbestos Report. Required? YES ☐ NO ☐
ERMS Title: FTAsbRpt[Des No.]Contracts
If not in ERMS, why?

Environmental-Document Compliance. The environmental document was approved on . The plans were reviewed against it on and were determined to be in compliance with it.

Geotechnical Report. Required? YES ☐ NO ☐
ERMS Title: FTGeoRpt[Des No.]Contracts
If not in ERMS, why?

LPA Agreement Determination. Required? YES ☐ NO ☐
Transmitted to the Research and Documents Library Team on .

Railroad Agreement. Signed? YES ☐ NO ☐ N/A ☐
If not signed, what is status?
Railroad special provision included? YES ☐ NO ☐
ERMS Title: FTRRSP[Des No.]Contracts

If not in ERMS, why?

Right of Way. Additional R/W required? YES ☐ NO ☐ N/A ☐
Is R/W clear and is Certification Letter included? YES ☐ NO ☐
ERMS Title: FTR/WCert[Des No.]Contracts
If not in ERMS, why?
If not clear, number of parcels remaining is
Expected R/W clear date is
R/W contact person is

Utility Coordination. Complete? YES ☐ NO ☐
If not complete, what is status?
Utilities special provision 107-R-169 included? YES ☐ NO ☐
ERMS Title: FTUtilSplProv[Des No.]Contracts
If not in ERMS, why?
Utility Coordination Certification ☐ Waiver ☐ included? YES ☐ NO ☐
ERMS Title: FTUtilCert[Des No.]Contracts
If not in ERMS, why?
Utility contact person is

Permits

Coast Guard Permit.
Not Required ☐ Applied For ☐ Received .
ERMS Title: FTCstGd[Des No.]Contracts
If not in ERMS, why?

Corps of Engineers Permit.
Individual: Not Required ☐ Applied For ☐ Received
Regional General: Not Required ☐ Applied For ☐ Received
ERMS Title: FT404Corps[Des No.]Contracts
If not in ERMS, why?

DNR Permit for Construction in a Floodway.
Not Required ☐ Applied For ☐ Received
ERMS Title: FTDNR[Des No.]Contracts
If not in ERMS, why?

FAA Indiana Tall-Structures Permit.
Not Required ☐ Applied For ☐ Received
ERMS Title: FTFAA[Des No.]Contracts
If not in ERMS, why?

401 Water Quality Permit.

Not Required ☐ Applied For ☐ Received
ERMS Title: FT401Wtr[Des No.]Contracts
If not in ERMS, why?

Rule 5.
Not Required ☐ Applied For ☐ Received
ERMS Title: FTRule5Eros[Des No.]Contracts
If not in ERMS, why?

Are all Permits included with the submittal? Yes ☐ NO ☐
If No, why not?

Summary of Commitments. This consists of a listing of commitments from the environmental document, regulatory agencies, purchasing agreements, etc., including context-sensitive items, as related to design and construction.
ERMS Title: FTCommit[Des No.]Contracts
If not in ERMS, why?

Design Approval. Date

Proprietary Materials. Are any specified which are not listed in *Design Manual* Chapter 17?
YES ☐ NO ☐
If Yes, has the justification been submitted and approved for each item? YES ☐ NO ☐

Unique Pay Items. Are any listed in the Schedule of Pay Items? YES ☐ NO ☐
If Yes, has a unique special provision been drafted and a unique pay item number been requested for each in accordance with *Design Manual* Chapter 20? YES ☐ NO ☐
Unique special provisions authenticated by: Testing ☐ Design ☐ Construction ☐

Non-Participating Pay Items. Are any non-participating pay items included in this contract?
YES ☐ NO ☐
If Yes, is there a separate list of the pay items included in the submittal? YES ☐ NO ☐
Is there a cost-sharing agreement for the non-participating pay items? YES ☐ NO ☐
If Yes, is a copy of the agreement attached to the submittal? YES ☐ NO ☐

Load Rating. Have all bridge structures in the contract been load rated or has the load-rating engineer indicated that structure(s) can not be rated at this time? YES ☐ NO ☐ N/A ☐

Coordination with District Construction Engineer.

For project with field office:
(628-R-552) Field Office, MOS

☐ Type A, 400 SFT (37 m2)
☐ Type B, 500 SFT (51 m2)
☐ Type C, 650 SFT (60 m2)

Field Office Computer System, Additional,
Qty. , Mos. YES ☐ NO ☐

For project without field office:
Mobile Laptop Computer System, Qty. , Mos. YES ☐ NO ☐
Mobile Internet Service, Qty. , Mos. YES ☐ NO ☐

For project with field laboratory:
(628-R-552) Field Laboratory, MOS
☐ Type A, 400 SFT (37 m2)
☐ Type B, 500 SFT (51 m2)
☐ Type C, 650 SFT (60 m2)

Cellular telephone (105-C-164), Qty. YES ☐ NO ☐
Anytime minutes, Qty.
Radio, Qty. YES ☐ NO ☐
Construction engineering YES ☐ NO ☐
Incentive/Disincentive (108-C-043) YES ☐ NO ☐
if YES, attach Justification form.
Partnering (108-C-078) YES ☐ NO ☐
Profilograph as pay item for HMA pavement YES ☐ NO ☐
Profilograph as pay item for PCCP pavement YES ☐ NO ☐
Traffic maintenance (104-C-112) (provide details) YES ☐ NO ☐

Latest date to begin work: Liquidated damages: $
(108-C-090)
Restriction time: Liquidated damages: $
(108-C-091 or -092) (provide details)
Closure time: Liquidated damages: $
(108-C-093)
Intermediate completion date: Liquidated damages: $
(108-C-094)
Calendar completion date: Liquidated damages: $
(108-C-095)
Earliest date to begin work: Liquidated damages: $
(108-C-127)

Designer:

Construction information provided by:

Comments:

Prepared by: Date:

ASBESTOS CERTIFICATION

Route:
Des. No.:
Contract No.:
Project No.:
Structure No.:
Over:
County:

I hereby certify that no asbestos-containing material was specified in a construction document as a building material for this project.

_____
(signed) Designer Date

INDOT location or consulting firm

:

cc: , District Bridge Inspection Engineer
, Environmental Policy Administrator
Project design calculations document

FINAL-TRACINGS CHECKLIST Rev. 12-27-10

Required Items for Contract Administration Division

CONTRACT NO. DES NO. DATE:

DATE	DOCUMENT DESCRIPTION	FILE TYPE	REMARKS	ERMS DOC. TYPE
	ASBESTOS REPORT	PDF	LETTING-DATE CRITICAL	ASBESTOS REPORT
	BRIDGE LOAD-RATING MEMO	PDF		OTHER
	BRIDGE SEARCH DATA FORM	PDF		OTHER
	CONTRACT PREPARATION DOCUMENT SUMMARY TO CONTRACT ADMIN. DIV.	PDF	LETTING-DATE CRITICAL	CONTRACT WORKSHEET
	COST ESTIMATE	PDF	LETTING-DATE CRITICAL; OPTIONAL	COST ESTIMATE
	COST ESTIMATE, GROUP NUMBER CHANGED TO 12	CES	LETTING-DATE CRITICAL	NOT LOADED IN ERMS
	GEOTECHNICAL REPORT	PDF	LETTING-DATE CRITICAL	REPORTS
	GEOTECHNICAL WAIVER	PDF	LETTING-DATE CRITICAL	REPORT
	LARGE CROSS-SECTIONS SHEETS, 36 in. x 24 in. or 34 in. x 22 in.	PDF	LETTING-DATE CRITICAL	FINAL TRACINGS
	LARGE PLANS SHEETS, 36 in. x 24 in. or 34 in. x 22 in.	PDF	LETTING-DATE CRITICAL	FINAL TRACINGS
	OFFICIAL DETOUR ROUTE if not on plans	PDF	LETTING-DATE CRITICAL	ADDITIONAL INFORMATION
	PERMITS: 404, 401, DNR, RULE 5, FAA, ETC.	PDF	LETTING-DATE CRITICAL	PERMITS
	ALL PROJECT COMMITMENT REPORT	PDF	LETTING-DATE CRITICAL	COMMITMENTS
	PROPRIETARY-MATERIALS-USE JUSTIFICATION	PDF	LETTING-DATE CRITICAL	OTHER
	QUANTITY CALCULATIONS	PDF		QUANTITY CALCULATIONS
	R/W CERTIFICATION LETTER	PDF	LETTING-DATE CRITICAL	ROW
	RAILROAD SPECIAL PROVISIONS, if applicable	Word	LETTING-DATE CRITICAL	PROVISIONS
	SMALL PLANS SHEETS, 8½ in. x 11 in.	PDF	LETTING-DATE CRITICAL	PLANS
	SPECIAL PROVISIONS MENUS	Excel	LETTING-DATE CRITICAL	PROVISIONS
	TRANSMITTAL LETTER	PDF	LETTING-DATE CRITICAL	TRANSMITTAL LETTER
	UNIQUE SPECIAL PROVISIONS AND MODIFIED RECURRING SPECIAL PROVISIONS	Word	LETTING-DATE CRITICAL	PROVISIONS
	UTILITY-COORDINATION CERTIFICATION / WAIVER	PDF	LETTING-DATE CRITICAL	OTHER
	UTILITY-RELOCATION PLANS	PDF	LETTING-DATE CRITICAL	UTILITY INFO

FINAL-TRACINGS CHECKLIST Rev. 12-27-10

Required Items for Research and Documents Library Team

DATE	DOCUMENT DESCRIPTION	FILE TYPE	REMARKS	ERMS DOC. TYPE
	ASBESTOS CERTIFICATION, BRIDGE	PDF	LETTING-DATE CRITICAL	LETTERS
	CORRESPONDENCE FILES	PDF	OPTIONAL FOR LPA PROJECT	LETTERS
	DESIGN COMPUTATIONS	PDF		DESIGN COMPUTATIONS
	FINAL DESIGN SUMMARY REPORT	PDF	NOT REQUIRED FOR PROJECT WITH STAGE 1, 2, 3 SUBMITTALS	DESIGN SUM-MARY REPORT
	FINAL PAVEMENT DESIGN	PDF		OTHER
	GEOTECHNICAL REVIEW OF FINAL CHECK PRINTS FORM	PDF		LETTERS
	LEVEL ONE DESIGN CRITERIA CHECKLIST	PDF		LEVEL 1 CHECKLIST
	LIMITED-REVIEW CERTIFICATION	PDF		LTD.-REVIEW CERTIFICATION
	LPA-PROJECT CONSTRUCTION ENGINEERING AGREEMENT IN PLACE ?		YES ☐ NO ☐ N/A ☐	
	LPA-PROJECT MASTER CONTRACT SIGNED BY LPA ?		YES ☐ NO ☐ N/A ☐	
	MARKUPS – FINAL CHECK PRINTS	PDF	INCORPORATED INTO FINAL TRACINGS ? YES ☐ NO ☐	LETTERS
	ORIGINAL FIELD BOOK	PDF	OPTIONAL FOR LPA PROJECT	OTHER
	QUALITY ASSURANCE FORM	PDF		QA FORM
	RESPONSE TO COMMENTS LETTER	PDF		LETTERS
	SCOPE / ENVIRONMENTAL COMPLIANCE CERTIFICATION / PERMIT APPLICATION CERTIFICATION	PDF		ENVIRON-MENTAL COMPLIANCE FORM
	SUBMITTAL DATE 14 WEEKS PRIOR TO LETTING DATE ?		YES ☐ NO ☐	
	SUMMARY OF DESIGN EXCEPTIONS	PDF		LETTERS
	TRAFFIC-CONTROL-PLAN CHECKLIST	PDF	CHECKLIST	OTHER
	TRAFFIC-MANAGEMENT PLAN	PDF	WHERE APPLICABLE	OTHER

CONTRACT INFORMATION BOOK CERTIFICATION

(Return to INDOT in 48 hours)

INDOT contact person, , Project Coordinating Engineer,
Office of Estimating, Contract Administration Division

Letting Date:
Contract No.:
Route:
Des. No.:
County:

I certify that I have reviewed the plans and the Contract Information book (CIB), and have verified that they are correct as compiled, based on design submittals received by Contract Administration prior to the compilation of the CIB.

_____

(signed) project designer

INDOT location or consulting-firm name

Date,

OR

The plans or CIB include errors. The designer is responsible for documenting the errors, and for noting which errors were caused by omissions or misinterpretations by INDOT based upon the original material, or based upon new material. The designer shall transmit the documentation to the contact person identified above.

_____

(signed) project designer

INDOT location or consulting-firm name

Date,

CONSTRUCTION CHANGE

Date:

Contract No.: Work Type:
Route: Des No.: Location: of
Structure No.: Project No.:

TO:
District Deputy Commissioner

ATTN.:
District Construction Office Manager

FROM:
Project Manager

Transmitted herewith are copies of the above-referenced contract's revised plans sheets, numbered . These sheets were revised on . The revision involved the following:

Please have the Project Engineer or Supervisor prepare a Change in Plans, Form IC-626, addressing revised pay quantities, if applicable.

Two sets of the revised sheets are for your files and two sets each are to be delivered to the Contractor and Project Engineer or Supervisor. The FHWA is being provided with a half-size set of the revised sheets for its files (if applicable).

Note: Quantities revisions are to be computed and transmitted by the designer with this memorandum to the Project Engineer or Supervisor for aid in preparing Form IC-626.

DATE: 14JUN04. TIME: 08:58:37
MOSS

REPO SECTIONS DESIGN

MODELNAME	RECORD	SECURITY	LAST UPDATED
Sections	195	Free	14 Jun 04, 08:11:52
Design	194	Free	14 Jun 04, 08:37:04

LABEL	SUBREF	CONTENTS	NO. PTS.	X-MIN	Y-MIN	X-MAX	Y-MAX
G001	MBRA	7705	24	4843	4801	4936	4874

CHAINAGE 2100.000

Point	---X---	---Y---	---Z---	OFFSET	LABEL CUT
1	4843.480	4873.250	783.566	-58.220	BNDR
2	4843.597	4873.159	783.578	-58.072	TRIA
3	4849.094	4868.863	783.709	-51.096	BNDR
4	4857.378	4862.390	783.784	-40.582	*TR*
5	4865.662	4855.916	783.858	-30.068	BNDR
6	4870.090	4852.456	783.252	-24.449	DLL1
7	4870.323	4852.274	783.292	-24.153	TRIA
8	4870.603	4852.055	783.322	-23.798	TRIA
9	4873.658	4849.668	783.634	-19.921	TRIA
10	4878.029	4846.253	784.052	-14.374	ESL1
11	4881.321	4843.680	784.194	-10.196	TRIA
12	4881.836	4843.277	784.211	-9.542	TRIA
13	4881.930	4843.204	784.214	-9.423	EPL1
14	4890.246	4836.705	783.901	1.131	TRIA
15	4890.299	4836.664	783.899	1.199	RC01
16	4890.359	4836.617	783.895	1.274	TRIA
17	4899.115	4829.774	783.278	12.387	EPR1
18	4900.460	4828.724	783.283	14.093	TRIA
19	4902.977	4826.756	783.239	17.288	ESR1
20	4904.728	4825.389	782.875	19.510	BNDR
21	4913.940	4818.190	782.961	31.202	BNDR
22	4919.066	4814.184	784.485	37.707	TRIA
23	4933.653	4802.785	784.324	56.219	TRIA
24	4935.277	4801.516	784.460	58.281	BNDR

LABEL	SUBREF	CONTENTS	NO. PTS.	X-MIN	Y-MIN	X-MAX	Y-MAX
G002	MBRA	7705	21	4854	4814	4958	4898

CHAINAGE 2125.000

Point	---X---	---Y---	---Z---	OFFSET	LABEL CUT
1	4854.682	4897.293	782.607	-64.367	BNDR

EXISTING ELEVATIONS FROM
ELECTRONIC CROSS SECTIONS DATA

Figure 14-2A

UNDERGROUND STORAGE TANKS REMOVAL

, 20

MEMORANDUM

TO:

Environmental Services Office Administrator
Production Management Division

THRU:

☐ Roadway Services Manager, Production Management Division
☐ Structural Services Manager, Production Management Division
☐ District Design Manager

FROM:

Project Manager

SUBJECT: Underground Storage Tanks Removal

Route: Des. No.:
Project No.: : PE County:
Description and Location:

Transmitted herewith is one set of plans for the above-referenced project.

This project has underground storage tanks to be removed at the locations as follows:

Station:	Offset:	left	right
Station:	Offset:	left	right
Station:	Offset:	left	right

Please provide the list of pay items and required special provisions. Also provide us with additional details that may be needed to accomplish the task.

If you need further information, please contact me at or e-mail.

Attachments/Enclosures
1.
2.

:

cc:

(A) (*thickness*) in. Plain PCCP

(A1) (*thickness*) in. Plain PCCP

(C) (*thickness*) in. PCCP for Driveways

(D) _____ lb/yd^2 HMA for Approaches *(type)* on _____ mm
Compacted Aggregate Base *(type)*, *(size)*

(D1) _____ lb/yd^2 HMA Surface *(type)* on
_____ lb/yd^2 HMA Base *(type)* on
_____ mm Compacted Aggregate Base *(type)*, *(size)*

(D2) _____ lb/yd^2 HMA Surface *(type)* on
_____ lb/yd^2 HMA Base *(type)*

(F) Concrete Sidewalk

(J) _____ lb/yd^2 HMA Shoulder

(J1) (*thickness*) in. Plain PCCP Shoulder

(J2) _____ in. Compacted Aggregate for Shoulder

(K) Full Depth HMA Pavement

(K1) Breakdown of Quantities, e.g., _____ lb/yd^2 HMA Surface on
_____ lb/yd^2 HMA Intermediate on
_____ lb/yd^2 HMA Base on
_____ in. Compacted Aggregate Base *(type)*

(N) _____ in. Compacted Aggregate for Surface *(size)*

(O) _____ in. Compacted Aggregate Base *(type)*, *(size)*

(P) _____ Prime Coat

(P1) _____ Seal Coat

(P2) _____ Tack Coat

(R) _____ lb/yd^2 HMA OverlayTack Coat

(R1) _____ lb/yd^2 HMA Surface on
_____ lb/yd^2 HMA Intermediate on
_____ lb/yd^2 HMA Base

(R4) (thickness) in. PCCP for Resurface

(U) (size) Underdrain

(X) Construction Sign, Type A

(X1) Construction Sign, Type B

(X2) Construction Sign, Type ____

(Y) Barricade, Type _____

(Y1) Barricade, Type _____

(1) 33 in. Concrete Barrier

(2) 45 in. Concrete Barrier

(2A) Modified Concrete Barrier

(3) Longitudinal Joint

(5) Butt Joint

(6) Construction Joint

(7) Keyway Joint

(8) 1 in. Expansion Joint with Load Transfer

(9) __(width)__ in. Preformed Joint Filler

(12) Impact Attenuator, Type _____

(13) Concrete Curb

(14) Integral Concrete Curb

(15) Concrete Curb and Gutter

(16) Concrete Curb Type B

(18) Integral Concrete Curb and Gutter, Type ____

(20) Contraction Joint, Type ____

(21) Longitudinal Construction Joint

(22) Concrete Center Curb, Type ____

(23) Asphalt Curb

(24) Ear Construction, Type A

(25) Ear Construction, Type B

(26) Sodding

(27) Cement Concrete Header, Type ____

(28) Retrofitted Tie Bar

(31) Temporary Concrete Barrier

(32) Impact Attenuator, CZ, Type _____

(33) Snowplowable Raised Pavement Marker

(34) *(width)* in. Solid White Paint Line

(35) *(width)* in. Solid Yellow Paint Line

⬡ Concrete Curb Ramp
(Type is indicated by letter inside hexagon)

(36) *(message)* Preformed Plastic Pavement Message Marking

(37) *(message)* Thermoplastic Pavement Message Marking

(38) *(width)* in. *(type)* *(color)* Thermoplastic Transverse Marking

(39) *(width)* in. *(type)* *(color)* Preformed Plastic Transverse Marking

(40) *(width)* in. Solid White Preformed Plastic Line

(41) *(width)* in. Solid Yellow Preformed Plastic Line

(42) *(width)* in. Broken White Preformed Plastic Line

(43) *(width)* in. Broken Yellow Preformed Plastic Line

(44) 24 in. Solid White Preformed Plastic Line

(45) 24 in. White Stop Line, Preformed Plastic

(46) *(width)* in. Solid White Thermoplastic Line

(47) *(width)* in. Solid Yellow Thermoplastic Line

(48) *(width)* in. Broken White Thermoplastic Line

(49) *(width)* in. Broken Yellow Thermoplastic Line

(50) No Change Required to Existing Sign and Supports

(51) Remove Existing Panel Sign from Ground Mounted Supports

(52) Remove Existing Sheet Sign from Supports

(53) Remove Existing Panel Sign from Overhead Sign Structure

(54) Remove Existing Sheet Sign from Overhead Sign Structure

(55) Remove Existing Sign Foundation

(56) Remove Existing Sheet Sign and Supports

(57) Remove Existing Ground Mounted Panel Sign, Supports and Foundations

(58) Remove Existing Overhead Sign, Supports and Foundations

(59) Existing Sheet Sign on New Supports

(60) Existing Panel Sign on New Supports

(61) Existing Panel Sign on New Overhead Structure

RECOMMENDED PLANS LEGENDS

Figure 14-3A

&	And
@	At
Δ	Delta or Deflection Angle
=	Equals
	Fish
||	Parallel
%	Percent
⊥	Perpendicular
∅	Phase or Diameter
Ɱ	Begin L.A. R/W
Ɱ	End L.A. R/W
A.A.D.T.	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
Ab.	Abrupt
Abut.	Abutment
Ac	Acres
A.C.	Aluminum Cap/Asphalt Cement
A.C.L.	Access Control Line
Add. Exc.	Additional Excavation
Adj.	Adjusted
Aggr.	Aggregate
Ah.	Ahead
Alum.	Aluminum
A.P.	Anchor Plate
App. Exist. R/W	Apparent Existing Right-of-Way
App. P. L.	Apparent Property Line
Appl.	Application
Appr.	Approach
Approx.	Approximate
Art.	Article
Asph.	Asphalt
ASTM	American Society for Testing Materials
Ave.	Avenue
Avg.	Average
AWG	America Wire Gauge
Az.	Azimuth
B.	Barn
B.E.	Bridge End
Beg.	Begin
B.I.P.	Boiler Iron Pipe
Bit.	Bituminous or Bitumen
Bk.	Back or Bank
Ɓ	Baseline
Bldg.	Building
Blk	Block
Blktp.	Blacktop
Blvd.	Boulevard
Bm.	Beam
B.M.	Bench Mark
Bndry.	Boundary
Bot.	Bottom
Br.	Bridge
Brg.	Bearing
Brk.	Brick
Br. S.	Bridge Seat
B.S.	Backsight
B. Spk.	Boat Spike
B.S.T.	Bituminous Surface Treatment
Bur.	Buried
Calc.	Calculated
C.A.P.	Corrugated Aluminum Pipe
C.A.T.	Crash Cushion/Attenuating Terminal Guard Rail End Treatment
Cb.	Curb
C.B.	Catch Basin
Cb.In.	Curb Inlet
Cb.L.	Curb Line
C.B.W.	Concrete Block Wall
C.C.	Corn Crib
C-C	Center to Center
Cdtn.	Condition
Cem.	Cemetery
C.G.M.P.	Corrugated Galvanized Metal Pipe
Ch.	Channel or Chain
Chan. Chg.	Channel Change
Chd.	Chord
C.I.	Cast Iron
C.I.P.	Cast Iron Pipe
Cir.	Circle
Ɠ	Centerline
Cl.	Class or Clearance
C.L.	Corporation or City Limits
C.L.T.F.	Chain Link Type Fence
C.M.B.	Concrete Median Barrier
C.M.P.	Corrugated Metal Pipe
Co.	County or Company
C.O.	Clean Out
Col.	Column
Comp.	Compacted or Composite
Conc.	Concrete
Conc. P.	Concrete Pipe
Conn.	Connection
Const.	Construction or Construct
Cont.	Continuous
Cor.	Corner
Corr.	Corrugated
Cov.	Cover
C.P.	Catch Point
Cr.	Crushed or Creek
Crs.	Course
C. Stn.	Crushed Stone
Ct.	Court
Ctr.	Center
Cu.	Cubic
Cul.	Culvert
Cyd	Cubic Yards
C.Z.	Clear Zone or Construction Zone
D	Distribution of Traffic
Dbl.	Double
Defl.	Deflection
Desc.	Description
Dest.	Destroyed
Det.	Detour or Detail
Detc.	Detector

D.H.	Drill Hole
D.H.V.	Design Hourly Volume
Dia.	Diameter
Diaph.	Diaphragm
Dim.	Dimension
Dist.	Distance or District
Dn.	Down
Dp.	Deep
Dr.	Drain or Drive
Dt.	Ditch
Drwg.	Drawing
E	East
Ea.	Each
E.B.	Eastbound
E.B. L.	Eastbound Lane
E.F.	Each Face
E.G.	Edge of Gutter
Elec.	Electric
El.	Elevation
E.M.	Edge of Metal (surface)
Emb.	Embankment
Eq.	Equation
Esmt.	Easement
E.T.L.	Edge of Traveled Lane
E.T.W.	Edge of Traveled Way
Exc.	Excavation
Exist.	Existing
Exp.	Expansion
Ext.	Extension
Fa.	Face
F.A.	Federal Aid
F.B.C.P.C.S.	Fully Bituminous Coated Perforated Corrugated Steel
F.Div.	Field Division
Fdn.	Foundation
Fe.	Fence
Fert.	Fertilizer
F-F	Face to Face
F.F.	Front Face
F.F.T.F.	Farm Field Type Fence
F. Hyd.	Fire Hydrant
Fig.	Figure
Fin.	Finish
Fix.	Fixed
Fl.	Flush
F.L.	Flow Line
Flg.	Flange
F.O.	Fiber Optic
F.P.	Fence Post
F.R.	Frontage Road
F.S.	Far Side or Foot of Slope
F.T.	Farm Tile
ft	Feet
Ftg.	Footing
Fut.	Future
Fwy.	Freeway
G.	Garage
Galv.	Galvanized
G.B.A.	Gravel Barrel Array Impact Attenuator
G.B.E.S._ _	Grated Box End Section (Pipes)
Gdr.	Girder
Geod.	Geodetic
G.L.	Gas Line
G.P.	Guy Pole
G.P.S.	Global Positioning System
G.R.	Guard Rail
Grav.	Gravel
G.R.E.A.T. __	GREAT Unit (Bays)
G.R.E.T.	Guard Rail End Treatment
Grnd.	Ground
Gr.Sep.	Grade Separation
G.S.	Gravel Surfacing
G.S.P.	Galvanized Steel Pipe
Gut.	Gutter
G.V.	Gas Valve
H.H.	Hand Hole
Hdw.	Headwall
H.I.	Height of Instrument
H.	House
Horiz.	Horizontal
H.P.S.V.	High Pressure Sodium Vapor
H.S.	High Strength
Ht.	Height
H.W.	High Water
H.W.L.	High Water Line
Hwy.	Highway
I	Interstate
I.C.	Incidental Construction
I.D.	Inside Diameter
I.F.	Inside Face
IMSA	International Municipal Signal Association
in.	Inches
In to In	Inside to Inside
Inc.	Incorporated
Incl.	Included
Inlt.	Inlet
Instr.	Instrument
Inters.	Intersection
Intch.	Interchange
Inv.	Invert
I.P.	Iron Pipe
I.P.B.	Iron Pipe Buried Below Plow Depth
I.P.F.	Iron Pin Flush
I.P.L.	Iron Pin Lightly Buried
I.P.N.F.	Iron Pin Not Found
Jct.	Junction
Jt.	Joint
L	Length of Curve, Liter or Loop
L.A.	Limited Access
L.A.R/W.	Limited Access Right of Way
Lb	Pounds
L.C.	Long Chord
L_C	Length of Circular Curve
L.D.	Loop Detector
Leng.	Length or Lengthen

Ln.	Lane
LRFD	Load Resistance Factor Design
L.S.	Land Surveyor
L.S.R.	Local Service Road
Lt.	Left
Lt. P.	Light Pole
L.W.	Low Water
Mac.	Macadam
Matl.	Material
Max.	Maximum
Mbox.	Mailbox
Mdwl.	Mudwall
Meas.	Measured
Med.	Median
Mh.	Manhole
Mi	Miles
Min.	Minimum, Mineral or Minute
Misc.	Miscellaneous
Mkr.	Marker
ML.	Mainline
Mncpl.	Municipal
M.O.	Mid Ordinate
Mom.	Moment
Mon.	Monument
M.P.C.	Mid-Point of Curve
N	North
N.B.	Northbound
N.B.L.	Northbound Lane
N.C.	Normal Crown
N.E.	Northeast
Neg.	Negative
NEMA	National Electrical Manufacturers Association
N.E.P.L.	No Evidence of Property Line
N.F.	Near Face
N.G.	Natural Gas
N.G.S.	National Geodetic Survey
Nl.	Nail
Nly.	Northerly
No. or #	Number
N.S.	Near Side
N.W.	Northwest
O.C.	On Centers or Overhead Crossing
O.D.	Outside Diameter
O.F.	Outside Face
Off.	Offset
Oh.	Overhang or Overhead
O-O	Out to Out
O.P.O.C.	Offset Point on Curve
O.P.O.S.T.	Offset Point of Semi-Tangent
O.P.O.T.	Offset Point on Tangent
Out.	Outlet
Oz	Ounces
P	Power Cable or Pipe
P. or Pg.	Page
P.B.	Pull Box
P.C.	Point of Curve (Beginning of Curve)
P.C.C.	Point of Compound Curve or Portland Cement Concrete
Ped.	Pedestrian
Pen.	Penetration
Perf.	Perforated
P.G.	Profile Grade
P.I.	Point of Intersection
Pl.	Place or Plate
P.L.	Property Line
Plas.	Plastic
P.M.P.	Perforated Metal Pipe
P.O.C.	Point on Curve
Pos.	Positive
P.O.S.T.	Point on Semi-Tangent
P.O.T.	Point on Tangent
P.O.V.C.	Point on Vertical Curve
Pp.	Pages
P.P.B.	Pedestrian Push Button
P.R.C.	Point of Reverse Curve
Prest.	Prestressed
Priv.	Private
Proc.	Processing
Proj.	Project or Projected
Prot.	Protect, Protector or Protection
P.S.D.	Paved Side Ditch
Pt.	Point
P.T.	Point of Tangent (End of Curve)
Pub.	Public
Pv.C.	Polyvinyl Chloride
P.V.C.	Point of Vertical Curve
P.V.I.	Point of Vertical Intersection
Pvm't.	Pavement
P.V.T.	Point of Vertical Tangent
Pwp.	Powerpole
Pwr.	Power (Lines)
Q	Peak Discharge (Water)
R.	Range or River
Rad. or R.	Radius
R.C.	Rapid Curing, Reinforced Concrete or Remove Crown
R.C.P.	Reinforced Concrete Pipe
Rd.	Road
Rdl.	Radial
Rd. N.	Road Nail
Rd NF.	Road Nail Flush
Rd NL.	Road Nail Lightly Buried
Rdwy.	Roadway
Rec.	Record or Recommended
Ref.	Reference
Reinf.	Reinforcement, Reinforcing, Reinforced
Req'd.	Required
Ret.	Retaining
Rev.	Revised
R.M.	Reference Monument
R.P.	Reference Point
R.P.M.	Raised Pavement Marker
R.R.	Railroad

R.R. Spk.	Railroad Spike
Rt.	Right or Route
Rte.	Route
R/W	Right-of-Way
R/W Mkr.	Right-of-Way Marker
Rwy.	Railway
S	South
S.	Shed
San.	Sanitary Sewer
S.B.	Southbound
S.B.L.	Southbound Lane
Sched.	Schedule
Sdwk.	Sidewalk
S.E.	Southeast
Sec.	Section or Second
Sec. Line	Section Line
Ser. Rd.	Service Road
S.G.	Subgrade
Sht.	Sheet
Shldr.	Shoulder
Sig.	Signal
S.L.D.	Sea Level Datum
Sly.	Southerly
Spa.	Spaces, Spacing
Spec. Prov.	Special Provision
Spk.	Spike
Spl.	Special or Splice
Sq.	Square
Sft	Square Feet
Sq. in.	Square Inches
S.R.	State Road or State Route
S.S.	Stainless Steel
St.	Street
Sta.	Station
Std.	Standard
Std. Spec.	Standard Specifications
Stiff.	Stiffener
Stk.	Staked or Stake
Stl.	Steel
Str.	Structure, Structural
Subd.	Subdivision
Subgr.	Subgrade
Supstr.	Superstructure
Surf.	Surface or Surfacing
Surv.	Survey
S.W.	Southwest or Sidewalk
Sym.	Symmetrical
T.	Tangent Length or Township (as T-6-N)
T	Ton
Tan.	Tangent
T.B.	Test Boring
T.B.M.	Temporary Bench Mark
Tbr.	Timber
Tel.	Telephone
Tel.C.	Telephone Cable
Tgp.	Telegraph Pole
Tfp.	Telephone Pole
Temp.	Temperature or Temporary
T.O.	Top of Opening
T.O.B.	Top of Bank
T.O.P.	Top of Pipe
T.O.S.	Top of Slope
Topog.	Topographic
T.P.	Turning Point
Trans.	Transmission Line or Transition
Trav.	Traverse
T.T.	Transmission Tower
Twp.	Township (as Center Township)
T.W.L.T.L.	Two-Way Left-Turn Lane
Typ.	Typical
U.	Unit
Ug.	Underground
Uncl.	Unclassified
U'pass.	Underpass
U.S.C. & G.S.	U.S. Coast & Geodetic Survey
U.S.Co.E.	U.S. Corps of Engineers
U.S.F.S.	U.S. Forest Service
U.S.G.S.	U.S. Geological Survey
U.S.P.L.S.	U.S. Public Land Survey
V	Design Speed or Velocity
V.C.	Vertical Curve
Veh.	Vehicle, Vehicular
Vert.	Vertical
W	West, Wide Flange Beam or Water
W/	With
W.B.	Westbound
W.B.L.	Westbound Lane
Wd.	Wood
W.L.	Water Line
Wly.	Westerly
W.P.	Working Point
Wt.	Weight
W.T.	Water Table
W.V.	Water Valve
W.W.	Wing Wall or Woven Wire
Xing.	Crossing
Xsec.	Cross Section

PLANS ABBREVIATIONS

Figure 14-3B

TRAFFIC DATA	
A.A.D.T. (20___) ①	V.P.D.
A.A.D.T. (20___) ②	V.P.D.
D.H.V. (20 ___) ②	V.P.H.
DIRECTIONAL DISTRIBUTION ③	%
TRUCKS ④	% A.A.D.T
	% D.H.V.
DESIGN DATA	
DESIGN SPEED	mi/h
PROJECT DESIGN CRITERIA	⑤
FUNCTIONAL CLASSIFICATION	⑥
RURAL / URBAN	(7)
TERRAIN	(8)
ACCESS CONTROL	(9)

① Current year and count

② Design year and count

③ Current-year figure

④ Design-year figures

⑤ is ONE of the following:

NEW CONSTRUCTION (FREEWAY)
NEW CONSTRUCTION (NON-FREEWAY)
COMPLETE RECONSTRUCTION (FREEWAY)
PARTIAL RECONSTRUCTION (4R) (FREEWAY)
RECONSTRUCTION (NON-FREEWAY)
3R (FREEWAY)
3R (NON-FREEWAY)
PARTIAL 3R (NON-FREEWAY)

⑥ is ONE of the following:

PRINCIPAL ARTERIAL
MINOR ARTERIAL
STATE COLLECTOR
LOCAL AGENCY COLLECTOR
LOCAL ROAD
LOCAL STREET
RECREATIONAL ROAD

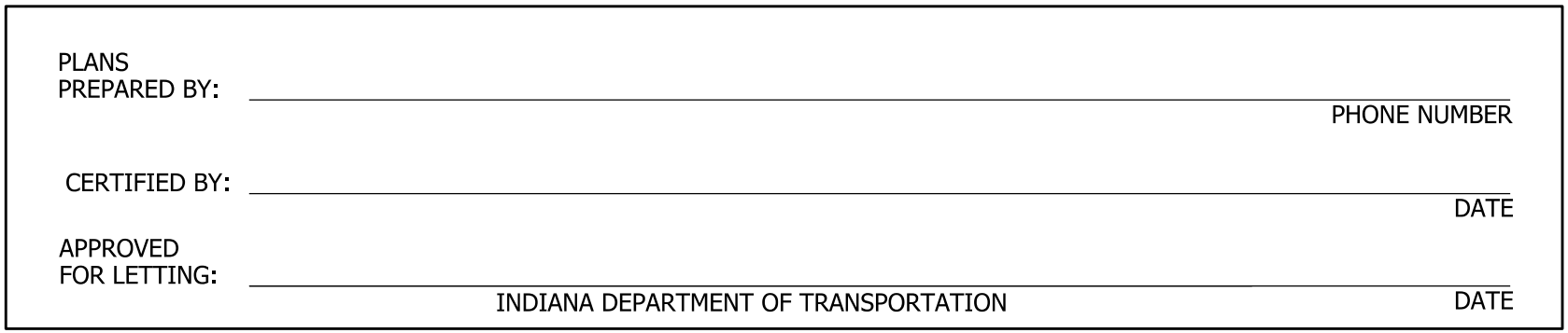
(7) is ONE of the following:
- RURAL
- URBAN (SUBURBAN)
- URBAN (INTERMEDIATE)
- URBAN (BUILT-UP)

(8) is ONE of the following:
- LEVEL
- ROLLING

(9) is ONE of the following:
- FULL
- PARTIAL
- NONE

TITLE SHEET INFORMATION BLOCK

Figure 14-3C



SIGNATURE BLOCK

Figure 14-3C (1)

DATUM	ACCURACY
PI	0 + 00.01
Δ	00º 00′ 01″
R, existing alignment	0.01 ft
R, new alignment	10 ft
T	0.01 ft
L	0.01 ft
E	0.01 ft
SE	0.1%

HORIZONTAL-CURVE DATA ON PLAN SHEETS

Figure 14-3D

CHAPTER 104

Utility Relocation

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CHAPTER TEN

UTILITIES

This Chapter includes step-by-step procedures for utility agreements and coordinating with utility companies. The Chapter also provides the INDOT policies, procedures, and criteria for the accommodation of utilities within highway right of way.

10-1.0 UTILITY PROCEDURES

10-1.01 Joint Occupancy

Transportation and utility networks are growing in number and complexity. As a result, the frequency of two or more networks occupying a common right of way or intersecting one another has increased. Therefore, problems may arise due to the construction, maintenance, and operation of one network as it affects another. Each transportation agency has the responsibility to maintain the highway right of way under its jurisdiction and to preserve the operation, safety, integrity, and function of the highway facility. Generally, utilities have a qualified right to install their lines and facilities on the right of way of most public roads and streets. Because the manner in which utilities cross or otherwise occupy highway right of way can materially affect the safe operation, maintenance, and appearance of the highway, it is necessary that such use and occupancy be authorized and reasonably regulated. Likewise, it is important that utilities are not unnecessarily impacted by a highway construction project, because it is generally in the public interest to accommodate utility facilities on highway right of way when such use and occupancy do not adversely affect highway safety, construction, maintenance, or operations.

Generally, utilities have a qualified right to free occupancy of the public right of way. Utilities are allowed to occupy the right of way, assuming they do not unreasonably restrict the highway agency's ability to construct, maintain, modify, improve, or otherwise operate its highway network. Additional restrictions and limitations apply to a limited-access facility. Because utility companies do not pay for a right to occupy the public right of way, they usually have to pay the costs of any relocations/adjustments. When total project costs are being considered, utility relocation/adjustment costs should also be included, regardless of who is responsible for the cost. Like roadways, utilities are important to public health, safety, and welfare. Therefore, they should not be unnecessarily impacted by a construction project. The utility-service needs of current and future customers adjacent to the project area should be considered by the designer.

Highway and utility facilities frequently co-exist within or along the same corridor. Therefore, it is essential that these public-service facilities be compatibly designed and operated. Joint highway and

utility planning and development efforts should be encouraged. Highway safety is important when accommodating utility facilities within highway right of way. The design and location of the utilities' use and occupancy of highway right-of-way must conform to the policies of the highway agency to provide and maintain an adequate roadside clear zone. However, safety should be balanced with other factors such as constructability, operations, and maintenance.

10-1.02 Adjustment/Relocation Plan

The utility owner is responsible for the design of its facility including depth, clearance, and separation between lines. Its work must meet the highway agency's utility-accommodation policy (see Section 10-3.0 for INDOT's Policy). The utility owner must ensure that its proposal is properly designed, installed, operated, and maintained.

10-1.02(01) Survey

A utility adjustment/relocation plan should be developed using the INDOT survey stationing and offsets. This will allow for ease in reviewing the proposed utility work. All utility facilities within the proposed right-of-way should be addressed, especially facilities located within the proposed construction limits.

10-1.02(02) Review

Developing the utility adjustment/relocation plan on the highway agency's construction plans will aid in reviewing the proposed adjustment/relocation work relative to the proposed construction activities. The adjustment/relocation plan should show the alignment and profile of the proposed relocation work.

The adjustment/relocation plan will be reviewed to determine if reasonable efforts are being made to resolve potential conflicts with the proposed construction project. The timing of the proposed work will also be reviewed to determine if there will be a potential impact to the contractor's work phasing and schedule.

Material acquisition time frames, budgetary constraints, utility seasonal demands, and proposed utility construction time frames all must be identified to properly coordinate the utility adjustment/relocation work with the proposed construction project.

Although a utility adjustment/relocation is generally performed by the utility-company forces or a contractor hired by the utility company, it may sometimes be in the best interest of all involved parties to allow the highway contractor to perform some of the utility work. Where it can be

demonstrated that total project costs can be reduced and the inclusion of additional work will not unduly interfere with the contractor's scheduling of work, utility adjustment/relocation work may be added to the contract. This will not affect the responsibility for paying for the work.

10-1.03 Reimbursement

Generally, a utility company is eligible for reimbursement if the utility facility is located on land for which the utility company has a properly-recorded property right, such as an easement. Utility companies involved within an Interstate-route project may also be eligible for reimbursement. Relocation of service facilities which are customer-owned may be eligible for reimbursement. In addition, for an INDOT project, where it can be shown that a utility company will incur an extraordinary cost to relocate, the utility company may be eligible for partial reimbursement. Reimbursement of extraordinary costs is subject to approval by the INDOT Chief Engineer.

The utility company is entitled to reimbursement for costs incurred for the adjustment/relocation of the facility within the documented property right of way. Eligible costs are those associated with replacement in kind for the affected facility. Costs which can be accredited to betterment or for relocation which goes beyond what is reasonable to accommodate the project are not eligible for reimbursement. The utility company must enter into an agreement with the Department prior to incurring costs to be eligible for reimbursement.

On a local-public-agency project, eligibility for reimbursement is the same with the addition that a municipal utility company may also qualify for reimbursement. However, a reimbursement agreement must be executed before incurring costs.

To enter into an agreement with the Department, the utility company must present a plan and cost estimate to INDOT. This information is attached to a Utility Agreement and, therefore, must be developed to clearly identify proposed work and associated costs. Costs should be identified on a unit basis which can be readily verified in the field and which can be audited. Because costs incurred prior to entering into the Agreement are not eligible for reimbursement and because it can require considerable time to execute the Agreement, it is important to initiate utility coordination early in the project cycle to avoid unnecessary delay. Documentation of the property right must also be submitted.

Expenses eligible for reimbursement need to be clearly identified as the following:

1. labor;
2. material;
3. overhead;
4. transportation;
5. contract engineering;

6. contract construction;
7. property acquisition; or
8. other costs.

Identified rates must be supported and able to withstand an audit by the Department.

Where affected utility facilities are located on both land for which the utility company holds a recorded property right and land for which the utility company does not have a recorded property right, such as public right of way, a reimbursement ratio will be established to identify the portion of work eligible for reimbursement. This ratio should reflect the extent of work eligible for reimbursement to total adjustment/relocation work.

Eligibility for reimbursement is determined based on where the anticipated construction conflict is located. If a conflict point is in public right of way, the adjustment/relocation work is not eligible for reimbursement. If a conflict point is outside public right of way, such work is eligible for reimbursement. If the conflict is an area, as opposed to a point, eligibility is determined by the area in conflict outside of the public right-of-way to the total area of conflict.

If Federal-aid funds will be used to reimburse a utility, such funds must be obligated prior to the utility company's incurring of expenses.

Where the utility company has a documented property right to property which the Department has acquired as public right of way, the utility company must subordinate its property right to the State through a Subordination Agreement. The Subordination Agreement identifies which rights have been subordinated and which rights have been retained by the utility company.

10-1.04 Subsurface-Utility Engineering

Subsurface-utility engineering represents a more-thorough investigation of the horizontal and vertical alignment of an underground utility facility. This information can be used to eliminate unnecessary utility adjustments/relocations and, therefore, minimize total project costs.

Subsurface-utility engineering is especially useful where the right of way is limited, and it is expected that the underground may be congested by a variety of different facilities, such as in a high-density urban area. Benefits are usually gained in construction phases by the utility company and by the project contractor.

However, to gain the greatest benefit, the subsurface-utility engineering needs to be done very early in the project design cycle. By utilizing the information from the subsurface-utility engineering report, the designer can make reasonable adjustments to the proposed design which may eliminate the need to relocate/adjust the utility. Potentially, this process can help reduce total project costs and

streamline some of the construction process because the contractor should have more definitive information on utility location.

Subsurface-utility engineering usually involves the process as follows.

1. Utility records are reviewed to determine the extent and type of utilities that should be encountered during the designating phase.

2. Utility facilities are designated in the field. This involves a relatively precise location of the utility facility regardless of the materials or products used by the utility company. These designations are then field surveyed so that the locations can be added to the construction plans.

3. At certain points identified on the construction plans as potential conflict points, the utility facility is exposed so that the vertical alignment can be determined. From this information, determinations can be made on the necessary extent of utility adjustments/relocations and/or what, if any, design changes can be made to lessen the impact of the project on the utility facility.

10-1.05 Utility Coordination

Section 10-2.0 provides the Department's guidelines for coordination with a utility company.

10-2.0 UTILITY COORDINATION

10-2.01 Introduction

There are many factors that dictate the level of effort required to coordinate a specific utility relocation. These include the type and condition of utility facility, potential impact to the project, and knowledge of the location.

Because of the many factors involved, the uniqueness of each project, and its impact on utilities, it is not practical to provide exact definitions of the level of effort required for each project. The intent of the coordination process is to resolve all utility issues during the design phase and, therefore, provide a better product for the contractor.

Responsiveness received from utility companies with respect to a highway project varies considerably. Most utility companies respond in a timely manner. However, utility companies have their own priorities and, unfortunately, sometimes it becomes necessary to contact a company several times to receive the required response. Part of the intent of these guidelines is to establish

benchmarks on what is reasonably expected when the designer is faced with an unresponsive utility company.

10-2.02 Utility Coordination Factors

When coordinating with a utility company, the designer should consider the following.

1. Utility Type. The type of utility facility encountered includes electric, water, sanitary sewer, gas and petroleum (or other product lines), or communication (e.g., telephone, cable TV). Each utility type can present unique situations or conflicts.

2. Impacts. There are many types of potential utility impacts due to poor coordination. These may include the following:

    a. the impact to the project schedule if a utility is in conflict with construction and the project is delayed because of this;

    b. the impact to construction workers who might strike a buried utility line;

    c. the impact to the users of the utility if a line is struck; or

    d. environmental consequences and disruption to essential (e.g., national defense, airport) communication links.

3. Location. The exact location of an underground utility has a direct correlation on the potential impact of that facility on the project. Utility-relocation problems may delay the contract work if the right of way is set so tight that there is inadequate room for all the utilities. The designer should make sure that all utilities are shown on the plans as correctly as possible.

The type of facility, potential impact, and knowledge of location are closely interrelated, and the combination of these factors is an indication of the level of effort is required to properly coordinate utilities.

10-2.03 Utilities Coordinator

The utilities coordinator for each type of work will be as follows:

1. The Production Management Division's Utilities Team is responsible for State-route projects developed in-house and by consultants.

2. The district Office of Design is responsible for a district-developed project.

3. The designer is responsible for State-route traffic work in a separate contract from road or bridge work.

4. The design consultant is responsible for a local-agency Federal-aid project.

When completing the utility-coordination-status questionnaire on the Memorandum to Office of Contracting form, if the designer does not have responsibility for utility coordination, he or she should contact the person who is responsible in the Production Management Division's Utilities Team. The designer should not contact a utility company for this information if he or she is not responsible for the coordination.

10-2.04 Certification

The utilities coordinator must complete a Utility Coordination Certification. The Certification must be transmitted with the final tracings, special provisions, estimates, and other final documents. The Certification ultimately becomes the property of the Contract Administration Division's Office of Contracting, which retains it in its contract file. A contract will not be advertised for letting without a fully executed Utility Coordination Certification form.

10-2.05 Utility Coordination Process, Design Timeframe of 12 Months or Longer - Design Phase

The following coordination process should be used, unless a waiver is approved to use the process for a short-term project as described in Sections 10-2.06 and 10-2.07, or a complete waiver of process is approved as described in Section 10-2.08.

10-2.05(01) Responsibilities

For a State-route project, the typical assignment of responsibility for the steps in Section 10-2.05(02) is as follows:

1. Step 1: Party preparing project scope.

2. Step 2: Surveyor.

3. Steps 3 - 6: Designer. The Utilities Team will participate in meetings and assist with follow-up.

4. Steps 7 - 11: Utilities Team.

For a local-agency Federal-aid project, the design consultant is responsible for all steps. The Utilities Team will be available for advice.

10-2.05(02) Process Steps

The steps for a long-term-design projects are as follows:

1. Identify and include a complete list of all affected utilities in the preliminary project reports (e.g., Engineers' Report). The locations of the utilities and all significant impacts should be included in the report. If the owner of the utility is evident from a field investigation, also include this information in the report.

2. Prior to conducting a field survey, prepare a list of all existing utilities including names, addresses, and telephone numbers. Contact each utility company and request that they field-locate their facilities. The field-located facilities will be shown on the survey and ultimately shown on the plans. Ensure that each utility company has actually field-located its facilities.

3. Send approved Grade Review Plans to each utility company for the purpose of requesting verification that its facilities are accurately shown. All utility locations, types, and sizes should be shown and verified.

4. Set-up a coordination meeting with each utility company early in the design phase (approximately 25% complete). This will allow the designer to work the utility company to develop alternatives where there are conflicts and to find the most cost-effective solution for all parties.

5. Distribute Preliminary Field Check plans to the utility companies and invite them to the field check.

6. Conduct the field check with the utility companies participating. Discuss any right-of-way needs.

7. After design approval, distribute plans with a tentative project schedule to each utility company. Also, request submittal of the relocation plan with an estimated relocation schedule. All revisions affecting utilities must be sent to the affected utility companies.

8. Written documentation is required for all utilities whether relocations are required or not.

9. Review each relocation plan and schedule to verify that all conflicts are resolved. At the appropriate time, INDOT or the local agency will provide written notice for the utility to proceed. Hold a meeting, if necessary, to resolve location or constructability issues.

10. Distribute two copies of the utility company's written notice to proceed with the approved utility-relocation plan to the appropriate district office.

11. Provide each utility company, along with contract documents, not later than 90 days prior to the contract letting, the items as follows:

    a. utility contact with telephone number;

    b. utility-relocation plan and/or verbal description of relocation if relocation is necessary;

    c. total schedule for relocation, if relocation is necessary, including material delivery, weather restraints, pre-work requirements, coordination issues, need for right-of-way staking, and construction time; and

    d. Utility Coordination Certification.

The Utility Coordination Certification, signed by the designer or other person responsible for utility coordination, should state that all utility companies have been contacted and that the included relocation plans address the relocation of all facilities known to be in conflict with the project. Figure 10-2A provides a Sample Utility Special Provision. Figure 10-2B provides a Utility Coordination Certification. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

10-2.06 Utility Coordination Process, Design Timeframe of Shorter than 12 Months (Short-Term Project) - Design Phase

This process may only be used for a project which is granted a waiver by the district development engineer, the Production Management Division's Design Team leader, or the Utilities Team leader.

10-2.06(01) Responsibilities

The typical assignment of responsibility for the steps in Section 1-2.06(02) is as follows:

1. Step 1: Party preparing project scope.
2. Step 2: Surveyor or designer.
3. Steps 3 - 8: Designer. The Production Management Division's Utilities Team will be available for advice.

The Utilities Team is responsible for Steps 3-8 for a bridge-rehabilitation project.

10-2.06(02) Process Steps

The steps for a short-term-design project are as follows:

1. The district office will identify and include a complete listing of all affected utilities in the project data sheets and preliminary project reports. The locations of the utilities and all significant impacts should be included in the report. If the owner of the utility is evident from field investigation, this should also be included in the report.

2. At the time the field survey is being conducted, prepare a list of all existing utilities including names, addresses, and telephone numbers. Contact each utility company and request that it field-locate its facilities. The field-located facilities should be shown on the survey and ultimately shown in the contract documents. Ensure that each utility company has actually field-located its facilities. If a field survey is not conducted, utility locations should be discussed and verified during the field check (Step 4.) Add verified locations to the plans as appropriate. Calling the Indiana Underground Plant Protection Service and local utilities for locations prior to the field check may also be desirable if no field survey is conducted.

3. Distribute field check plans to the utility companies and invite them to the field check(s). See Section 10-2.06(03) for the procedure for a bridge-rehabilitation project.

4. Conduct field check with the participating utility companies. At this time discuss possible conflicts, relocation, and any right-of-way needs. See Section 10-2.06(03) for the procedure for a bridge-rehabilitation project.

5. Distribute plans, after design approval, with tentative project schedule to each utility company, requesting submittal of the relocation plan with estimated relocation schedule. See Section 10-2.06(03) for the procedure for a bridge-rehabilitation project. All revisions affecting utilities must be sent to the affected utility companies.

6. Written documentation is required for all utilities whether relocations are required or not.

7. Review the relocation plan and issue notice for the utility company to proceed.

8. Provide each utility company, along with contract documents prior to the contract letting, the items as follows:

   a. utility contact with telephone number;

   b. utility relocation plan, or verbal description of relocation if relocation is necessary;

   c. total schedule for relocation, if relocation is necessary, including material delivery, weather restraints, pre-work requirements, coordination issues, need for right-of-way staking, and construction time; and

   d. Utility Coordination Certification.

   The Utility Coordination Certification, signed by the designer or other responsible person responsible for utility coordination, should state that all utility companies have been contacted and that the included relocation plan addresses the relocation of all facilities known to be in conflict with the project.

10-2.06(03) Bridge-Rehabilitation Project

A bridge-rehabilitation project has unique qualities and benchmarks that prevent it from exactly conforming to the sequence of steps for this process. A field check held for the purpose of preparing an inspection report, and a field check is held near the end of the plan development process. Neither of these meetings are appropriate times to perform the utility coordination outlined in Section 10-2.06(02), Steps 3 and 4. Once preliminary plans are developed, transmit these plans to the Production Management Division's Utilities Team. The number of copies of plans sent for utility coordination must equal the number of utilities plus one copy for the Utilities Team. The Utilities Team will then set up a field check to be attended by the utility companies, the designer, and a representative from the Utilities Team. The preliminary plans distributed for the field check are also to be used by the utility companies for development of relocation plans and schedule as outlined in Step 5. A second distribution of plans to the utility companies as is indicated in Step 5 will not be required.

10-2.07 Utility Coordination Process, Design Timeframe of Shorter than 12 Months (Short-Term Project) - Traffic Signal Project Design Phase

A traffic signal project has unique qualities and benchmarks that prevent it from exactly conforming to the sequence of steps for the Utility Coordination Process for Short Term Project outlined in Section 10-2.06.

The steps for a traffic signal project are as follows:

1. The district office will identify and include a complete list of all affected utilities and the owners of the utilities in the project data sheets and preliminary project reports. The location of the utilities and all significant impacts should be included in the report.

2. The designer will contact the Indiana Underground Plant Protection Service and the utility companies at least once before the preliminary field inspection for locating utilities prior to the field inspection. Each utility company is responsible for field-locating its existing facilities. The designer is responsible for ensuring that this happens. Show all utilities on the preliminary field inspection plans. If, in the preliminary field inspection, a utility company does not locate its facilities, location of said facilities should be discussed and verified at the final field inspection.

3. The designer will invite each utility company to attend the final field inspection. Send the invitation at least two, and preferably three, weeks before the final field inspection. Provide the design plans to each utility company before or at the final field inspection.

4. Conduct final field inspection with the utility companies participating. At this time, discuss possible conflicts and relocations and verify locations of utilities. Each utility company must verify the location of its facilities and submit revisions to the designer no later than three weeks after the final field inspection.

5. The designer should request that each utility company needing to relocate its facilities submit a utility-relocation plan and estimated relocation schedule. The utility company should be given at least 30 days to do this. All revisions affecting utilities will be sent to the affected utility companies.

6. Written documentation is required for all utilities whether relocations are required or not.

7. Review the relocation plan and issue notice for the utility company to proceed.

8. Provide each utility company, along with contract documents prior to the contract letting, the items as follows:

    a. utility contact with telephone number;

    b. utility relocation plan, or verbal description of relocation if relocation is necessary;

c total schedule for relocation, if relocation is necessary including material delivery, weather restraints, pre-work requirements, coordination issues, need for right-of-way staking, and construction time; and

d. Utility Coordination Certification.

The Utility Coordination Certification, signed by the designer, should state that the utility company has been contacted and that the included relocation plan addresses the relocation of all facilities known to be in conflict with the project. Figure 10-2A provides a Utility Coordination Certification for Short Term Project.

10-2.08 Complete Waiver of Process

Work such as herbicide treatment, mowing, raised pavement markers, traffic striping, sweeping, etc., which normally have no utility involvement may be granted a complete waiver from the utility coordination process. The waiver must be signed for approval by the district development engineer, the Production Management Division's Design Team leader, or the Utilities Team leader. See Figure 10-2D, Utility Coordination Certification Waiver form. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

10-2.09 Level of Effort

10-2.09(01) Process Steps

The listed step number corresponds to the step number of the Utility Coordination Process for a long-term-design project as described in Section 10-2.05. The discussion can also be applied to Sections 10-2.06 and 10-2.07 for a short-term project. The level of effort required for each step is described below.

1. Step 1. Provide a general description of the locations of all visible utilities in the report. If the owner of the utility facility is evident in the field, include this information in the report. Also, it may be obvious that there are other utilities in an area but there might not be visible appurtenances. Therefore, contact the applicable local government unit, the appropriate district office, or the Production Management Division's Utilities Team to obtain the name of the utility company so that a description of the location of the facilities can be given in the report. All significant impacts or concerns involving utilities must be described. Research required beyond what can de done in the field to obtain utility locations and utility-company names should be kept to a reasonable minimum. The intent of this step is not to have the writer of the report spend a significant amount of time doing utility research.

2. Step 2. All utility facilities must be located and shown on the plans. Compile a list of all existing utility companies including names, addresses, and telephone numbers. Use the list of utility owners supplied in the preliminary project report as a starting point for this step. Contact the Underground Plant Protection Service for a list of underground utilities in the area. Not all utility companies subscribe to this service, so the records at the county courthouse also must be checked. All underground utilities are listed with the county recorder. This listing is arranged by civil townships.

   All identified utility companies must be contacted to field locate their facilities in order that they may be located by the survey crew. If, upon arrival at the site, it is discovered that a utility company has not responded to the request, contact it immediately to to provide this service at least one more time. If the utility company marks its facilities prior to the survey crew leaving the site, the survey crew should note the markings. If the utility company does not mark its facilities prior to the survey crew leaving the site, there is nothing else the survey crew must do. Each unresponsive or uncooperative utility company should be documented.

3. Steps 3 and 4. All utility companies must be sent plans and be invited to the coordination meeting. It is up to the utility company to attend or not. It is recommended, however, to contact by telephone and advise each utility company that will have significant involvement in the project to attend the meeting.

4. Steps 5 and 6. All utility companies should be sent plans and be invited to the preliminary field check. It is up to the utility company to attend or not. It is recommended to contact by telephone and advise each utility company that will have significant involvement.

5. Steps 7-10. A response from each utility company is required. The effort required for these steps are the hardest to define in terms of what is required to comply with the intent of the coordination process if there is an unresponsive utility company. The level of effort required for coordination depends upon the factors listed earlier. Because each situation can be unique, no specific guidelines have been established. However, Section 10-2.09(02) provides examples which show what levels of effort should be used to obtain a response from the utility company.

   If an unresponsive utility company is encountered, it will be up to the utility coordinator to assess the situation and determine what level of effort and what steps should be taken to meet the intent of these guidelines. The utility coordinator should also note the following:

   a. If unable to make contact with a utility company, ensure that the proper person is being contacted and that the telephone number is correct.

   b. If at least one other individual is known at the utility company, consider contacting that individual to determine how to get cooperation from the unresponsive individual.

c. Provide reasonable time frames for relocation-plan return dates. For a large road project or other project with major utility involvement, each utility company should be sent plans to develop its relocation plan at least a year in advance of the ready-for-letting date. For another project type (excluding a short-term project), plans should be sent at least six months in advance of the ready-for-letting date when asking for a relocation plan. For a short-term project, because it is not possible to give each utility company a long advance notice, make every effort to provide the utility company with a reasonable amount of time to respond to the request.

6. Step 11. The information to complete this step should have been obtained in the previous steps. Therefore, supply this information to the proper personnel.

10-2.09(02) Examples

The following examples are provided to show what level of effort should be used to address an unresponsive utility company.

Example 10-2.1 Several power poles are located within the project limits. From field observations it is apparent that neither the poles nor the lines attached to them should conflict with the project. All facilities are visible and a reasonably accurate decision may be made that no conflict exists. Thus, if the utility company does not respond to the letter sent, it would not be productive to try to contact it more than two or three times to elicit a reply. If no response is ever received from the utility company, a letter should be sent notifying it that the assumption is being made that there is no conflict with its facilities and that it will be liable for any delay to the project if there is a conflict. Or, at a minimum, documentation of the attempted communication should be kept if a problem later develops.

Example 10-2.2 A cable-TV line is attached to poles owned by an electric company. The electric company will be moving its poles to accommodate construction of the project. The cable TV company has not provided a relocation plan even though it has been contacted twice after the letter requesting a relocation plan was sent. It appears fairly obvious that the cable company will have to move with the electric company, but it just will not respond to the request to submit a letter that this is what it intends to do. A notice to proceed with relocation should be sent to the utility company. This notice should include a statement that the utility company will be liable for any delay to the project if it does not relocate in a timely manner.

Example 10-2.3

An overhead telephone line is present within the project limits. It is apparent that the poles will be in conflict with the project. The utility company has not submitted its relocation plan by the date requested. The utility company has been called twice since that date and has not responded back with a relocation plan or a reason on why its submission is late.

Because a conflict is evident, make every effort to contact the utility company by telephone or other means. If after trying to contact the utility company up to four or five more times over a period of a month, and a response has still not been received, a letter from the project owner should be sent notifying the utility company that its facilities are in conflict with the project and that action will be taken against it if it does not proceed with developing its relocation plan and relocating its facilities.

If no response is received after this, the matter should be turned over to the project owner to pursue with its attorneys or however it deems necessary. At this point, the utility coordinator has fulfilled his/her obligations in this matter. The only further obligation would be if the utility company does respond and submits a relocation plan. The coordinator would have to resume his/her coordination per normal procedures. The Production Management Division's Utilities Team may also be contacted for advice in such a matter.

Example 10-2.4

A water main exists within the limits of a road project. The line is known to run the length of the project either under or near where new pavement will be placed. No other details of location of the main or service lines are known. It is not known if there is a conflict or not. Whether there is a conflict or not would depend on the location and condition of the main and the service lines.

The utility company has not submitted its relocation plan by the date requested. The utility coordinator has contacted the utility company and was told that the utility company would get right on it and have plans submitted within two weeks. Three weeks have passed and a relocation plan has still not been received. During the next three weeks, five telephone messages have been left with the utility company, but none of the calls has been returned.

It is necessary to obtain a response from the utility company due to the possible consequences if a conflict exists. A letter from the project owner must be sent notifying the utility company that its facilities are likely in conflict with the project and action will be taken against it if it does not proceed with developing its relocation plan and relocating its facilities. If no

response is received, the utility coordinator has fulfilled his/her obligation and the matter should be turned over to the project owner to pursue.

Example 10-2.5

A high-pressure gas transmission line crosses under the road at one location within the limits of a road project. It appears that there might not be a conflict because only minimal work is being done above the pipeline. However, there will be a need for heavy construction machinery to traverse over top of the area where the lines are located during construction.

The utility company has been contacted but has indicated that it is too busy to spend the time to review the project plans and make an assessment of the situation. The utility company has indicated that it will be at least 6 months before it will have a chance to do a review. Unfortunately, this is not in accordance with the schedule for the highway project.

Even though the utility is present only at a spot location, due to the type of utility facility involved, a response would be necessary from the utility company. Also, gas transmission and other pipeline utilities have stringent regulations that sometimes result in relocations where it might not be readily apparent that there would need to be one. Pipeline relocations can also tend to be costly, take a considerable amount of time and be subject to seasonal constraints. Thus, it would be beneficial to receive an early response from the utility company.

The utility company is communicating, but it is not willing to meet the highway project schedule due to its own priorities. It would be best to inform the utility company why it is to its advantage to spend some time to at least perform an analysis to see if a conflict exists or not. For instance, if a conflict is identified early enough, the project plans or special provisions could be altered to accommodate the utility without the utility having to make any adjustment to its facilities. If the utility company waits until the last minute, there will be much less flexibility to make changes. Therefore, a short amount of time spent now could save a large amount of time later. It is always best to try to demonstrate to the utility company the advantages of coordinating in a timely manner.

If the incentive method doesn't work, then more forceful methods would need to be pursued as listed in the Examples 10-2.3 and 10-2.4.

10-3.0 UTILITY ACCOMMODATION POLICY

10-3.01 Introduction

10-3.01(01) Purpose

The policies and principles in this Section should be used to control the utility occupancy of public-highway right of way, including easements, under INDOT's jurisdiction. This includes local-public-agency work which uses Federal-aid funds administered by INDOT.

INDOT has the responsibility to maintain highway right of way under its jurisdiction as necessary to preserve the integrity, operational safety, and function of the highway facility. Because the manner in which utilities cross or otherwise occupy highway right of way can materially affect the appearance, safe operation, and maintenance of the highway, it is necessary that this use and occupancy be authorized and reasonably regulated.

This policy is provided to develop and preserve a safe roadside and to minimize possible interference and impairment to the highway, its structures, appearance, safe operation, construction, and maintenance.

10-3.01(02) Application

This policy applies to all public and private utilities including electric power, telephone, telegraph, cable television, water, gas, oil, petroleum products, steam, chemicals, sewage, drainage, irrigation, and similar lines that will be located, adjusted, or relocated within the right of way under the jurisdiction of INDOT. The utilities may involve underground, surface, or overhead facilities, either singularly or in combination.

10-3.01(03) Scope

This policy is provided by INDOT for use in regulating the location, design, and methods for installing, adjusting, accommodating, and maintaining utilities on highway right-of-way. It is limited to matters which are the responsibility of highway authorities for preserving the integrity of the highway and its safe operation.

Where laws or orders of public authority (such as the Indiana Utility Regulatory Commission, the Indiana State Board of Health, or the requirements of the Federal Natural Gas Pipeline Safety Act of 1968), industry or governmental codes prescribe a higher degree of protection or standards than those described herein, the higher degree will prevail.

10-3.01(04) Other Requirements

All utility installations and construction must comply with the requirements contained herein, the INDOT *Standard Specifications*, the *Manual on Uniform Traffic Control Devices*, and the clear-zone requirements described in Chapter Forty-nine.

10-3.01(05) Exceptions

Throughout this policy, there are several instances where the phrase "exceptions may be permitted in accordance with Section 10-3.01(05)" is used. These denote where INDOT tends to receive the most requests for exceptions to this policy. However, exceptions not only to these provisions, but any provision contained in this section may be authorized by the INDOT Chief Engineer, where it is demonstrated that extreme hardship or unusual conditions provide justification and where alternative measures can be prescribed to fulfill the intent of this policy. All requests for exceptions must include an evaluation of the direct and indirect design, environmental and economic effects, including impacts on agricultural lands, which would result if the installation is permitted and a comparison to the results if it is not permitted, plus any other pertinent information.

10-3.01(06) Prior Instructions

This policy supersedes and replaces all policies or portions of policies pertaining to the accommodation, location and methods of utility installations, adjustments and maintenance which are in conflict.

10-3.02 Definitions

The following definitions apply to utility accommodation.

1. Utility. This term applies to all publicly-, privately-, or cooperatively-owned lines and/or their accessories within the highway right of way except those used for highway-oriented needs. Such utilities may involve underground, surface, or overhead facilities either singularly or in combination. The term Utility, when capitalized, means the utility company, including any wholly-owned or -controlled subsidiary. Public utilities are generally considered those which convey a product, power, or communication from the Utility to a customer. Private lines are generally considered those which are devoted exclusively to private use.

2. Low-Volume Highway. Any non-limited-access highway which carries a traffic volume of not more than 750 vehicles per day, and, if known, upon which the projected traffic volume at the design year is not anticipated to exceed 1300 vehicles per day.

3. Utilities Team. The team in the Production Management Division responsible for identifying potential utility conflicts in a highway project and coordinating with those utility companies to make adjustments or relocations as needed.

4. Permits Team. The team in the Contract Administration Division responsible for issuing a permit to a Utility for the construction, rebuilding ,or repair of utility lines and facilities on highway right of way.

5. Relocation Permit. The written permission provided to a Utility by the Utilities Team and/or district office which allows the Utility to relocate existing facilities to accommodate highway construction or maintenance.

6. Right-of-Way Permit. The written permission by INDOT which allows the use and occupancy of highway right of way for utility lines and/or facilities.

7. High- or Low-Pressure Gas Line. A high-pressure gas line is that which is generally operated at a pressure in excess of 60 psi. A low-pressure gas line is that which operate at 60 psi or lower.

8. Pavement Structure. The combination of the surface, intermediate, and base courses, subbase, and up to 8 in. of stabilized subgrade material which supports the traffic load and distributes it to the roadbed. A maximum of 8 in. of subgrade stabilization will be considered a part of the pavement structure.

9. Highway, Street, or Road. A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way.

10. Roadway. The portion of a highway, street, or road, including shoulders, intended for vehicular use. A divided highway has two or more roadways.

10-3.03 General

10-3.03(01) Permits

Each public utility company has a qualified right to occupy public right of way, subject to the control of INDOT or other agencies with jurisdiction of the right of way. This control is exercised by requiring a right-of-way permit for each point or area of use by a utility facility. This will ensure

compliance with the standards, policies, and methods promulgated by INDOT and will make possible the safe control of traffic movement, safety, and coordination of work with other utilities and highway maintenance or construction work.

A utility company's occupancy request may be initiated as follows.

1. Utility-Company-Initiated. A utility company initiates the request if it wants to install new facilities or adjust existing facilities within highway right of way. The utility company must obtain a permit through the appropriate district or subdistrict office. A fee is charged for the permit.

2. INDOT-Initiated. INDOT initiates the request if a utility must be relocated or adjusted to accommodate proposed highway construction, reconstruction, or maintenance. This work is coordinated by the Utilities Team or the appropriate district office.

All utility facilities within the existing or proposed right of way are identified while the project is in the design stage. All affected utility companies receive plans of the proposed highway construction and are notified if relocation is necessary. Each utility company must coordinate relocations with, and obtain a relocation permit from, the Utilities Team or the appropriate district office. No fee is charged for the permit.

If the utility company does not complete its adjustments or relocations in a timely manner, INDOT may claim damages from the utility company for delay of highway work. In the event of delay, INDOT may also perform the necessary work itself or through a contractor and bill the utility company for all costs associated with this work.

The utility company must identify and obtain any other necessary permits or authorizations for the installation, which may be required from the U.S. Army Corps of Engineers, the Indiana Department of Natural Resources, railroad companies, or others. INDOT may require the utility company to produce satisfactory evidence that these permits and authorizations have been obtained.

10-3.03(02) Driveway Conflict

Construction, reconstruction, modification, or relocation of a private drive on highway right of way may also require adjustment or relocation of utility facilities. Where the work on the drive is initiated by is or incidental to a highway project, the adjustment or relocation of the utility will be treated like any other highway-initiated work.

Where the work on the drive is initiated by a private owner, subject to INDOT approval, INDOT is not responsible for identifying or resolving any conflicts between the drive and utilities. If a conflict exists and there is no other practical location for the drive, the utility must be adjusted or relocated.

The division of costs, if any, for this work will be resolved between the utility company and the owner of the drive.

10-3.03(03) Private Line

Because a private line serves only its owner, it is not in the public interest for it to be located within highway right of way. A longitudinal installation of a private line is not permitted. Exceptions may be made in accordance with Section 10-3.01(05) where public interest can be demonstrated. A crossing of highway right-of-way by a private line may be permitted subject to INDOT control. A private-line installation must be in accordance with all other applicable requirements included herein.

10-3.03(04) Service Line

A service line is a special class of private line. Whether the public-utility facility is on or off highway right-of-way, the sole reason for a service line to be on highway right-of-way is to facilitate its connection with a public utility. Because it is in the interest of both the customer and utility company to have these connections, a service line is permitted on highway right-of-way whenever practical.

There is a wide variation among utility companies on the division of ownership, costs, and responsibility between them and their customers for the portion of the service line on highway right-of-way. INDOT neither seeks nor desires to regulate this relationship. However, the utility company clearly benefits from the service line. As a practical consequence of effectively regulating utility occupancy of highway right-of-way, the utility company must at a minimum co-sign any service line permit. Each utility company must determine the proper division of costs, if any, with each customer.

10-3.03(05) Access Control

INDOT has the authority to control and regulate access to each highway under its jurisdiction. A large public investment has been made to construct and maintain a safe and efficient highway system. A major objective is to limit interference with vehicles or pedestrians which are entering, exiting, or crossing the highway. Access control includes the categories as follows.

1. Non-Limited Access. INDOT has the authority to regulate the location and details of access which affect the safe operation of the highway. However, it has not purchased access control rights from adjoining properties. This level is typical of a highway with frequent drives or intersections.

2. Partial Limited Access. INDOT has declared or purchased access control from adjoining properties. Access is controlled to give preference to through traffic, but there may still be some intersecting streets at grade and some driveway connections. This level is typical of a divided highway with some intersections or drives.

3. Full Limited Access. INDOT has purchased access control rights from adjoining properties. Access is controlled to give priority to through traffic by providing access only from selected public roads, by prohibiting crossings at grade, and by prohibiting driveway connections. This level is typical of an Interstate highway or a divided highway.

The type of access control is not always apparent from visual inspection. The appropriate district office should be contacted to confirm the type of control in effect for a specific location. This determines the type and extent of utility installations which may be permitted. The access-control line is the limit at which access is physically controlled for limited-access right of way. The access-control line is normally but not always in the same location as the right-of-way line.

10-3.03(06) Location

The following applies to the location of utility lines.

1. Utility lines must be located to avoid or minimize the need for adjustment for future highway improvements and to permit access to the utility lines for their maintenance with minimum interference to highway traffic. Full consideration must be given to the measures necessary to preserve and protect the maintenance, operation, safety, and aesthetic characteristics of the highway.

2. Utility installations on an urban street with closely abutting improvements must be resolved consistent with the prevailing limitations and conditions.

3. Utilities should cross a roadway at right angles or as nearly as practical to right angles. Reasonable latitude may be exercised for existing utilities which are otherwise qualified to remain in place.

4. Underground utility crossings which are encased should be constructed to allow for replacement of the lines within the existing encasement if the existing line ruptures.

5. For utility crossings on a limited-access highway, all supporting structures and above-ground appurtenances should be located outside the access-control line and, preferably, outside the right-of-way line. Installation and maintenance must be from non-limited access frontage roads, crossroads, or streets where practical or otherwise from outside the access-control line and, preferably, outside the right-of-way line of the through-traffic roadway. Exceptions may

be allowed in accordance with Section 10-3.01(05) for an unusually wide right of way or median.

6. Longitudinal installations must be located on uniform alignment as near as practical to the right-of-way line to provide space for future highway construction and for possible future utility installations. Where irregularly shaped portions of the right of way extend beyond the normal right-of-way limits, variances in the location from the right-of-way line may be allowed as necessary to maintain a reasonably uniform alignment for longitudinal utility installations. Above-ground longitudinal installations are not permitted in a highway median.

7. Longitudinal installations on a highway with partial access control are generally discouraged. Installations may be allowed in accordance with Section 10-3.01(05) and the following conditions.

    a. Individual service connections will be permitted only if no other reasonable alternative exists. Factors to be considered include distance between distribution points, terrain, cost, and prior existence.

    b. Utility maintenance points, such as manholes, must be installed outside of the right of way wherever practical.

8. Longitudinal installations on a highway with full access control are not permitted. Exceptions may be allowed in accordance with Section 10-3.01(05) and the following conditions:

    a. individual service connections may not be permitted;

    b. the utility must not be installed or serviced by direct access from the limited-access roadway or connecting ramps; and

    c. the utility must not interfere with or impair the safety, design, construction, operation, maintenance, stability, or future expansion of the highway.

2. Wireless telecommunication towers may be permitted in highway right-of-way with partial- or full-access control in accordance with Section 10-3.06.

10-3.03(07) Design

The following applies to the design of a utility installation.

1. The utility company is responsible for the design of the utility facility to be installed within the highway right-of-way or attached to a highway structure. Full consideration must be provided to the measures necessary to preserve and protect the maintenance, operation, safety, and aesthetic characteristics of the highway.

2. Utility installations on, over, or under the highway right of way must, at a minimum, be in accordance with the following:

    a. electric power and communication facilities must be in accordance with the National Electric Safety Code;

    b. water lines must be in accordance with the applicable specifications of the American Water Works Association;

    c. pressure pipelines must be in accordance with the applicable sections of the American National Standards Institute (ANSI) Code for Pressure Piping; 49 CFR Parts 192, 193 and 195; and any applicable industry codes;

    d. liquid petroleum pipelines must be in accordance with the applicable recommended practice of the American Petroleum Institute for pipeline crossings under a railroad or highway; and

    e. any pipeline carrying hazardous materials must be in accordance with the rules and regulations of the U. S. Department of Transportation governing the transportation of such materials.

3. Each utility installation on, over, or under highway right of way, or attachment to a highway structure should be of durable materials designed for a long service life expectancy, and be relatively free from routine servicing and maintenance.

4. On a new installation or adjustment of an existing utility line, provisions should be made for known or planned expansion of the utility facilities, particularly those located underground or attached to a bridge. They should be planned to minimize hazards and interference with highway traffic if additional overhead or underground lines are installed at some future date.

5. Utility lines which are attached to a highway bridge or separation structure must have shut-off valves, automatic where practical, installed at or near the ends of the structure, unless segments of the lines can be isolated by other devices within a reasonable distance.

10-3.04 Structure

10-3.04(01) Utility Structure

Where it would be more economical to carry one or several utility lines across a highway in a tunnel or on a bridge rather than in separately trenched and encased crossings, consideration should be given to using a separate structure specifically for the utility crossing. Such a structure may serve a joint purpose as a utility and pedestrian facility and/or sign support structure.

Each utility company must agree that any maintenance, servicing, or repair of its utility lines will be its responsibility. Further, the cost of designing, constructing, and maintaining the utility tunnel or bridge must be divided among the utility companies in an agreed, equitable manner. INDOT will participate in these costs only to the extent that the utility company would otherwise normally be reimbursable for such work or to the extent that the structure is also used for highway purposes.

10-3.04(02) Highway Structure

The following applies to the attachment of utility lines to a highway structure.

1. The attachment of utility lines to a highway bridge or separation structure is discouraged. Such attachments can materially affect the durability and load capacity of the structure, the safe operation of traffic, the ease of maintenance, and the overall appearance.

2. Exceptions are permitted in accordance with Section 10-3.01(05) and the following criteria. Each attachment will be considered individually and must not be considered a precedent for granting of any subsequent requests for attachment.

    a. Communication Line. Where it is impractical to carry a communication line across a stream or other obstruction, INDOT may permit attachment of the line to its bridge. On an existing bridge, the line must generally be carried in conduit and located so as not to interfere with stream flow, traffic, or routine maintenance operations. If a request is made prior to construction of a bridge, suitable conduit will be provided in the structure if the utility company bears the cost of all additional work and materials involved and all other applicable requirements have been met.

    b. Gas or Petroleum Line. A line carrying these or other hazardous, explosive, or highly pressurized or heated materials must not be attached to a structure except in extreme hardship. It cannot be installed where it can be impacted by traffic on or under the bridge, nor where a leak could flood a roadway on or under the bridge.

    c. Power Line. A high-voltage power line must not be attached to a structure except in extreme hardship. A low-voltage line may be attached where the cost of other

solutions is prohibitive. A power line will not be installed where it can be impacted by traffic on or under the bridge.

d. Water or Sewer Line. This line must not be installed where it can be impacted by traffic on or under the bridge, nor where a leak could flood a roadway on or under the bridge.

e. Structural Analysis. Each request to attach a pipeline to an existing bridge must be accompanied by sufficient information to determine the effect of the added load on the structure. If the bridge does not have sufficient strength to carry the load with an adequate margin of safety, the request will be denied. Where the request is to attach a line within or to a new structure, the utility company will be responsible for any increase in the cost of the structure to support the extra load of the pipeline, including any increase in the size or thickness of members necessary to contain lines or conduits installed within the structure.

f. Attachment Details. All requests for attachments must be accompanied by sufficient details of the manner and type of attachment to allow for adequate review and approval by INDOT.

g. Asbestos Materials. Materials contain asbestos should not be used on a utility line attached to a highway structure. Where a utility is located on a highway structure, the utility company shall submit to INDOT on its letterhead, a signed, dated copy of the statement as follows:

> *We hereby certify that no asbestos-containing material was specified as a building material in any construction document for this project.*

In addition, the Contractor's contract should include the statement as follows:

> *Before final payment of the contract price, the Engineer will sign and submit to INDOT, on the Contractor's letterhead, a dated copy of the following statement:*
>
> *I hereby certify that to the best of my knowledge that no asbestos-containing material was used as a building material during this project.*

3. If an attachment to a structure must be relocated to accommodate highway work or safety, the utility company must apply for a new attachment. Prior existence will not be a basis for reattachment.

10-3.05 Pipeline

10-3.05(01) General

1. Methods of Protection.

   a. General. Each pipeline must provide sufficient strength to withstand internal design pressures and must be of satisfactory durability under the conditions to which it may be subjected and must meet any other applicable codes or industry standards for the type of pipeline and material being transmitted.

   b. Encased. Encasement must consist of a pipe or other separate structure around and outside the carrier line and should be designed to support the superimposed loads of roadway, traffic, and construction equipment. Casing strength must meet or exceed the structural requirements for a drainage culvert. Casing materials must be of satisfactory durability under the conditions to which they may be subjected. A highway crossing must be encased in the interest of safety, protection of the highway and utility, and access to the utility.

      Where casing is used, it must be provided under a median, from top of backslope to top of backslope for a cut section, 5 ft beyond the toe of slope under a fill section, 5 ft beyond face of curb in an urban section, or 5 ft beyond any structure which the line passes under or through. Encasement may be omitted under a median which is substantially wider than standard for such a roadway.

   c. Non-Encased. A non-encased pipeline must provide sufficient strength to withstand internal design pressures and the superimposed loads of the roadway and traffic, including that of construction equipment. A non-encased pipeline crossing a highway must comply with the requirements herein for each type of utility.

2. Manhole, Vault, or Pit. This type of access must be limited to that necessary for installation and maintenance of an underground line. Each must be directly in line with the utility facility, must be of the minimum width and length to accomplish its intended function, and must comply with any other necessary codes or requirements. It must not be placed or permitted to remain in place in the pavement or shoulders of a high-volume roadway. Exceptions in accordance with Section 10-3.01(05) may be permitted for extreme hardship for a roadway in an urban area. It may also be placed or permitted to remain in place under traffic lanes of a low-volume roadway in an urban area provided steps are taken to minimize such installation and to avoid its location at an intersection. It must be installed flush with the roadway or ground surface and must be of sufficient strength to withstand the superimposed loads of the roadway, traffic, and construction equipment.

3. Depth. As used herein, depth of cover must be to the top of the pipe if non-encased or otherwise to the top of the casing. The depth of an underground line must be as specified herein for each type of utility. Where placement at such depth is impractical or where unusual conditions exist, exceptions to permit other types of protection may be approved as appropriate.

4. Methods of Installation. An underground line to be installed across an existing roadway must be installed by boring, tunneling, or jacking in accordance with INDOT specifications. Where installed by jacking or boring, encasement may be required. A bore pit should be located at least 30 ft from the edge of the nearest through traffic lane and not less than 20 ft from the edge of pavement on ramps. On a low-traffic roadway or a frontage road, a bore pit should not be less than 10 ft from the edge of pavement or 5 ft from face of curb. Adequate warning devices, barricades, or protective devices must be used to prevent traffic hazards. Where circumstances necessitate the excavation of a bore pit closer to the edge of pavement than established above, concrete barrier rail or another approved device must be installed for protection of traffic in accordance with INDOT criteria (see Chapter Eighty-two). A bore pit must be located and constructed so as to not interfere with highway structural footings. Shoring must be used if necessary.

5. Location. An unsuitable or undesirable location must be avoided. This includes the following:

   a. deep cut;

   b. near footing of bridge or other highway structure;

   c. across at-grade intersection or ramp terminal;

   d. at cross-drain where flow of water, drift, or stream bedload may be obstructed;

   e. within basin or an underpass drained by a pump if the pipeline carries a liquid or liquefied gas; or

   f. in wet or rocky terrain where minimum depth of cover would be difficult to attain.

6. Clearance. Vertical and horizontal clearance between a pipeline and a structure or other highway or utility facility should be sufficient to permit maintenance of the pipeline and the other facility.

7. Materials. Each pipeline or casing must provide sufficient strength to withstand the internal design pressure and the dead and live loads of the backfill, pavement structure, and traffic, including construction equipment.

10-3.05(02) High-Pressure Gas or Liquid Petroleum Line

1. Depth of Cover. Each line that is not under the roadway and not within 5 ft of it must have a minimum depth of cover of 2.5 ft if encased, or 3 ft if not encased.

   Each line that is under the roadway or within 5 ft of it must have a minimum depth of cover under the pavement surface of 2.5 ft if encased, or 4 ft if not encased. Further, each line must be a minimum of 18 in. or one-half the diameter of the pipe or casing beneath the pavement structure, whichever is greater.

   Each line must have a minimum depth of cover of 4 ft under a ditch.

   An exception may be authorized for an existing line to remain in place with a reduction of 0.15 m in the depth of cover specified above. A further reduction may be permitted if the pipeline is protected by a reinforced-concrete slab which meets the following requirements.

   a. Width. Three times the pipe diameter but not less than 4 ft.
   b. Thickness. Minimum of 6 in.
   c. Reinforcing. Minimum of #4 bars on 12 in. centers, or equivalent.
   d. Cover. Minimum of 6 in. between the slab and top of pipe.

2. Crossing Line. This may be encased or non-encased. However, only a welded-steel line with adequate corrosion protection may be used for a non-encased highway crossing.

3. Vents. One or more vents must be provided for each casing or series of casings. For a casing longer than 150 ft, vents should be provided at both ends. For a shorter casing, a vent should be located at the high end with a marker placed at the low end. Vents must be placed at the right-of-way line immediately above the pipeline and situated so as to not interfere with highway maintenance and to not be concealed by vegetation. Ownership of the line must be shown on the vents.

4. Marker. The utility company must place a readily-identifiable and suitable marker immediately above any high-pressure gas or liquid petroleum line where it crosses the right-of-way line, except where marked by a vent.

10-3.05(03) Low-Pressure Gas Line

1. Depth of Cover. Each line that is not under the roadway and not within 5 ft of it must have a minimum depth of cover of 2.5 ft if encased, or 3 ft if not encased.

   Each line that is under the roadway or within 5 ft of it must have a minimum depth of cover under the pavement surface of 2.5 ft if encased, or 4 ft if not encased. Further, each line must be a minimum of 18 in or one-half the diameter of the pipe or casing beneath the pavement structure, whichever is greater.

   Each line must have a minimum depth of cover of 4 ft under a ditch.

   An exception may be authorized for an existing line to remain in place with a reduction of 6 in. in depth of cover specified above.

2. Crossing Line. This may be encased or non-encased. A non-encased crossing must be of welded-steel construction with adequate corrosion protection or a plastic line with no joints under or within 5 ft of the roadway.

3. Vents. One or more vents must be provided for each casing or series of casings. For a casing longer than 45 m, vents should be provided at both ends. For a shorter casing, a vent should be located at the high end with a marker placed at the low end. Vents must be placed at the right-of-way line immediately above the pipeline and situated so as to not interfere with highway maintenance and to not be concealed by vegetation. Ownership of the line must be shown on the vents.

4. Marker. The utility company must place a readily identifiable and suitable marker immediately above any low-pressure gas line where it crosses the right-of-way line, except where marked by a vent.

5. Plastic Line. The maximum size must not exceed industry standards, which is 6 in. to 8 in. Where plastic pipe is installed without a metallic casing, a metal wire must be installed concurrently or other means must be provided for detection purposes.

6. Location Exception. In an urban area, an existing longitudinal line which can be maintained without violating access control and which is not under the pavement or shoulder of any existing roadway or potential future improvement may remain in place provided that all other requirements are met, and provided that measures are taken to minimize any future need for cutting the pavement to make service connections on a high-traffic roadway.

10-3.05(04) Water Line

1. Depth of Cover. Each line that is not under the roadway and not within 5 ft of it must have a minimum depth of cover of 2.5 ft.

   Each line that is under the roadway or within 5 ft of it must have a minimum depth of cover under the pavement surface of 4 ft. Further, each line must be a minimum of 18 in. or one-half the diameter of the pipe or casing beneath the pavement structure, whichever is greater.

   Each line must have a minimum depth of cover of 3 ft under a ditch.

   An exception may be authorized for an existing line to remain in place with a reduction of 6 in. in depth of cover specified above.

2. Crossing Line. Each crossing line must be encased, except for a service line of 2 in. diameter or less. Encasement under an entrance may be omitted in consideration of the type and amount of traffic and the depth, condition, and maintenance responsibility.

3. Plastic Line. Where plastic pipe is installed without a metal casing, a metal wire must be installed concurrently or other means should be provided for detection purposes.

4. Location Exception. In an urban area, an existing longitudinal line which can be maintained without violating access control and which is not under the pavement or shoulder of any existing roadway or potential future improvement may remain in place provided that all other requirements are met, and provided that measures are taken to minimize any future need for cutting the pavement to make service connections on a high-traffic roadway.

5. Appurtenances. Meter pits, sprinkler pits, regulator pits, or other such features must not be located within highway right of way. An exception may be allowed for an existing facility if it does not interfere with proposed highway construction, maintenance, operation, or safety.

6. Drain. One or more drains must be provided for each casing or series of casings. The drain should outlet outside of the roadway area to a natural drainage feature or roadway ditch.

7. Marker. The utility company must place a readily identifiable and suitable marker immediately above any water line where it crosses the right-of-way line.

10-3.05(05) Sanitary Sewer Line

1. Depth of Cover. Each line that is not under the roadway and not within 5 ft of it must have a minimum depth of cover of 2.5 ft.

Each line that is under the roadway or within 5 ft of it must have a minimum depth of cover under the pavement surface of 4 ft. Further, each line must be a minimum of 30 in. or one-half the diameter of the pipe or casing beneath the pavement structure, whichever is greater.

Each line must have a minimum depth of cover of 3 ft under a ditch.

An exception may be authorized for an existing line to remain in place with a reduction of 6 in. in depth of cover specified above.

2. Crossing Line. A line to be operated under pressure or which does not conform to the material, strength, or cover depths described herein must be encased. Encasement under an entrance may be omitted in consideration of the type and amount of traffic, depth, condition and maintenance, responsibility.

3. Material. New or relocated sewer lines may be of any material which has been proven to be of satisfactory strength and durability in local use, provided all other requirements are met.

4. Non-Metallic Line. Where a non-metallic line is installed without a metallic casing, a durable metal wire must be installed concurrently or other means should be provided for detection purposes.

5. Location Exception. Except where relocation is necessary to clear an existing line from a structure or other highway appurtenance or for other specific reasons, INDOT may permit an existing line to remain in place at any location except longitudinally under through-traffic lanes or ramps of a limited-access highway, provided the line is of satisfactory quality and depth, manholes are adjusted as needed, and provisions are made to ensure that any future service lines will not violate access-control limits or disturb the roadway.

10-3.06 Overhead Power or Communication Line

10-3.06(01) General

1. Type of Construction. A longitudinal line should be limited to single-pole construction. A transverse line should be limited to single-pole construction where practicable, but may also be approved to use the same type of support as used on the portion of the line immediately adjacent to the highway right of way provided all other requirements herein are met.

2. Vertical Clearance. Except as noted in Item 3.c. below, the minimum vertical clearance for an overhead communication or power line above the highway shall be not less than 18 ft, and should be greater if required by the National Electric Safety Code or other law or regulation.

3. Location.

   a. In a rural area or at an uncurbed section in an urban area, poles supporting a longitudinal line should be located on a uniform alignment as far from the roadway as possible. Guy wires placed within the right of way should be held to a minimum and should normally be in line with the pole line. Other locations may be permitted for guy poles or wires, but they should not be located within the specified clear zone. At a curbed section in an urban area, poles shall be located as far as practical behind the outer curbs and preferably adjacent to the right-of-way line, but should provide at least 1.5 ft clearance behind the face of an existing curb or 2 ft behind the face of a proposed curb.

   b. At a crossing, poles will not be permitted in the median or more than 3 ft inside the right-of-way line where practical. An exception may be allowed where the cost of spanning an extreme width is excessive and where poles can be located in accordance with these requirements.

   c. The horizontal or vertical location of an overhead power and communication line relative to a highway bridge or other structure should provide adequate clearance for construction and maintenance activities, where practical.

4. Clear Roadside. Each new utility-pole installation or other above-ground obstruction should be located outside of the appropriate clear zone (see Chapter Forty-nine). If the clear-zone width extends to the right-of-way line, an installation will not be permitted unless approved in accordance with Section 10-3.01(05). An existing installation must be relocated to outside of the clear zone (see Chapter Forty-nine) or obstruction-free zone (see Chapter Fifty-five), whichever is applicable, where they are found within the project limits.

   Guy wires to ground anchors or stub poles should not be placed between a pole and the traveled way where they encroach upon the clear zone.

10-3.06(02) Telecommunication Tower

1. Applicability. These requirements apply specifically to a telecommunication tower placed within highway right-of-way as part of a resource-sharing project. Such tower will typically occupy space within Interstate-route limited-access right of way. A telecommunication tower that is not a part of a resource-sharing project will not be permitted to occupy Interstate-route limited-access right of way. A resource-sharing project is defined as a project undertaken by the State and a telecommunications provider to achieve a common goal of meeting each other's communication needs.

2. Location. Each location site must be in accordance with the following:

   a. adequate sight distance for safe ingress to and egress from the tower site;

   b. the tower should be located outside the clear zone and where it is unlikely to be struck unless shielding already exists. The desirable distance is 80 ft; and

   c. there is an adequate pull-off area beyond the shoulder for construction and maintenance of the tower.

   Listed below, in descending order of preference, are the site locations that INDOT will consider.

   a. Priority 1. Vehicle access to the tower site can be obtained from outside the limited-access control roadway. This would include access from a frontage or local road. This also would include access from a ramp to a rest area, weigh station, etc. Where fencing exists, gates should be placed at appropriate locations to provide controlled access to the tower. Gates should be sized to accommodate the type of traffic-maintenance equipment that will access the tower. All gates shall be secured with locks, with keys being distributed to appropriate personnel. A locked-gate access requires an FHWA approval. See Figure 10-3A, Priority 1 Access.

   b. Priority 2. Within an interchange, vehicle access can be obtained from the right-hand side of a diagonal ramp. See Figure 10-3B, Priority 2 Access.

   c. Priority 3. Within an interchange, vehicle access can be obtained from the left-hand side of a diagonal ramp. See Figure 10-3C, Priority 3 Access.

   An installation within Interstate-route limited-access right of way that is not in accordance with the criteria described above may be approved only through joint INDOT/FHWA concurrence.

3. Multiple Providers. Multiple telecommunication providers will be permitted on a tower. However, only one provider will maintain the tower structure and all attachments. The provider who will maintain the tower will be chosen through standard INDOT selection procedures.

10-3.07 Underground Power Line

1. Depth of Cover. Each line that is not under the roadway and not within 5 ft of it must have a minimum depth of cover of 2.5 ft if encased, or 3 ft if not encased.

   Each line that is under the roadway or within 5 ft of it must have a minimum depth of cover under the pavement surface of 2.5 ft if encased, or 4 ft if not encased. Further, each line must be a minimum of 18 in. or one-half the diameter of the pipe or casing beneath the pavement structure, whichever is greater.

   Each line must have a minimum depth of cover of 4 ft under a ditch.

   An exception may be authorized for an existing line to remain in place with a reduction of 0.15 m in the depth of cover specified above. A further reduction may be permitted if the pipeline is protected by a reinforced-concrete slab which meets the following requirements.

   a. Width. Three times the pipe diameter but not less than 4 ft.
   b. Thickness. Minimum of 6 in.
   c. Reinforcing. Minimum of #4 bars on 12 in. centers, or equivalent.
   d. Cover. Minimum of 6 in. between the slab and top of pipe.

2. Crossing Line. An underground power line operating at 600 V or less may be encased or non-encased provided the installation complies with the depths of cover specified herein. A line operating at above 600 V must be encased. Consideration should be given to encasement or other suitable protection for a power line near a bridge footing or other highway structure, or near other locations where there may be hazards.

   Encasement, where used, may be metallic or nonmetallic. Such encasement must be designed to support the load of the highway and superimposed loads thereon, including that of construction equipment. The strength of the encasement must equal or exceed structural requirements for a drainage culvert. It must be composed of materials of satisfactory durability under conditions to which it may be subjected. Where used, encasement must be provided under a median, from top of backslope to top of backslope for a cut section, 5 ft beyond toe of slope and under a fill section, 5 ft beyond face of curb in an urban section including all side streets, and 5 ft beyond any structure which the line passes under or through. Encasement may be omitted under a median which is substantially wider than standard for such a roadway.

3. Marker. The utility company must place a readily identifiable and suitable marker immediately above any underground power line where it crosses the right-of-way line.

4. Location and Installation. A longitudinal line may be placed by plowing or open-trench method. It must be located on uniform alignment as near as practical to the right-of-way line to provide space for possible future highway construction or utility installations. Distance

from the right-of-way line will depend upon the terrain involved and obstructions such as trees or other existing underground or aerial utility lines. On a highway with a frontage road, such installation will be located between the frontage road and the right-of-way line. An underground power line must not be placed longitudinally beneath the median or beneath a through-traffic roadway including shoulders. An underground power line placed longitudinally along a connecting roadway must not be placed under the median or beneath a through-traffic roadway, including shoulders, where that roadway connects with a State highway.

An underground line to be installed across an existing roadway must be installed by means of boring, tunneling, or jacking in accordance with INDOT specifications. If installed by means of jacking or boring, encasement may be required. A bore pit should be located at least 30ft from the edge of the nearest through traffic lane and not less than 20 ft from the edge of pavement on a ramp. On a low-traffic roadway or frontage road, a bore pit should not be less than 10 ft from the edge of pavement or 5 ft from face of curb. Adequate warning devices, barricades, or protective devices must be used to prevent traffic hazards. Where circumstances necessitate the excavation of a bore pit closer to the edge of pavement than established above, concrete barrier rail or another approved device must be installed for protection of traffic in accordance with Chapter Eighty-two. A bore pit must be located and constructed so as to not interfere with the highway's structural footings. Shoring must be used if necessary.

5. Appurtenances. Above-ground pedestals or other appurtenances must be located at or near the right-of-way line, well outside the highway maintenance operation area.

6. Manhole, Vault, or Pit. This type of access point must be limited to that necessary to install and service the line. It must be directly in line with the utility facility and of the minimum width to accomplish its intended function and comply with any other necessary codes or requirements. It must be installed flush with the roadway or ground surface and must be of sufficient strength to withstand the superimposed loads of the roadway and traffic, including that of construction equipment. It should not be placed or permitted to remain in the pavement or shoulders of a high-volume roadway. An exception in accordance with Section 10-3.01(05) may be permitted on a roadway in an urban area of extreme hardship. A manhole may be placed or permitted to remain in place under traffic lanes of a low-volume roadway in an urban area provided measures are taken to minimize such installations and to avoid such locations at an intersection.

10-3.08 Underground Communication Line

1. Depth of Cover. Each line that is not under the roadway and not within 5 ft of it must have a minimum depth of cover of 2.5 ft.

Each line that is under the roadway or within 5 ft of it must have a minimum depth of cover under the pavement surface of 2.5 ft if encased, or 4 ft if not encased. Further, each line must be a minimum of 18 in. or one-half the diameter of the pipe or casing beneath the pavement structure, whichever is greater.

Each line must have a minimum depth of cover of 3 ft under a ditch.

An exception may be authorized for an existing line to remain in place with a reduction of 6 in. in depth of cover specified above.

2. Crossing. A line crossing a highway does not require encasement except where in the judgment of INDOT it is necessary for the protection of the highway or utility facility. Where encasement is not used, the utility company must specifically agree that the pavement will not be cut for repairs at any time in the future. Consideration should be given to encasement or other suitable protection for any communication facilities near bridge footings or other highway structures or near other locations where there may be hazards.

   Encasement, where used, may be metallic or nonmetallic. Such encasement must be designed to support the load of the highway and superimposed loads thereon, including that of construction equipment. The strength of the encasement must equal or exceed structural requirements for a drainage culvert. It must be composed of materials of satisfactory durability under conditions to which it may be subjected. Where used, encasement must be provided under a median, from top of backslope to top of backslope for a cut section, 5 ft beyond toe or slope and under a fill section, 5 ft beyond face of curb in an urban section and all side streets, and 5 ft beyond any structure which the line passes under or through. Encasement may be omitted under a median which is substantially wider than standard for such a roadway.

3. Marker. The utility company must place a readily identifiable and suitable marker immediately above any underground communication line where it crosses the right-of-way line.

4. Non-Metallic Line. Where a non-metallic line is installed without a metallic casing, a durable metal wire must be installed concurrently or other means must be provided for detection purposes.

5. Location and Installation. A longitudinal line may be placed by plowing or open-trench method. It must be located on uniform alignment as near as practical to the right-of-way line to provide space for possible future highway construction or utility installations. Distance from the right-of-way line will depend upon the terrain involved and obstructions such as trees or other existing underground or aerial utility lines. On a highway with a frontage road,

such installation will be located between the frontage road and the right-of-way line. An underground power line must not be placed beneath the median or beneath a through-traffic roadway or connecting roadway, including shoulders.

An underground line to be installed across an existing roadway must be installed by means of boring, tunneling, or jacking in accordance with INDOT specifications. If installed by means of jacking or boring, encasement may be required. A bore pit should be located at least 30 ft from the edge of the nearest through traffic lane and not less than 20 ft from the edge of pavement on a ramp. On a low-traffic roadway or frontage road, a bore pit should not be less than 10 ft from the edge of pavement or 5 ft from face of curb. Adequate warning devices, barricades, or protective devices must be used to prevent traffic hazards. Where circumstances necessitate the excavation of a bore pit closer to the edge of pavement than established above, concrete barrier rail or another approved device must be installed for protection of traffic in accordance with Chapter Eighty-two. A bore pit must be located and constructed so as to not interfere with the highway's structural footings. Shoring must be used if necessary.

6. Appurtenances. Above-ground pedestals or other appurtenances must be located at or near the right-of-way line, well outside the highway maintenance operation area.

7. Manhole, Vault, or Pit. This type of access point must be limited to that necessary to install and service the line. It must be directly in line with the utility facility and of the minimum width to accomplish its intended function and comply with any other necessary codes or requirements. It must be installed flush with the roadway or ground surface and must be of sufficient strength to withstand the superimposed loads of the roadway and traffic, including that of construction equipment. It should not be placed or permitted to remain in the pavement or shoulders of a high-volume roadway. An exception in accordance with Section 10-3.01(05) may be permitted on a roadway in an urban area of extreme hardship. A manhole may be placed or permitted to remain in place under traffic lanes of a low-volume roadway in an urban area provided measures are taken to minimize such installations and to avoid such locations at an intersection.

10-3.09 Irrigation or Drainage Pipe, Ditch, or Canal

1. An irrigation or drainage facility installed across highway right of way must be designed and constructed in accordance with INDOT standards for a culvert or a bridge.

2. A longitudinal ditch or canal which would closely parallel the highway must not be permitted nor will any appurtenances be permitted within the clear zone which would constitute a hazard to traffic. See Chapter Forty-nine.

10-3.10 Miscellaneous

10-3.10(01) General

Various types of utility lines not specifically described herein must be considered based on the nature of the line. Each line carrying caustic, flammable or explosive, heated, or otherwise hazardous materials must be considered in the requirements for high-pressure gas or liquid-petroleum line.

1. Preservation, Restoration, and Cleanup.

    a. Disturbed Area. The area disturbed by a utility installation or relocation should be minimized. Restoration methods must be in accordance with INDOT specifications or special provisions included in the utility use and occupancy agreements.

    b. Spraying, Cutting, or Trimming of Tree. The utility company should be prohibited from such activities unless written permission is provided by INDOT. Where permission is granted, only light trimming should be permitted. If the removal of a tree is permitted, the stump must either be cut to the ground or be removed and the hole properly backfilled as specified by INDOT. All debris, refuse, and waste must be removed from the site. It is common that a tree must be removed where a utility company is doing relocation work to accommodate an INDOT project. If the utility company wishes to do the removal, it must contact INDOT regarding trees that must not be disturbed.

    c. Drainage. An existing drainage facility should not be disturbed. An underground utility facility must be backfilled with pervious material and outlets must be provided for entrapped water. Underdrains must be provided where necessary. Jetting or puddling will not be permitted under the roadway.

2. Safety and Convenience.

    a. Control of Traffic. Traffic controls for utility construction and maintenance operations must be in accordance with the *Manual on Uniform Traffic Control Devices.* All construction and maintenance operations must be planned with full regard to safety and to minimize traffic interference. On a heavily-traveled highway, construction operations interfering with traffic should not be permitted during periods of peak traffic flow. Such work must be planned so that closure of intersecting streets, road approaches, or other access points is minimized.

    b. Servicing, Maintenance, or Repairs. Each utility facility must be maintained in good repair both structurally and aesthetically. The utility use and occupancy agreement

will identify the maintenance operations which are permitted and will indicate situations where prior notification to INDOT is required.

3. Records. The utility company must maintain records that describe the utility usage, size, configuration, material, location, height or depth, and any special features such as encasement, manholes, and valves. Such records must include all service lines which enter or cross the highway right-of-way. The information must be in a reproducible form which is available to other utility companies or highway agencies.

4. Construction Identification of Utilities. If it is likely that construction or maintenance activities could involve existing utilities, it is often desirable to locate and identify these facilities well in advance of the initiation of the work as an aid to both design and construction. The location of each underground utility should be identified by the utility company with stakes, paint, or other temporary surface markings color coded by utility type. The recommended uniform color code system is as follows.

   a. Red: Electric power line or conduit.
   b. Orange: Communication line.
   b. Yellow: Gas, petroleum, steam, or other hazardous material.
   d. Green: Storm or sanitary sewers.
   e. Blue: Water system or slurry pipeline.
   f. Purple: Radioactive material.

10-3.10(02) Trenching and Backfill

The essential features for trench and backfill construction are as follows:

1. restoration of the structural integrity of entrenched roadbed;
2. security of the pipe against deformation likely to cause leakage; and
3. assurance against the trench becoming a drainage channel.

The integrity of the pavement structure, shoulders, and embankment are of primary concern.

Trenched construction, bedding, and backfill must be in accordance with the INDOT *Standard Specifications.* Other controls are as follows.

1. A trench must be cut with vertical faces, where soil and depth conditions permit, with a maximum width of outside diameter of pipe plus 24 in. It must be shored where necessary.

2. Bedding must be provided to a depth of 6 in. or half the diameter of the pipe, whichever is less. For ducts not encased in concrete, not less than 3 in. of bedding must be placed under

the lower duct. Bedding must consist of pit-run sand and gravel mixture or other suitable material approved by the permit inspector. The bottom of the trench must be prepared to provide the pipe with uniform bedding support throughout the length of the installation.

3. Backfill for a trench in the roadway, or within 5 ft of pavement, paved shoulders, sidewalks, curbs, gutters, or similar structures, must consist of B borrow or other suitable material approved by the regulatory investigator and compacted in accordance with the INDOT *Standard Specifications*.

4. Backfill for a trench outside the roadway may consist of the excavated material or other suitable material as approved by the permit inspector and compacted to a density comparable to that of the surrounding soil. The top 12 in. of fill must be topsoil.

10-3.10(03) Underground Plant Protection

Each underground-utility company should subscribe to the Underground Plant Protection (UPP) Service. This ensures protection of the utility company's facilities, as it is required by law that the UPP is called at least two days prior to any excavation work. This allows the utility company to mark its underground facilities before excavation work is started.

Once a survey is completed for a proposed highway project, the surveyor should also contact UPP. While utility companies are not required by law to locate their facilities for survey work, this should still be done. If the facilities are marked for the survey, this information should be shown on the project plans. This will allow the designer to design around these facilities, if possible, and will allow the utility company to be notified in advance of an upcoming project and any potential impact to its facilities. The utility company also will have a chance to meet with the designer and discuss possible alternatives that might lessen any impact. Therefore, it is beneficial to all parties involved that each utility company subscribes to this service.

10-3.10(04) Pavement Cut

Open cutting of the pavement to install a utility facility is discouraged as it adversely affects the structural integrity of the roadway. If it is not possible to install a facility without disturbing the pavement, the utility company will be required to provide written documentation and justification for an open cut. Where a longitudinal open cut is proposed or where several cuts are proposed to cross the pavement in the same area, the district office will inspect the roadway to determine the extent of road repair that will be required.

The utility company will be required to use patch materials of at least equal quality and thickness as the originally constructed material and place it in accordance with INDOT specifications. The limits

of the pavement patch must extend at least 2 ft outside the limits of the trench. The edges of the trench must be beveled at least 6 in. The limits of the patch must have vertical faces and must be sawcut for a clean break. The restored surface must be flush with and sloped at the same rate as the existing surface.

Rev. 7-1-95

STATEMENTS ABOUT EXISTING CONDITIONS OF UTILITIES, ADDITIONAL RIGHT-OF-WAY, AND ENCROACHMENTS

The Standard Specifications are revised as follows:

SECTION 107, AFTER LINE 597, INSERT AS FOLLOWS:

107.25 Existing Conditions of Utilities, Additional Right-of-Way, and Encroachments. *Such existing conditions are as described below.*

(a) Utilities. *The status of all utility companies and organizations potentially involved with the work to be performed are described below.*

The facilities of Spartan Water Co. exist within the project limits, but are not expected to be affected by the proposed construction. The utility has a 6 in. water line crossing under SR 1001 at Station 20+00. If questions arise, Dan Tanna of the utility shall be contacted at 800-111-1111.

The facilities of Hawkeye Pipeline Co. exist within the project limits. Their facilities have been adjusted to accommodate construction. The utility has a 12 in. product pipeline crossing SR 1001 at Station 30+00 which has been lowered in place to eliminate any conflict with the construction of the underdrains. If questions arise, Thurston Howell III of the utility shall be contacted at 800-222-2222.

The facilities of Golden Gopher Sewer Co. exist within the project limits. The utility has a 12 in. sewer main running parallel to SR 1001 on the North side of the road for the entire length of the project. This sewer main will be relocated to within 6 ft of the new North right-of-way line for the entire length of the project. It is anticipated that they will adjust their facilities for construction on or before March 31, 1999. This date is dependent on the utility receiving their environmental permit prior to March 1, 1999. If questions arise, Jamie Sommers of the utility shall be contacted at 800-333-3333.

The facilities of Boilermaker Electric Co. exist within the project limits. The utility has power poles along the existing North right-of-way line for the entire length of the project. The utility will relocate its facilities to the new North right-of-way line for the entire length of the project except from Station 45+00 to Station 50+00 where the poles will remain in place. Where the poles will remain in place the utility will support these poles when the Contractor places the storm sewer in this area. It is anticipated that the utility will take approximately 20 work days to adjust its facilities once the Contractor has staked and cleared the right-of-way along the north side of SR 1001. If questions arise, Norm Petersen of the utility shall be contacted at 800-444-4444.

Rev. 7-1-95

The facilities of Nittany Lion Gas Co. exist within the project limits. The utility has a 16 in. gas line outside of the existing right-of-way on the South side of SR 1001 for the entire length of the project. The gas line will be relocated as follows:

- *From Station 10+000 to Station 15+00 the line will remain in place.*
- *From Station 15+00 to Station 40+00 the line will be relocated to within 3 ft of the new South right-of-way line.*
- *From Station 40+00 to Station 50+00 the line will remain in place. In the areas where drainage structures shall be placed, the utility will locate and expose their main. The gas main shall not be disturbed during the placement of these structures.*

Once the contractor has staked and cleared the right-of-way between Station 10+00 and Station 50+00 along the south side of SR 1001 and placed Structure No. 10, the utility will take approximately 30 work days to adjust its facilities. This line cannot be worked on until after May 1 and anytime the temperature is below freezing. The utility's schedule is also dependent on the availability of 16 in. steel gas line. Supply of this is scarce and may not be able to be delivered to the site until May 15. If questions arise, Mary Richards of WJM Contract Services shall be contacted at 800-555-5555.

The facilities of Bearcat Communications exist within the project limits. The utility has two fiber optic cables on poles owned by Boilermaker Electric Co. The utility will be relocating their facilities on the new power poles to be placed by Boilermaker Electric Co. The utility cannot begin their relocation until Boilermaker Electric Co. has completed the majority of their work. It is anticipated that the utility will take approximately 10 work days to complete their relocation. Once the utility relocates, they will work with Boilermaker Electric Co. to remove the existing poles. This will take approximately an additional 3 work days. If questions arise, Herb Tarlick of the utility shall be contacted at 800-777-7777.

107-R-169

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SAMPLE UTILITY SPECIAL PROVISION
Figure 10-2A

UTILITY COORDINATION CERTIFICATION

Contract No. Des No.

Project Description:

The undersigned certifies they have made a diligent effort, consistent with INDOT guidelines, to identify and show all known utilities within the limits of this contract. All known utility companies have been provided with plans or other information that clearly identifies the scope of this contract. Utility relocation plans and schedules, where provided, for all utilities expected to be in the way of construction in this contract have been reviewed, coordinated, and approved or forwarded to the Owner for approval. The "Existing Conditions of Utilities" statements included in this contract include utility names, contact persons' names and telephone numbers, and relocation descriptions and schedules, where provided, for all utilities found to be within the limits of this right-of-way.

The Utility Coordinator is not responsible for utility companies who have failed to cooperate, respond, and/or provide information needed. Further, the Utility Coordinator does not guarantee or warrant in any way the accuracy of information supplied by utility companies.

UTILITY COORDINATOR

_____ Date:
Signed

_____
Printed

The facilities of the _____ (utility) (utilities) exist within the project limits, but are not expected to be affected by the proposed construction.

The _____ utility is involved in this contract as a (non-reimbursable) (reimbursable) utility The relocation (plan) (agreement) was approved on _____. [Copy the sentence for each utility, then complete it. Delete this instruction when finished.]

Utility Coordination Certification Waiver

Contract No. Des No.

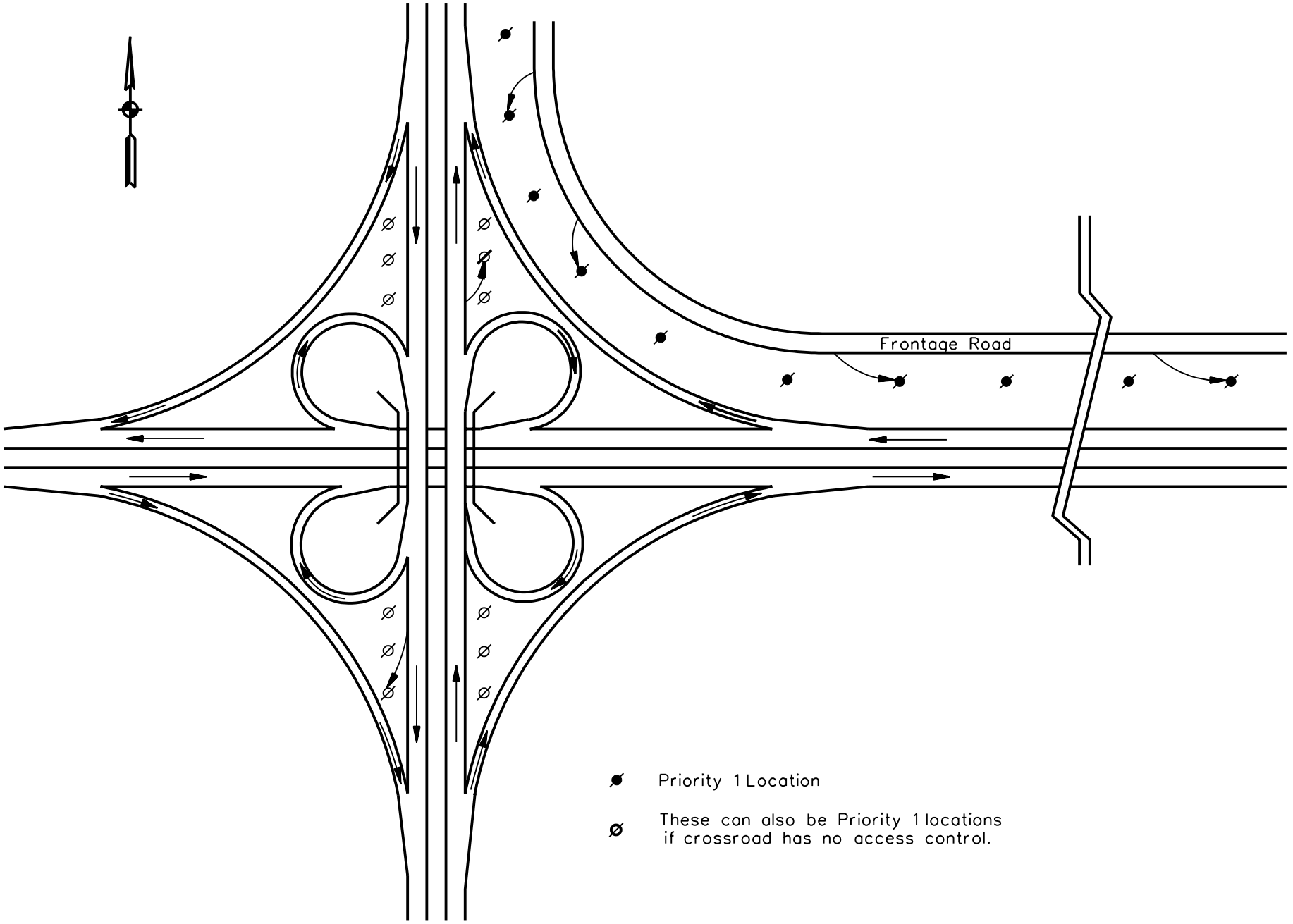
Project Description:

The facilities of the _____ (utility) (utilities) exist within the project limits, but are not expected to be affected by the proposed construction.

The undersigned agrees that the type of work included in this contract does not normally affect utility facilities and hereby approves this contract for a waiver from the need to follow utility coordination guidelines.

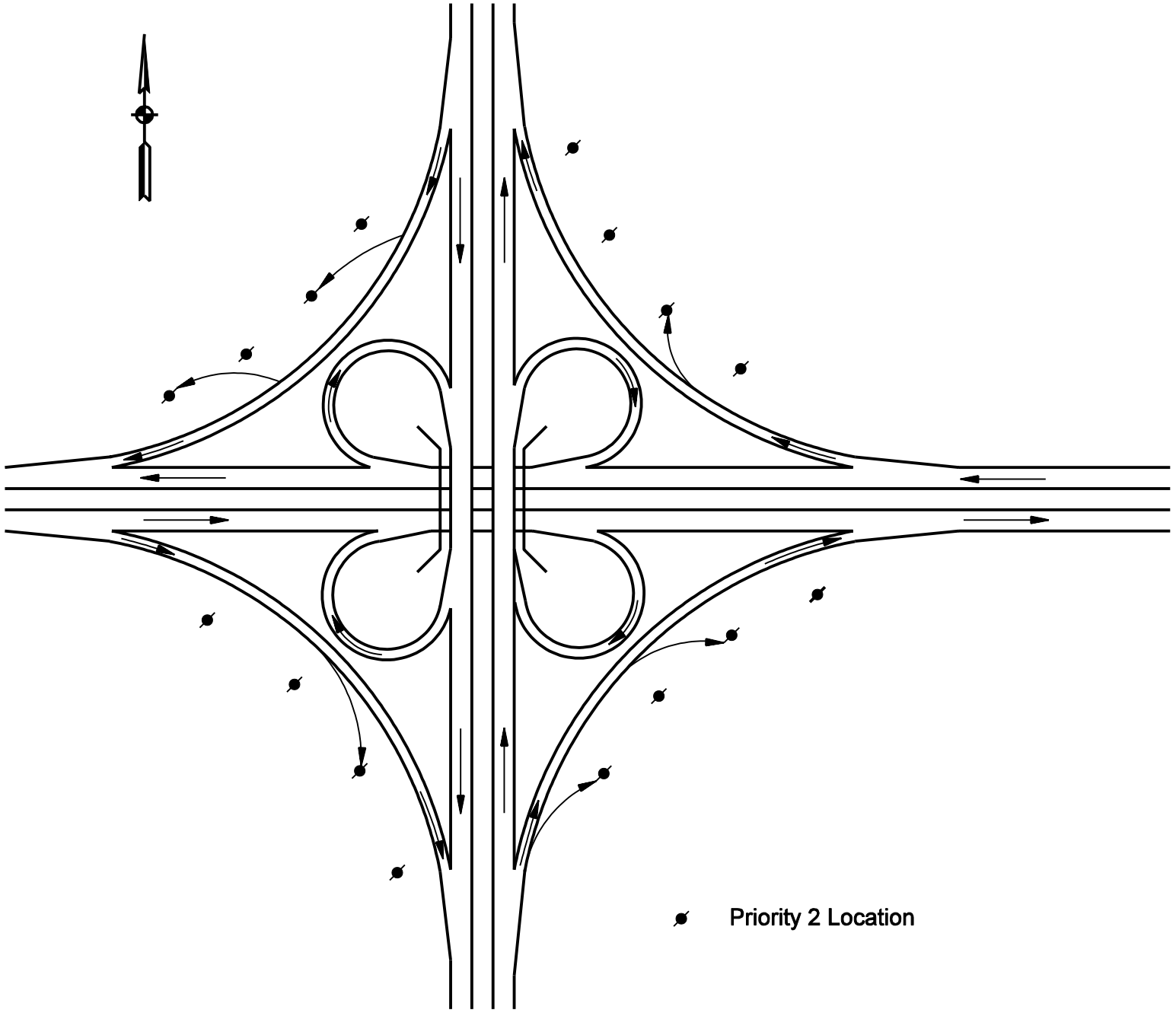
(signed) _____ Date:

(printed) _____
District Real Estate and Right-of-Way Program Director, or
Production Management Division Highway-Utility Manager



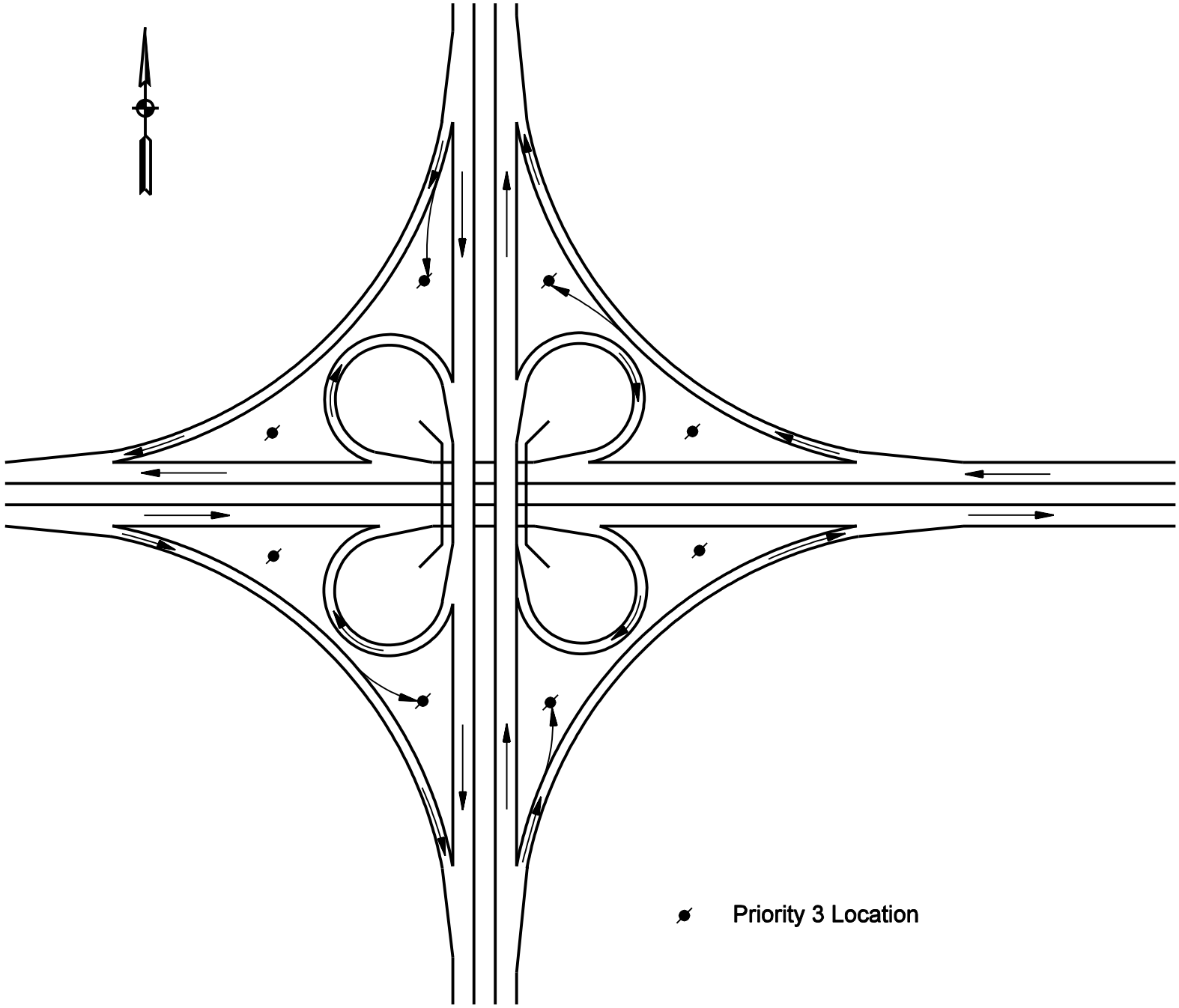
PRIORITY 1 ACCESS

Figure 10-3A



PRIORITY 2 ACCESS

Figure 10-3B



PRIORITY 3 ACCESS

Figure 10-3 C

CHAPTER 105

Railroad Coordination

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Figure Title

CHAPTER ELEVEN

RAILROAD COORDINATION

11-1.0 INTRODUCTION

11-1.01 General

Railroad coordination is required if a project crosses or is adjacent to a railroad, and which potentially has an impact on the railroad facilities or operation. This includes roadway design features (e.g., roadway widening, earthwork) which obviously require work on railroad right-of-way, and not-so-obvious impacts (e.g., maintenance of traffic, contractor work activities during construction) which may impact the safe operations of the affected rail line.

The highway and railroad networks are both vital components of our transportation system. Each includes its own unique set of design, construction, operational, and maintenance considerations. Where these two modes intersect, are adjacent to, or otherwise encroach upon each other, problems may develop if the operations of one mode affect the other. Highway agencies and railroad companies are each generally responsible for constructing, maintaining, and operating their own facilities. However, close coordination and cooperation between the two is needed where they interact to ensure that the design, construction, operation, and maintenance of both modes are compatible.

Within INDOT, the Production Management Division's Railroads Team is responsible for coordinating with each railroad company that is affected by a proposed highway project administered by the Department, regardless of whether the project is designed by the Production Management Division, a district office, a consultant, or a local public agency. The Railroads Team does not generally perform highway design or railroad design functions and does not assume the responsibilities of the designer. Rather, the Team is responsible for the following:

1. initiating contact with the railroad company;

2. providing technical advice and guidance to both the highway and railroad-company designers;

3. facilitating a mutually-satisfactory resolution of any conflicts or problems between the highway project and the railroad company; and

4. administering the Railroad Agreement and reimbursement process for each railroad company involved in a highway project.

11-1.02 Responsibilities

The various responsibilities of highway agencies and railroad companies are documented in detail in State and Federal laws and regulations. It is a complex and sometimes confusing set of rules and responsibilities. The *Indiana Design Manual* does not repeat, replace, or modify these laws or regulations. This Chapter briefly discusses some of the more common considerations in the railroad-coordination process. The Railroads Team should be notified of any conflict between the information presented in this *Manual* and State/Federal laws and regulations.

The following information applies to the railroad-coordination process.

1. Reimbursement. If a highway agency initiates a proposed project, the agency must coordinate with any railroad company that might be affected by the highway project and, be responsible for reimbursing any costs the railroad company incurs in adjusting its facilities or operations to accommodate the highway project.

   Likewise, if the railroad company initiates the work, it generally responsible for coordinating with the affected highway agency and for reimbursing any costs incurred by the highway agency.

2. Maintenance. Once a facility has been constructed, the railroad company is generally responsible for maintaining the crossing surface, the crossbucks, any train-activated warning devices, and its own track, ties, ballast, communication lines, or other facilities. The highway agency is responsible for maintaining the approach roadway at the crossing, advance warning signs, pavement markings, stop signs, or other traffic control devices at the crossing.

3. Right of Way. At a highway-railroad crossing, the railroad company owns the right of way, although there are some exceptions, predominantly for an industrial spur-track crossing. Although this does not prevent one party from crossing the other, it is an important consideration for any highway project.

4. Regulatory Authority. For INDOT, regulatory authority resides with the Railroads Team. This includes the authority to order construction of a new highway-railroad crossing, to relocate an existing crossing, to eliminate a crossing, and to change the type of warning devices at a crossing. Therefore, a highway project may occasionally require review and approval of the Railroads Team before proceeding to construction. The Railroads Team can also advise and assist the highway designer when this approval is needed.

11-2.0 RAILROAD-COORDINATION PROCESS

11-2.01 General

A highway project may have simple or complex impacts on railroad operations and facilities. These include right-of-way encroachments, conflicts with railroad communication and signal lines, at-grade crossings, changes in track alignment and grade, interconnected highway and railroad traffic signals, grade separation structures, etc. In addition, each railroad company has a different organizational structure with differing abilities to respond in a timely manner to the preliminary engineering (PE) and construction activities needed to accommodate a highway project. Because of the variety of potential conflicts, the wide variation in potential scope for each type of conflict, and the internal variations among railroad companies, no single railroad-coordination process or timetable is applicable to every highway project.

The coordination process is not initiated until the designer informs the Railroads Team that a potential conflict exists between the highway project and the railroad. The Railroads Team will then review the plans, discuss the project with the designer, briefly discuss it with the railroad company, and advise the designer what information is needed (and at what point in design) before the Railroads Team can formally begin the coordination process with the railroad company. Even if some coordination occurred in the scoping stage of a highway project, it is essential that the designer contact the Railroads Team to ensure that coordination with the railroad company proceeds in a timely manner.

The INDOT highway project schedule includes an item for Railroad Coordination. The target completion date is just before the Ready for Contract (RFC) date. It is not, however, an activity that should occur just before a project is ready for contract, nor does it mark the end of all railroad coordination required for a project. Instead, it is an indication that railroad-coordination work is sufficiently advanced for the highway project to proceed to the contract stage. The Railroads Team determines if the railroad coordination is complete and records this in the project schedule. This indicates the following:

1. the highway plans and specifications are acceptable (or have only pending minor revisions) to the railroad company;

2. all information needed from the railroad company for the highway project to proceed to letting has been received (or is expected in the near future);

3. the railroad company has completed (or nearly completed) all preliminary engineering work needed for the highway project to proceed to letting; and

4. regulatory approval (for new or relocated highway-railroad crossing) has been received from the Railroads Team (or at least no major objections are expected from the railroad company).

The highway project manager or designer must contact the Railroads Team to request railroad-coordination work for a highway project. The highway project manager or designer must also periodically inform the Railroads Team of the status of the highway project and of any changes that might affect the railroad or the railroad coordination process.

The highway-project schedule must allow sufficient time for the railroad company to perform its engineering and construction relative to the overall highway project. Although the Department reimburses the railroad for these costs, each company has unique constraints on its manpower and other resources necessary to accommodate a highway project. The highway project manager must coordinate with the Railroads Team to ensure that the anticipated project design and letting and construction schedules are compatible with the probable timetable that can be expected from the railroad company for a specific project. The railroad work may sometimes control the overall highway project schedule, and it may set controlling limits on how and when the highway contractor may proceed with construction of the highway project and what type or sequence of construction activities are permissible.

11-2.02 Process Steps

Figure 11-2A, Railroad-Coordination Process, provides a flowchart of the typical railroad-coordination process. The following discussion reflects the typical aspects of railroad coordination. However, experience and judgment regarding a specific project or with a specific railroad company is essential. The top of Figure 11-2A lists the major steps in highway-project development. The major corresponding activities for railroad coordination are provided below the highway-project process.

11-2.02(01) Scoping Process

If the project includes constructing a railroad bridge over a roadway, involves changes to the alignment or profile of the railroad tracks, or if consolidation of multiple tracks could reduce structure costs or otherwise improve the roadway, railroad coordination must begin during the project scoping stage. The project manager or scoping engineer must contact the Railroads Team and request the initiation of the railroad-coordination process. The Railroads Team will contact the railroad company if needed for input on the various project alternatives, their feasibility from the railroad company's perspective, the potential project impact on railroad facilities and operations, very preliminary cost estimates from the railroad company to evaluate project alternatives, and any information on changes in facilities or operations that the railroad company may have independently planned that could affect the highway project scope.

It is advantageous to initiate railroad coordination too soon rather than too late. With the proper information up front, informed decisions can be made on project scope to avoid subsequent unexpected events that may require substantial additional cost and time to redesign or to accommodate during construction. Assumptions regarding railroads and potential project scope or railroad-company involvement should not be made. Even though the involvement appears to be minimal or non-existent, if there is a railroad within or near the proposed highway project, the project manager or scoping engineer should request a brief review by the Railroads Team. Although the highway project may appear to have little or no impact on the railroad, potential changes in facilities or operations by the railroad company may have a significant impact on the scope of the proposed highway project. If no actual highway construction encroaches on or requires changes to railroad facilities or construction techniques, equipment or sequencing (or maintenance of traffic outside the project limits) may impact railroad operations, require the use of a flagger by the railroad company during construction of the highway project, or require other actions on train operations.

Some project-scoping issues can be addressed directly by the Railroads Team based on its overall experience and knowledge of specific railroad companies. Other issues will require coordination with the railroad company to obtain the needed information. It may require considerable time to receive a response, depending on the complexity of the impact and the specific railroad company involved. The Railroads Team may sometimes initiate contact and then, subsequently, request that the appropriate staff at the railroad company work directly with the highway project manager or scoping engineer to resolve the scoping issues.

11-2.02(02) Preliminary Design

Early in the preliminary design process, the designer (or project manager) for the highway project must contact the Railroads Team to discuss the project. The applicable railroad information is needed to properly select a structure type and size and to establish the line and grade of the highway or railroad.

Neither a highway bridge over a railroad nor a railroad bridge over a highway can be designed without identifying the number of railroad tracks and determining whether a maintenance or service road must be provided for the railroad. Elsewhere, this *Manual* discusses the clearances and geometrics for a railroad bridge (see Chapter Fifty-nine). These should be considered minimal guidelines, as these criteria do not replace requirements which may be specific to an individual project or railroad.

The project design must incorporate a track alignment and profile that is acceptable to the railroad company. Railroad-track work is based on design criteria which is distinct from that familiar to the highway designer. Each individual railroad company may have criteria specific to its individual needs that differ from typical AREMA specifications.

It is necessary to determine if rail traffic must be maintained during construction or if it can be detoured or halted. If traffic must be maintained, it may require a temporary railroad bridge (and connecting track) over a highway, a temporary at-grade crossing, a new railroad bridge on new railroad alignment in conjunction with a permanent track relocation, or operation of the railroad on its existing track including coordination and sequencing of highway construction in conjunction with continuing rail operations on that track.

Some project preliminary-design issues can be addressed directly by the Railroads Team based on its overall experience and knowledge of specific railroad companies. Other issues will require coordination with the railroad company to obtain the needed information. It may require considerable time to receive a response, depending on the complexity of the impact and the specific railroad company involved. The Railroads Team may sometimes initiate contact and then, subsequently, request that the appropriate staff at the railroad company work directly with the highway project manager or design engineer to resolve the preliminary design issues. The Railroads Team should be informed of all such direct contact developments, and the Team should receive copies of all written correspondence.

11-2.02(03) Field Check/Design Approval Stage

The highway project manager should submit plans to the Railroads Team at the Field Check stage. For a project in which a preliminary and a final field check are expected to be held, the submission of plans should be at the Preliminary Field Check stage. The Railroads Team will review the plans for any obvious issues and will ensure that the information the railroad company will need for its review or design is included in the plans.

If not previously performed in the scoping or preliminary design stages, the Railroads Team will formally authorize the railroad company to work on the project and incur reimbursable expenses. However, this authorization is the culmination of a separate process for funding and authorizing railroad preliminary-engineering work. Key points of this process include ensuring the following:

1. that the highway project is properly programmed for railroad work in the proper fiscal year;

2. that Federal-aid funds (if being used) have been obligated for the railroad work on the project;

3. that an Agreement exists between the State and local agency (for a local project using Federal-aid funds) for the necessary railroad work; and

4. that a purchase order has been requested and received allowing payment of railroad expenses for the project.

An omission of any of these or their related steps can lead to delays in authorizing the railroad company to begin preliminary engineering work, and it may ultimately delay the highway project.

The Railroads Team will submit the plans to the railroad company for review and comments and request that the company perform any necessary railroad preliminary engineering and request that the railroad submit the following:

1. the flagging and insurance information which will eventually be needed as part of the highway project;

2. special provisions concerning the railroad for construction of the highway project; and

3. cost estimates for all railroad work necessary to accommodate the highway project.

If the highway project involves creating a new highway-railroad crossing where none existed before, or relocating an existing crossing, the Railroads Team will, at this time, provide guidance to the highway project manager or designer on submission of a formal petition to request regulatory approval for the proposed crossing and warning devices.

The Railroads Team or the affected railroad company may attend the highway project field check, or they may visit the site independently, either together or separately, depending on the scope and extent of railroad involvement and the specific railroad company involved.

As the Design Approval stage approaches, the highway project manager or designer should closely communicate with the Railroads Team. Although the railroad company will sometimes submit all needed information and comments back to the Railroads Team by the Design Approval date, this may not always happen. The Railroads Team may need to contact the railroad company to determine if the railroad has any significant problems with the overall design concept for the project at the Design Approval stage. If there are no major objections from the railroad company, the highway project can proceed to the Final Plans stage. If the railroad company has serious concerns on the acceptability of the plans, work on final highway plans and possibly design approval should be delayed until the major issues are resolved. This typically occurs for a bridge project or a project that requires changes to railroad alignment and grade. It may also be a factor in creating a new at-grade highway-railroad crossing where none existed before, and the railroad company has strong objections that may affect the regulatory process for receiving approval for the crossing.

11-2.02(04) Final Plans Stage

While final work on the highway plans is being completed, a number of railroad coordination activities must also be completed for the overall project to remain on schedule and be ready to proceed with highway letting activities. These include the following.

1. If not previously received, the railroad company must submit its detailed project cost estimates and drawings and details of its proposed work, as needed. The Railroads Team will use this and other information to prepare a legal Agreement between the State and the railroad company for the necessary railroad work to accommodate the highway project. The Agreement requires both railroad company and INDOT approval to proceed.

2. If not previously received, the railroad company must submit its detailed information on railroad flagging and insurance requirements for the INDOT highway contract and contractor for highway construction work at or near the railroad.

3. No project with a new or relocated at-grade highway-railroad crossing should proceed beyond the Final Plans stage until regulatory approval for the new crossing is received from the Railroads Team.

11-2.02(05) Ready-for-Contract Process

The highway project manager or designer must submit final plans and specifications (at least for items that affect the railroad) to the Railroads Team. The Railroads Team will submit the plans and specifications, where appropriate, to the railroad company for approval. Desirably, for items that directly affect railroad facilities or operations, the railroad company will accept the proposed highway plans and specifications at this stage. However, lacking full acceptance, the letting and construction process may proceed, if there is assurance that items still in dispute are relatively minor and that they can be addressed satisfactorily without subsequent delay to the highway contractor.

If not previously completed, the Railroads Team will also finalize the Railroad Agreement and the flagging and insurance items at this time.

Once the plans, specifications, Agreement, and flagging/insurance activities are completed, the item in the highway project schedule for Railroad Coordination is marked complete. However, more accurately, this represents the end of the preliminary engineering phase of railroad coordination and indicates that it is reasonable to proceed to the letting and construction phases of the highway project.

Although it is desirable to complete all of these activities before proceeding to highway letting and construction, this is not always practical or reasonable. For example, it may be reasonable to proceed with a major road reconstruction project without railroad coordination fully completed if the railroad work is incidental to the overall project and the railroad company has no basic objections (such as line, grade, bridge clearances, etc.) to the overall project concept, and it is reasonably certain that any minor objections can be addressed and any railroad construction completed without causing delay to the overall highway project. These are discretionary decisions, and the highway project manager

must work closely with the Railroads Team before proceeding to letting or construction if Railroad Coordination in the project schedule is not marked complete.

11-2.02(06) Letting Stage

For the highway project, this involves soliciting bids, selecting a contractor, and authorizing the contractor to initiate work on the project.

For railroad coordination, it involves formally authorizing the railroad company to proceed with any necessary construction activities to accommodate the highway project. However, this authorization is the culmination of a separate process for funding and authorizing railroad construction work. Key points of this process include ensuring the following:

1. that the highway project is properly programmed for railroad construction in the proper fiscal year;

2. that Federal-aid funds (if being used) have been obligated for the railroad work on the project;

3. that the necessary State funds (if any, for a State-route project) are available;

4. that, for a local-agency project, an Agreement exists between the State and local agency for the necessary railroad work;

5. that the necessary local funds (if any) for railroad construction have been received and deposited into an escrow account for the project; and

6. that a purchase order has been requisitioned and received to allow payment of railroad construction expenses.

An omission of any of these or their related steps can delay authorizing the railroad company to begin work, and this may ultimately delay the highway letting or construction of the project.

11-2.02(07) Construction Stage

If not previously performed, the railroad company must be authorized to do any necessary railroad construction and flagging work.

Project construction requires coordination among all parties. However, the contractor and INDOT's construction project manager are responsible for the day-to-day coordination during construction.

Railroad construction work must sometimes proceed in advance to clear an area or otherwise prepare it to accommodate the work of the highway contractor. Otherwise, the contractor must perform advance work before the railroad work can begin or be completed. Still otherwise, both the railroad company and contractor must be working concurrently.

Some contractor activities will require railroad flagging for safety of the contractor, railroad, or public. The railroad company must have sufficient advance notice to ensure that a flagger is present. This again requires close day-to-day coordination in the field, which is the responsibility of the contractor and field personnel.

Where problems develop that cannot be resolved satisfactorily in the field, the Railroads Team is available for assistance.

Once the contractor has finished all work in the vicinity of the railroad and the railroad company is satisfied that it has no claims against the contractor, the railroad company will sign a release to relieve the contractor of any further responsibility and of the need for any further railroad protective liability insurance. This can be addressed between the contractor and the railroad company, but INDOT requires a file copy for its records and to close out the project.

Final inspection and approval of railroad work is limited to items which directly affect highway operations and safety, such as warning devices or surface work for an at-grade crossing. Where the work only affects the railroad, such as communication and signal lines or track work, INDOT need not inspect nor approve the work. Only a general review is necessary to ensure that the billed time, material, and equipment costs appear consistent with the work that was actually performed by the railroad company for the highway project.

11-2.02(08) Project Complete

If not previously received, closing out a project requires confirming that the railroad company has granted a release to the contractor for the highway project. It also requires implementing the steps of a separate process for the final railroad invoice on the project. This process starts when the railroad company submits a comprehensive, final invoice for the project that itemizes all salaries, material, and equipment billed to the project and provides adequate documentation for those costs. The invoice is reviewed by both the Railroads Team and the district office, it is audited by the Accounting Division, any problems are resolved, a final payment is made to the railroad company (or refund received), and the project officially is closed out.

The final invoice is actually the culmination of a series of periodic preliminary engineering and construction progress invoices received from the railroad company during the project time and reviewed as needed by the Railroads Team or the district office. Since progress invoices are estimates of progress, they do not require documentation for every billed item but, rather, a brief

review to ensure that the amounts billed appear consistent with work performed by the railroad company to date on the project. Detailed documentation is not required until the final invoice.

11-2.03 Conclusion

This Section provides only a brief introduction to the railroad-coordination process. The actual sequence on a specific project will depend on the type of highway project, the extent of the railroad involvement, the internal organization of the specific railroad company that is involved, and the desired schedule of the highway project relative to any constraints on the railroad company to provide the manpower and resources to accommodate the highway project. This is subject to their internal workloads and priorities and the importance of the highway project relative to other current highway projects that affect that railroad company.

Mainline railroad companies, such as CSX Transportation, Norfolk Southern, and Conrail, operate over territories within many states. They must continually balance their resource needs and projects against those in INDOT and those of many other State and local transportation agencies. Short-line railroad companies, although often locally-owned and with limited territories, have different problems because they seldom have the engineering expertise or field personnel to quickly react to the Department's design and construction needs. They must often use consultants and contractors of their own selection (subject to INDOT approval) to accommodate a highway project.

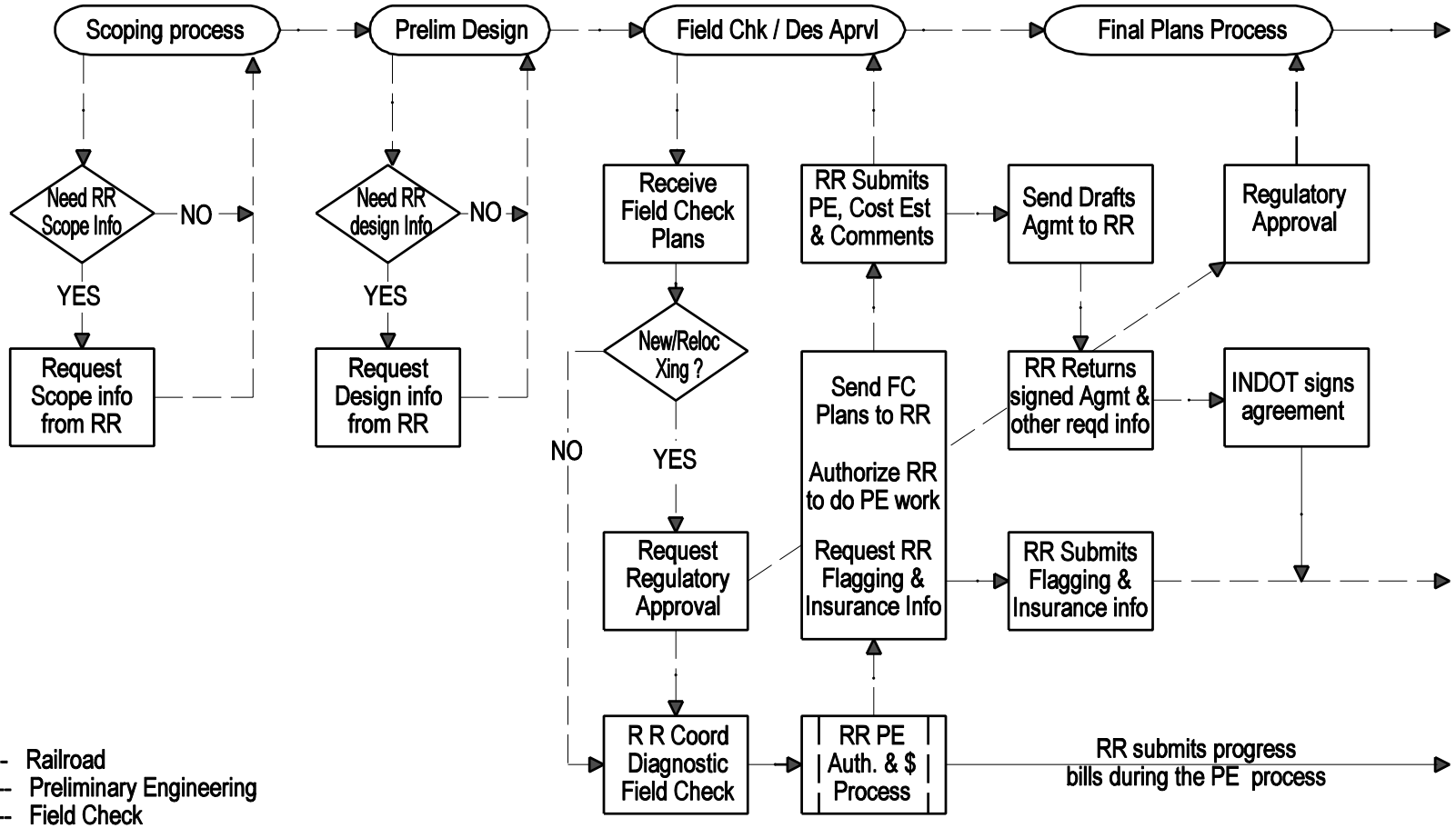
The Railroads Team does not have the authority to direct a railroad company to accommodate a highway project or meet the Department's desired project deadlines. Although, arguably, this is inherent within INDOT's overall authority to provide and maintain a safe highway transportation system, State law does not clearly provide this authority. The Railroads Team depends on maintaining a good working relationship with each railroad company and maintaining close coordination as needed for a specific highway project. There are a number of key steps that must be completed, depending on the type of project and railroad involvement. However, the exact sequencing and time needed for each step may vary among projects and railroad companies.

The greater the impact on the railroad facilities, the earlier in the project that coordination must begin. Railroad coordination, even for routine or relatively minor involvement, is likely to require 6 to 12 months before the highway project can proceed to letting. Further, depending on the type of construction that must be performed, the railroad company may need up to 6 months of advance notice to order and stockpile critical materials needed for construction.

Finally, railroad coordination must be considered an essential part of each project, even that which may initially appear to have no railroad involvement. For example, a bridge-painting contract or road project with a paving exception may require railroad coordination. If a highway project crosses, is adjacent to, is in close proximity to, or has a detour or other traffic control plan that crosses a railroad, or the contractor has a work plan that places traffic on, over, or near railroad tracks at any

time, railroad coordination is required, and the Railroads Team should be contacted as soon as possible.

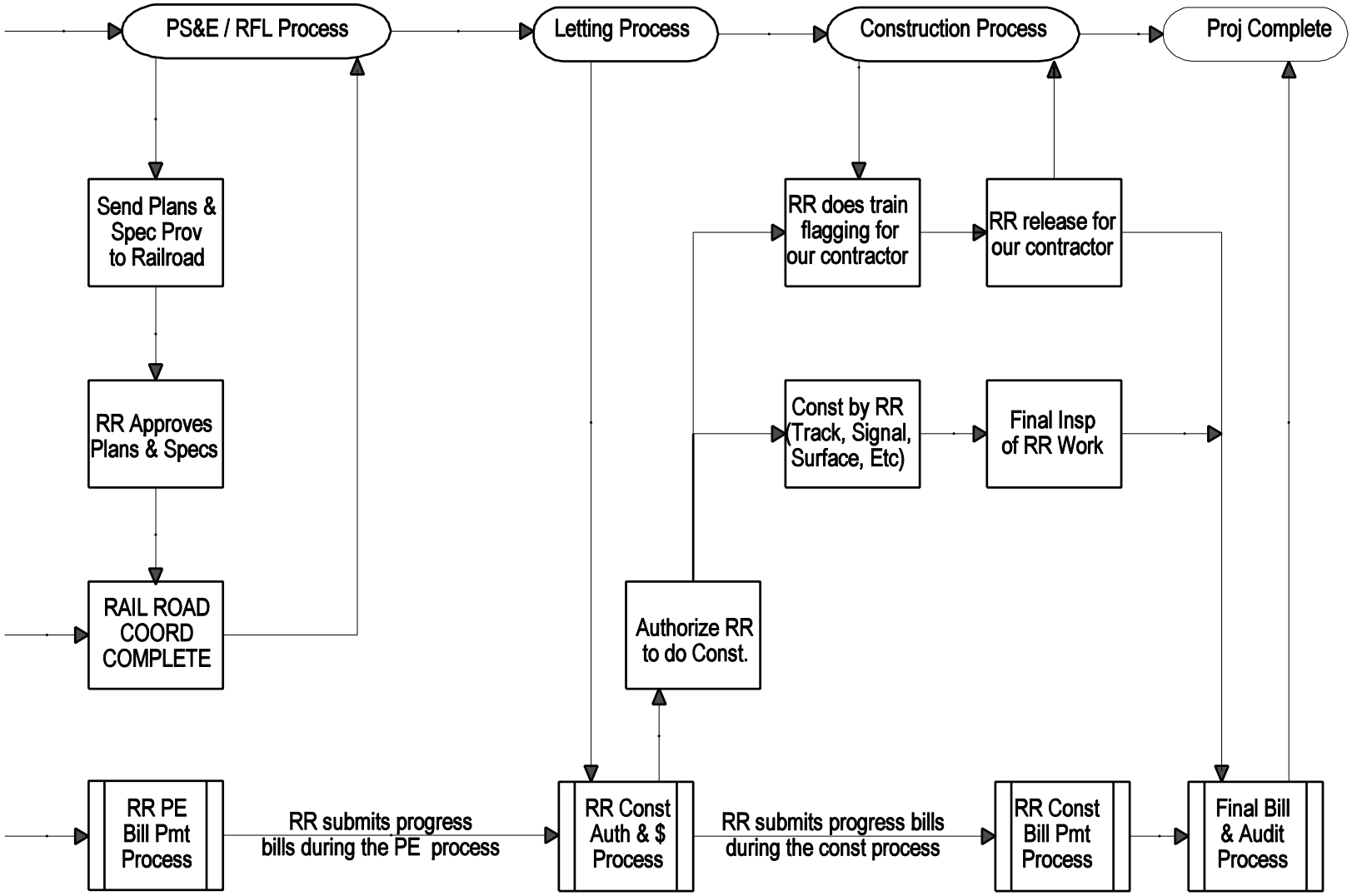
RAILROAD COORDINATION PROCESS



Legend:

RR --- Railroad
PE --- Preliminary Engineering
FC --- Field Check
RFL --- Ready for Letting
PS&E --- Plans, Specifications & Estimates

RAILROAD COORDINATION PROCESS
Figure 11-2A



RAILROAD COORDINATION PROCESS
Figure 11-2A
(Continued)

CHAPTER 106

Aerial/Ground Survey

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Figure Title

CHAPTER 22 [Rewritten Apr. 2011]

GENERAL SURVEY PROCEDURES

The intent of this Chapter is to follow the rules and procedures concerning a route survey as defined in 865 IAC. If INDOT rules and procedures are determined to be less stringent than those shown in 865 IAC, 865 IAC will govern.

22-1.0 ENGINEER'S REPORT

The Engineer's Report provides a project number, a designation number, and a new structure number for a bridge project. The report will be for one of the types of projects as follows:

1. bridge replacement;
2. bridge rehabilitation and repair;
3. small structure replacement;
4. intersection improvement;
5. road rehabilitation and repair;
6. added travel lanes; or
7. a new-centerline route.

The Engineer's Report also establishes the project's survey limits and incorporates incidental construction and right of way, temporary or otherwise, that is required.

Once the Engineer's Report is received by the Office of Land and Aerial Surveys, a survey then may be initiated. A major objective of the survey is to establish a baseline that complements the survey limits documented in the Engineer's Report. If right of way is required, section corners must be located during the survey.

22-2.0 PRELIMINARY RESEARCH

22-2.01 Research Requirements

The items to be researched by the Office of Land and Aerial Surveys, or a consultant, and furnished to the field-survey party prior to initiating the survey are as follows:

1. USGS quadrangle maps which encompass the project, ensuring that adjoining maps are obtained where drainage basins extend beyond the primary maps' edge;

2. benchmark locations, elevations, and base datum. NGS 1988 NAVD is required if within 8 mi of the project limits;

3. existing road and intersection survey books;

4. existing road plans;

5. bridge survey books of existing structures;

6. layout and general plans of existing structures;

7. railroad plans within the limits of the project;

8. Engineer's Report for the proposed project;

9. painted cross references;

10. available section-corner references;

11. project designation number;

12. project number including the parenthesized character;

13. structure number, if for a bridge project; and

14. line designation letters.

These items should be packaged so that an item which was researched but not found is readily identified by the party chief.

22-2.02 Sources of Information

The sources that should be contacted during the research phase of the survey include public offices, private surveyors, or utility companies. The information obtained from these sources will be of value during the development of the survey. Key sources of information are discussed below.

22-2.02(01) County Surveyor's Office

Contact the office for section-corner references that may be required. The county surveyor, by virtue of its position, is on the county's Drainage Board and will have relevant information concerning legal drains within its county. Information that is required for legal drains include the following:

1. cause number;
2. flowline profile;
3. side slopes;
4. bottom width;
5. last year dredged;
6. official drainage area and how it was determined; and
7. information pertinent to tying stationing and level equations to the survey baseline.

22-2.02(02) County Auditor's Office

One of the duties of the county auditor's office is to maintain property plat maps. Contact the office to obtain updated records of property owners who may be affected by the planned project survey. A notice of survey should be sent to each of the affected property owners. This information will also be required to prepare section plats and topography notes. The preparation of notice of survey and section plats is discussed in Section 22-3.0 and Section 22-4.0, respectively.

22-2.02(03) County Recorder's Office

The county recorder's office maintains all final subdivisions plats, property surveys, Title 865 surveys, deeds, and easement records. If a survey baseline is in the vicinity of a subdivision or platted town, a copy of the official plat and its description must be obtained, without exception. These plats are necessary to locate relevant property lines and section corners. Deeds for all affected property owners within the survey area must be obtained and packaged with the completed survey.

22-2.02(04) Private Surveyors

Private surveyors are familiar with the section corners, property deeds, and peculiarities particular to their locale.

22-2.02(05) Utility Companies

A critical part of the survey is the accurate location of the underground utilities that will be affected by the project. This requires that each local utility company be notified before the project survey is initiated. To facilitate this task, the utility companies have established the two toll-free telephone numbers as follows:

1. 800-382-5544 for calls originating within Indiana, and
2. 800-428-5200 for calls originating outside Indiana.

Do not attempt to contact individual utility companies unless they are not listed by Underground Indiana. A utility company will not respond to a utility-location request unless it is placed through one of these numbers, and it is best to give as much advance notice as practical. Once the call is placed, the caller should be prepared to provide the information as follows:

1. county name;
2. civil township;
3. section, congressional township, and range;
4. address or location;
5. type of work;
6. extent of work;
7. name of caller;
8. title of caller;
9. telephone number;
10. best time to call;
11. start date;
12. start time;
13. contractor;
14. surveyor or engineer's telephone number; and
15. contracting engineer's or surveyor's address.

During the conversation, the person contacted will inform the caller of the companies that will be notified. This information should be compiled for placement in the field book. The person contacted will also issue a reference telephone number that should be retained if future discussions are needed or if a problem arises, e.g., schedule conflict, utility company fails to locate lines. The person contacted will ensure that all relevant utility companies are notified of the planned project survey. Each notified company then will schedule its own field crew to locate underground utility lines and appurtenances. Afterward, the locations of all affected utilities should be incorporated into the field-data file.

22-2.02(06) Research and Documents Library Team

Because the survey will most likely involve an existing State-maintained route, the plans and the field books for each affected highway must be obtained. These can be obtained from the Planning Division's Research and Documents Library Team. Department benchmark information can be obtained from the Office of Land and Aerial Surveys. The location of a benchmark should already be determined from field reconnaissance before contacting the Office for the elevation.

22-2.02(07) National Geodetic Survey

The desired control, both vertical and horizontal, is obtained from NGS. Control that is used should be identified for the datum, e.g., NGVD29, NAVD88, NAD83 (1986). However, the latest datum should be used if possible. The website address is http://www.ngs.noaa.gov.

22-3.0 NOTICE OF SURVEY

22-3.01 Indiana Code Requirements

To comply with Indiana Code IC 8-23-7-26 through 8-23-7-28, it is necessary to mail a survey notice to each affected property owners. Quoted below is Indiana Code 8-23-7-26 through 8-23-7-28 as added by Public Law 18-1990, Sec. 216.

1. Sec. 26. *An authorized employee or representative of the department engaged in a survey or investigation authorized by the commissioner or the commissioner's designee may enter upon, over, or under any land or property within Indiana to conduct the survey or investigation by manual or mechanical means, which include the following: (1) Inspecting, (2) Measuring, (3) Leveling, (4) Boring, (5) Trenching, (6) Sample-taking, (7) Archeological digging, (8) Investigating soil and foundation, (9) Transporting equipment, (10) Any other work necessary to carry out the survey or investigation.*

2. Sec. 27. *Before an authorized employee or representative of the department enters upon, over, or under any land or water under section 26 of this chapter, the occupant of the land or water shall be notified in writing by first class United States mail of the entry not later than five (5) days before the date of entry. The employee or representative of the department shall present written identification or authorization to the occupant of the land or water before entering the land or water.*

3. Sec. 28. *If during an entry under section 26 of this chapter damage occurs to the land or water as a result of the entry or work performed during the entry, the department shall compensate the aggrieved party. If the aggrieved party is not satisfied with the compensation determined by the department, the amount of damages shall be assessed by the county agricultural extension educator of the county in which the land or water is located*

and two (2) disinterested residents of the county, one (1) appointed by the aggrieved party and one (1) appointed by the department. A written report of the assessment of damages shall be mailed to the aggrieved party and the department by first class United States mail. If either the department or the aggrieved party is not satisfied with the assessment of damages, either or both may file a petition, not later than fifteen (15) days after receiving the report, in the circuit or superior court of the county in which the land or water is located.

22-3.02 Preparation of Survey Notice

A notice of survey should be completed as illustrated in Figure 22-3A. An editable version of this form appears on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

1. Item 1. The name of the person or persons whose names appear on the tax records in the office of assessor or auditor of the county where the project is located. This information should be placed near the top-left side of the sheet.

2. Item 2. The survey party's telephone number should be located near the top-right side of the sheet. If a consultant is performing the survey, its telephone number should be located here instead of the Survey Team's number. Also, include a fax number as indicated.

3. Item 3. The date of mailing.

4. Item 4. RE: Survey _____. This information must include the project number and a brief project description written in layman's terms.

5. Item 5. The notice should include a complimentary close and the following:

   _____ (name)
   Location Survey Engineer
   or Consultant Project Manager

6. Item 6. The designation number for the project.

The front pages of both the white and yellow copies of the form are identical and should be completed with the same information, i.e., a carbon copy. The white copy must be sent by first-class mail to the property owner. The yellow copy is retained for the interviewer.

Prior to entering private property, the occupant first must be interviewed. The back of the form's yellow copy is used to document the interview. The following provides the instructions for

completing the survey interview report as illustrated in Figure 22-3B. An editable version of this form appears on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

1. Item 1. Enter the designation number.

2. Item 2. Enter the project number.

3. Item 3. Enter the name of the county.

4. Item 4. Enter the route number.

5. Item 5. Enter a brief description of the project location.

6. Item 6. Enter the name of person interviewed, and indicate if this is the property owner, a renter, lessee, or other occupant.

7. Item 7. Enter the date on which the interview took place.

8. Item 8. Enter the name of the survey-party interviewer.

9. Item 9. Indicate if the occupant received the Notice of Survey letter.

10. Item 10. Enter a name or address correction if necessary.

11. Item 11. Enter information relevant to property access and the interviewee (i.e., attitude, special requests, instructions to close gates, beware of dog, future identification).

The yellow copy of the survey notice is retained until the completion of the survey, and then filed with the Research and Documents Library Team.

22-3.03 Public Relations

The survey party and project consultant can promote public relations for future contacts through representatives of the State. These individuals are among the first representatives to contact people that will be affected by a planned highway improvement. A first impression is a lasting one, and its importance cannot be over-emphasized. To achieve this goal, the survey party should perform a service to the Department by being courteous, presenting a pleasing appearance, conducting themselves properly, and properly identifying themselves to the people that they contact during the performance of their duties.

Survey notices and interview reports, as described above, are the first step in this process for public relations. The survey party should be sensitive to the needs of each property owner. For example, an overgrown fencerow may be viewed by a farmer as a nuisance, so the farmer may want to have the survey crew cutting brush as needed for surveying operations. Others may view the same fencerow as prime wildlife habitat, or it can include their favorite persimmon tree or berry patch. The survey party will need to work differently with each property owner or occupant in such a circumstance.

While a survey party has the right to enter on private property to conduct a survey, it does not own or control the property. The survey party should minimize adverse impacts. The party should not leave behind trash or debris. Lath and flagging should be removed, unless a property owner agrees that it can remain in place. For farm animals, plastic flagging or sheeting may pose a health hazard if eaten. The property owner can prefer that it not be used. Due consideration must be given to lath and stakes that extend above ground which can interfere with farm operations or cause damage to farm equipment such as combines if left in place. Walking around a site may be a problem at a time of year when farm crops are susceptible to damage.

A survey control point that must be left in place to facilitate subsequent phases of project development poses other concerns. In a farm field which is plowed, such a point should be buried 1.0 ft to 1.5 ft below the ground line to avoid being disturbed by plowing or damage to the plow or other farm equipment. Where possible, it may be desired to locate such a point in a fencerow or edge of a field where it is less likely to be disturbed or cause a problem.

A buried survey point may also be needed where a vandal or unhappy property owner willfully removes or disturbs the control monument overnight while the survey is still in progress. Though it is a nuisance for the survey party, such action cannot be stopped since the party does not own the property. A somewhat-visible nearby decoy point can be installed that a vandal can disturb, while the real survey control point is buried to be as inconspicuous as possible.

A property owner or occupant may refuse to allow the survey party onto the property, or can become belligerent or threatening. The party should contact its office for further instructions. A consultant should contact the Office of Land and Aerial Surveys for further instruction. A telephone call or letter from the Office or the Legal Services Division can resolve the problem. A law-enforcement officer may be needed to help preserve the peace. A court order may be needed to enforce INDOT's right to enter upon private property to complete a survey. A survey-party member should not argue with a property owner or occupant, should not force his or her way onto a property, and should not take action that can endanger safety.

A property owner or occupant, nearby residents, or the media can all be expected to be curious about the effect of the project on the property and the area. Questions from the media should be directed to the Office of Communications. A property owner deserves explanation once a survey party enters his or her property. However, most inquiries are best addressed by explaining the general nature of the project (intersection improvement, bridge replacement, road reconstruction, etc.). It is best to

explain that the survey party is there only to gather information necessary for proper design of the project. The survey party is unfamiliar with details of the project except for the scope of the needed survey. Questions about specific design features or impact on specific properties must be referred back to its office, and often cannot be answered until later in project development.

A survey party should be neighborly and should maintain public relations with each property owner or occupant, and the public. These people may have anxiety or concerns about the project and its potential impact on their property, so they may not want the survey party on the property. Understanding and concern for individual needs and concerns will make the survey process easier for both the party and the public.

22-4.0 SECTION PLATS

22-4.01 Section-Plat Requirements

A preprinted section plat form is furnished by the Office of Land and Aerial Surveys to the survey party for use in preparing a section plat. The items to be completed on the form are as follows.

1. Project Number.

2. Transit-Book Number. For a bridge project, this is Number 1, as a bridge survey will not likely to be extensive enough to require more than one book. For a road project, multiple books are numbered consecutively.

3. Survey-Line Letters.

4. County.

5. Civil Township.

6. Section.

7. Congressional Township.

8. Range.

9. Designation Number.

10. North Arrow. The north arrow is preprinted on the form.

11. Scale. A scale of 1:12 000 is used to facilitate the use of USGS quadrangle maps at double scale.

12. Date. The date of plat preparation.

13. Survey Party. The person who prepared the plat and the survey-party members.

22-4.02 Preparation of Section Plat

1. Property Information. The plat should identify all of the property included within the quarter sections where the project is located. All contiguous properties which lie within adjoining quarter sections should also be identified. The Real Estate Division requires this information to assess property damage. The property-owner names should be shown, and can be obtained either from the county auditor or the township assessor. A routine check of the Transfer Books is necessary so that the current owners are identified on the plat.

2. Development Identification. Cities, towns, subdivisions, or additions should be identified as shaded areas. A copy of the official plat that is obtained from the county recorder's office must be submitted with the field book.

3. Survey Baseline. The survey baseline must be shown, and the beginning and ending points must be identified.

4. Color Scheme. The color scheme should be as follows:

    a. blue for stream,
    b. yellow for State-maintained route,
    c. red for survey baseline, and
    d. green for county road.

    This achieves a neat and consistent appearance on the original section plat. Color does not appear on copies of documents.

5. Section Monuments. Section and quarter-section monuments should be shown.

6. Road Names. All road names should be identified.

A copy of the completed section plat should be made and placed in an envelope in the back of the field book. The original section plat is retained by the Research and Documents Library Team. Figure 22-4A provides an example of a completed section-plat sheet.

If a county updates its plat records electronically, its plat books will be located on a computer. A copy should be purchased and manually updated as the county does not update the older plat books. Each property owner will have a code number associated with his or her property holdings. Items on the older plats should appear on the electronic plat, e.g., scale.

22-5.0 SURVEY OPERATIONS

22-5.01 Establishing Alignment Baseline

The first operation of the survey is to establish the baseline. The new baseline is used for the following:

1. determining the present right of way in relation to the baseline;
2. determining additional right-of-way requirements; and
3. staking the new right of way.

In establishing the baseline, permanent points should first be located from the original survey. Iron pins will be in their original positions if not disturbed by construction. This approach is best for establishing both alignment and stationing. However, other means may be necessary to establish the baseline. For a concrete pavement, split the pavement in two locations at either side of a PI, and project the tangents to their point of intersection. The stationing then can be equated at the PI. If a concrete pavement has been resurfaced with asphalt, a pick or jackhammer should be used to locate the pavement edge. For a road without as-built plans (e.g., a county-road takeover), the baseline can be established by splitting the pavement using the longest possible sights available or by establishing an offset baseline that identifies pavement edges at 60-ft intervals.

After the centerline tangents are recreated and intersected to form the PI, the Δ angle is determined from the results of the centerline traverse or by coordinate geometry calculation with verification on the calculations. Since these measurements are likely being done with more-accurate equipment than that used for the original survey, the Δ angle for the curve and the stationing will vary. It is not desired to have a station equation at every monument found, therefore the new more-precise Δ angle should not match the old even-minute Δ angle from the original survey. Horizontal-curve calculations require two elements to geometrically define the curve. Apart from the Δ angle, the desired second element for curve calculation is the plan radius or the degree of curve converted to feet and then to meters. If monuments are found at the PCs or PTs, they should be used for tangent-line determination only because of the discrepancy in the stationing described above. Therefore, the two desired elements for curve determination are the new measured Δ angle and the radius as obtained from the old plans.

22-5.02 Alignment Data

Once the alignment has been established, a closed traverse should be run through the PIs and back on a separate line to the beginning of the traverse. Measured distances should be recorded and a minimum of two pairs of angles (i.e., one direct, one reverse) should be turned at each traverse point. The horizon shall be closed at the end of the traverse. The misclosure should be calculated, and the traverse shall close with a precision of at least 1 in 20 000. The raw field data should be recorded in the field book.

After checking the misclosure, a full adjustment should be performed on the traverse and the adjusted data recorded in the field book for the alignment data. All curve information then should be calculated and the PCs and PTs set from existing monuments at the PIs.

The alignment data is the listing of the permanent points in the field and curve data. The listing should reflect the type of point (e.g., PC, PT), its correct stationing (e.g., 107+80.26), and type of monument set. The PI station should include the following:

1. Δ angle;
2. radius of curve, or degree of curve;
3. tangent length;
4. length of curve;
5. external distance; and
6. bearing of the foretangent.

Points in the survey baseline should not exceed an interval of 1000 ft and should be of a material and size that is in accordance with 865 IAC 1-12-24.

Each permanent point must be referenced. These references can be used to assist in relocating the originally set monument. The measured distance between the monument and reference shall always be made to accurately reset the monument in its original location if the monument has been destroyed or disturbed. The references must be shown in the topography notes next to the point listing. The most common reference is a roofing nail that is driven through a bottle cap into a tree. However, a point on a distinct object may be used as long as the reference is fully described (e.g., northeast corner of headwall, bolt on light standard). A compass-directional description should not be used.

A folded piece of flagging may be used for a reference. As a tree matures, the flagging will remain visible long after the tree has grown over the nail. At least three references should be used for each point. Each reference should be positioned to swing an arc so that it will have a distinct crossing over the point. If a sloped distance is used, it should be identified on the reference.

22-5.03 Obtaining Bearings

The starting bearing must be shown and the source described. Methods of obtaining a bearing are as follows:

1. celestial observation, either polar observation or sun shot;
2. using global positioning equipment to fix a bearing;
3. running a bearing traverse from a USC&GS triangulation station; or
4. using a bearing from existing road or bridge plans.

22-5.04 Running Bench Levels

Only the length of survey line described in the transit book should be in the corresponding level book. Benchmark elevations begin on level book page 2 for a road survey.

Bench levels should originate at a benchmark that is on a sea level datum. The permitted types of benchmarks are as follows:

1. National Geodetic Survey (NGS), formerly U.S. Coast and Geodetic Survey (USC&GS);

2. U.S. Geological Survey (USGS);

3. Indiana Flood Control and Water Resources (IFC&WR) of the Indiana Department of Natural resources; and

4. Indiana Department of Transportation.

If available, NGS with NAVD 1988 datum is required within a 3-mi radius of the project. The monument should be described in detail including the fully-spelled-out name of the agency, the datum used, the elevation, and a digital photograph of the disc. The NGS benchmark elevations that are in the vicinity of the work area are available from NGS at the location shown in Section 22-2.02.

If the starting benchmark is distant from the beginning of the project, a circuit must be run from that benchmark to the first benchmark set for the project and back to the original benchmark to complete the circuit. Each bench circuit should be run to third-order accuracy and specification. The allowable error in the circuit is computed from the formula as follows:

Allowable Error = $\pm 0.05\, ft\sqrt{K}$ where: K = length of circuit, mi

This provides the survey party with a starting elevation to use as the benchmark elevation for the baseline benchmarks following the double-run benchmark circuit as shown in Figure 22-5A.

In running bench levels, do not make sights of more than 300 ft length. Keep the backsight and foresight as equidistant as practical with a 30-ft maximum difference per setup and a 30-ft cumulative maximum per circuit (see Third-Order Leveling Specifications, NGS). The selected point should be marked before giving a sight. If more than one sight is needed, the exact point is lost between sights. The rodperson should use a solid turning point and keep the bottom of the rod shoe free from mud, ice, etc. The same standards and allowable error in the circuit apply for the benchmarks along the baseline. Do not set or check a benchmark as a sideshot on a benchmark. Make a complete turn on every benchmark with a different instrument set-up for a foresight and backsight. Once the circuit has been closed, the benchmarks for the project are set. Starting at the benchmark, set in the circuit at the start of the project. The benchmarks for the project should be set not more than 1000 ft apart. In a hilly terrain they should be set closer as the number of turns determines the frequency rather than the distance. Benchmarks should not be more than four turns apart. A benchmark should be set far enough from the baseline in a permanent object such that it will not be disturbed during construction. The most common object is a 6-in boat spike in a tree. The boat spike should be placed as low in the tree as practical so that, if the tree is cut down, the benchmark will remain undisturbed in the stump. A benchmark can be a chiseled cross or square in the concrete base of a sign, etc. The description of each benchmark written on the right-hand page should describe the benchmark followed by its location as a plus and distance out from the baseline. A minimum of three benchmarks should be set for each project, with one at each end of the project and outside of the construction limits.

Conventional field-book notes may not be utilized due to recording in an electronic data collector. However, if the software used for processing the data allows for the printout of a level-book format report, it should be included with the adjusted elevations in the skeleton-survey field book.

If starting a baseline for a new survey, the benchmark should be numbered at the start of the survey as TBM #1, the next benchmark as TBM #2, etc. Benchmarks retain the number assigned to them on the earliest field survey. Thus, if survey line “A” is completed and it later becomes necessary to run baseline “B” ±1 mi from line “A”, benchmark 1 “A” retains its original number and elevation. If line “B” bench levels tie into other line “A” bench levels, the line “B” benchmarks also carry their original numbers 1st TBM 1 “A,” 2nd TBM 1 “B,” 3rd TBM 2 “B,” 4th TBM 5 “A,” etc.

Level equations, with their respective basis of datum, are to be shown in bench levels as illustrated in the example in Figure 22-5A. Each benchmark is tied to the survey baseline by station and offset. Benchmarks can be tied using conventional surveying techniques or an electronic data collector. Show party members’ names, the date, and weather conditions at the time bench levels are run.

After the bench levels have been run and the backsights and foresights have been totaled, the difference between the totals of the foresights and the backsights should be equal to the difference in elevation between the start and end of the bench circuit. This is done at the end of each bench circuit

and is a check on the mathematics of the circuit. Each level circuit should be adjusted according to standard techniques.

22-5.05 Locating Section Corners

Each section or quarter-section corner in the area should be located and tied in to the survey baseline so that an accurate Location Control Route Survey Plat can be made. When the last deed of record is examined, if monuments are called for in the document, such monuments should be located. If the monument corners are not found, that should be indicated. The Office of Real Estate uses the information which appears in the Location Control Route Survey Plat to compute right-of-way takings and to write descriptions of such takings. If a reference point cited from a last deed of record cannot be found, the county surveyor's office should be notified of a candidate location which needs to be re-established by that office.

If a section corner is visible from the survey line, a distance and a minimum of two pairs of angles should be measured to the section corner. These measurements should be recorded in the field book or electronic data file.

If a section corner is not visible from the survey baseline, a closed traverse should be run from the survey line to the section corner with the measured distance recorded and two pairs of angles turned at each traverse point. The horizon will be closed at the end of the traverse. The traverse misclosure shall be calculated and the traverse shall close with a precision of at least 1 in 20,000. The raw data of the completed traverse should be recorded in the field book or electronic data collector.

Other pertinent information about the monument found at a section corner also should be recorded in the field book. This includes the following:

1. type of monument;
2. size of monument;
3. mass of monument;
4. distance above or below the ground;
5. other existing monument near the subject monument;
6. reasons for using the monument;
7. testimony; and
8. other relevant information.

The above list is not complete, but should provide sufficient guidance to the type of information that is to be recorded in the field book. The references are to be drawn in the book and provided on reference cards as shown on Figure 26-1C.

Whether the county surveyor is the only party who can reset a section or quarter-section corner monument is debatable. The following sections of the Indiana Code clarify the issue.

1. Indiana Code 36-2-12-13, Sec. 13. *A person may, for excavation, mineral extraction, or other purposes related to the person's business, temporarily remove a monument marking a corner. The person must notify in writing the county surveyor at least thirty (30) days before removing the monument. The person must replace the monument within a reasonable time at the person's expense under the supervision of the county surveyor or, if the county surveyor is not registered under IC 25-31, the registered person who is selected under section 11 of this chapter. The surveyor shall file a copy of the notice in the corner record book.*

   Only a county surveyor or a designee may change the location of any monument. A person who wishes to have the location of a monument changed must make a request to the surveyor in writing and furnish written approval of all landowners whose property is affected by the proposed change. The surveyor may approve, reject, or modify the request and shall file a copy of the notice and the landowners' consents in the corner record book.

2. Indiana Code 8-23-9-24. *If in the construction or maintenance of a state highway it is necessary to remove or bury a monument marking or evidencing an established corner, the department shall cause to be set in the pavement or right-of-way at the place where the monument was located a monument capable of activating a metal detection device. The top of the monument must be level with the pavement or the grade of the right-of-way. The department shall cause a memorandum of the monument to be filed in the county surveyor's office of the county.*

To perpetuate the location of a corner before, during, or after construction, the following definitions apply.

1. Established Corner. A corner for which the county surveyor has provided references, which was found as referenced and described, and which the county surveyor has recognized as being true and correct.

2. Re-established Corner. A corner that has been reestablished by the field survey party and accepted by the county surveyor as being true and correct.

3. Apparent Corner. A corner location that has been reestablished by the field survey party and has not yet been approved or accepted by the county surveyor.

All three types of corners should be documented in the field survey notes, referenced, and the type identified. For items 2 and 3 listed above, a pin or rebar should be set on that corner and the type of monument should be identified. The references and an explanation of the procedure used should be provided to the county surveyor so that he or she can add them to the reference book.

22-6.0 FIELD-BOOK FORMAT

22-6.01 Front Flyleaf

An identifying note on the flyleaf should include the project number, designation number, structure number if a bridge survey, and a brief description of the project.

The description of a bridge project as found in the improvement program is taken directly from the bridge-inventory book. If there is a conflict between the improvement program and the bridge-inventory book, the wording of the improvement-program description should be used, as it is the most-common usage. To further clarify this statement, the following example applies.

> *The improvement program states, SR 2, bridge over Wolf Creek, 6.60 mi south of US 30. The bridge-inventory book shows Wolf Creek on SR 2 to be 6.60 mi south of US 30 and also 6.85 mi north of US 231.*

The description in this example is expressed to 0.01 mi.

The description to be used on the flyleaf should read as follows:

> *Structure No. 2-64-1170 over Wolf Creek, 6.60 mi south of US 30.*

If the other description, *Structure No. 2-64-1170 over Wolf Creek, 6.85 mi north of US 231,* is used, all subsequent correspondence can raise a doubt as to whether that bridge or another was being discussed. A check of the bridge-inventory book is needed for clarification.

For a road project, the description shown in the improvement program should be followed as closely as possible.

An example is a follows:

> *US 6, from the west junction with SR 3 to 0.40 mi east of Kendallville.*

See Figure 22-6A for an example of a front flyleaf.

22-6.02 Index Sheet

The index sheet is page 1 of a road or bridge survey's transit book. The list of the information that should appear on the index sheet is as follows.

1. Transit Book Number. The transit book number should be centered on the top line of the left-hand sheet.

2. Project Number. The project number should be in the right margin on the second line.

3. Route Number. The route number should be in the left margin on the second line.

4. County Name. The county names should be centered on the third line.

5. Structure Number. The new structure number of the proposed bridge should be centered on the fourth line.

6. Designation Number. The designation number should be centered on the fifth line.

7. Line Description. The line description should be listed in order of appearance on the actual survey in progressing headline. An example is, *S-16-G – a side-road survey @ Co. Rd. 500S from Station 50+21.78 to Station 62+62.63*.

8. Instrument Data. Instrument data should be shown, including the instrument manufacturer, model, and serial number for total station, or transit and EDM, along with horizontal circle least count and the manufacturer's specified accuracy for the EDM.

9. Registration Seal. The book must be certified by a registered Indiana land surveyor. The land surveyor who certifies the book should place his or her seal on the lower left hand sheet of page 1 under the line description. He or she should place his or her initials and the date adjacent to the seal.

10. Top Line. The top line of the right hand sheet of page 1 should indicate *Indiana Department of Transportation* and *Survey Team* or the consulting-firm name.

11. Roster. The roster of the survey party should be shown under the party number.

12. Table of Contents. The table of contents for the items shown in the transit book follows the roster for the party numbers.

13. Dates. The last line on the sheet shows the date the book was started and the date the book was finished.

The only difference between a road- or bridge-survey table of contents sheet is the indexed items. The level book and transit book for a bridge survey is one book, so there will be only one index.

This also applies to a small intersection improvement or spot-improvement. See Figure 22-6B for an example.

22-6.03 General-Information Sheet

This sheet is page 2 in a bridge survey, but is not included in a road project. However, for a road project it is useful to have this sheet to describe how the baseline was set up and certain specifics about the project.

This sheet is used to point out specifics which are difficult to show graphically, but for which the designer must develop a logical design.

There can be more than one name for a stream. The bridge-inventory book can have one name; the quadrangle map for the area can have another; and the county records can show a third. If the stream is a legal ditch, the name of the first person to sign the petition is used as the name of the ditch. If there is more than one name, the name which appears in the bridge-inventory book should be used, with the other names shown in brackets, to make it clear that the stream has more than one name. The following is the information to be shown on the general-information sheet as illustrated in Figure 22-6C:

1. Alignment and Stationing. A full explanation of the method of establishing the alignment is necessary. If the old plans are available, they should be used to establish the baseline of the survey. If the old line is re-established, the existing right-of-way location can be determined by the Real Estate Division. If the baseline is established at random without regard to the existing right of way, the existing right-of-way location is difficult to re-establish. The baseline should be matched to that on the old plans with equations in at least two places. The existing right-of-way location can be determined mathematically.

2. Level Datum. A full explanation of the level datum used is needed. An existing bridge was likely built on an assumed datum. As it is required to survey an INDOT project on a sea-level datum (see Section 22-5.04), there should be a statement concerning the level datum used. Level equations must be shown between the survey for the present structure and the survey for the proposed bridge.

3. Present Structure. There should be a short description of the present structure. This description should state type of structure, number of spans, lengths of spans, and clear-roadway width.

4. Miscellaneous Information. This is the location to make comments such as conversations with local people about the location of section corners, unusual circumstances encountered on the project (e.g., such as not being able to re-establish the baseline without difficulty,

etc.). Statements which are neither level notes nor topography notes can be valuable to the designer in the work.

5. Survey Purpose. A statement as to the purpose of the survey (e.g., widening, replacement, repair) should be included. An example is, *The purpose of this survey is to provide data for the repair and widening of the present structure*.

6. Other References. There should be references to old survey books, plans, or miscellaneous information so that the designer is aware that more information is available.

22-6.04 Stream-Data Information

Stream-data information appears on page 4 of the bridge-survey field book, but is not included in a road-survey field book. Figure 22-6D illustrates an example of stream data. The information needed is similar to drainage data for a small- to medium-sized area. The information can be shown in narrative form and should include discussions of the following:

1. how fast the water level rises and falls;
2. the condition of the channel;
3. siltation;
4. brush;
5. amount and size of drift; and
6. ice flow.

22-6.05 Present-Structure Information

The present-structure information appears on page 5 of the bridge-survey field book, but is not included in a road-survey field book.

If the bridge is to be replaced, whether on its present location or on a slightly different location, the regular station and offset, as shown in the topography notes, is sufficient to show the existing bridge. If the present bridge was State built and plans are available, the old plans can be used to determine the quantities for removal of the present structure. A statement that the bridge was built according to the plans is sufficient.

If the bridge is to be repaired or widened, it is necessary to obtain detailed information on the existing structure so that the new work will match the existing structure once completed. A plan view of the structure needs to be drawn, with the station and offset recorded on the drawing to the nearest 0.02 ft. See Figure 22-6E for an example.

Also, a side view should be drawn so that the elevations can be recorded. The required elevations are as follows:

1. top of opening;

2. profile along the main baseline under the bridge, showing enough ordinates to adequately figure the effective opening;

3. low-water elevation;

4. ordinary high-water elevation;

5. extreme high-water elevation;

6. bridge-seat elevations;

7. top of curb, if present; and

8. top of handrail.

Additional levels on the present structure will be discussed later in this Chapter. See Figure 22-6F for an example.

22-6.06 Utility-Ownership Information

The complete name and address of each utility and the reference number should be listed on Page 2 of a road-survey field book, or page 6 of a bridge-survey field book. If more than one company for a single utility is encountered, all names and addresses should be listed. The limits of each utility location should be identified with stationing and left or right offset.

The name of the utility shown refers to the area served by that utility and implies only the company involved. If a company has no utilities in the field, then *None* should be entered next to the name of the utility. See Figure 22-6G for an example.

22-7.0 FIELD-POINT REFERENCE

The information described below will assist the surveyor in maintaining uniformity and minimizing ambiguity in reference drawings. Examples are illustrated in Figures 22-7A and 22-7B.

22-7.01 Field-Book Entries

Make each field-book entry neat, but be expedient in entering information. If a question arises about spelling, wording, coordinates, etc., ask and resolve the question before entering the information. Avoid erasing a field-book entry. If an entry cannot be crossed out, then redevelop the field-book page. Entering the information correctly the first time is desirable over having to redevelop a page in a hurried manner.

22-7.02 Orientation

In a new-roadway-location area, or an area accessed via winding roads, disorientation is possible. To minimize mistakes resulting from becoming disoriented, use a compass for each reference ties. Have an assistant check all information. Use the following guidelines for orientation.

1. Reference a survey or base-line point to the ahead line.

2. Reference a section corner, or other point not referenced to the survey line, to North.

3. Label the arrow appropriately (e.g., line name, North) and check the compass reading to verify the direction of the line.

4. In drawing the reference, ensure that it is properly labeled. If, for example, the southwest corner of a post is used, draw the line to the southwest corner of the post.

5. If the point is an equation point of two lines, orient to the current line of the survey. Show the relationship of the other line by drawing a solid line at the appropriate angle and label both lines. In the equation note, list the station of the current alignment first and the intersecting line second. In a reference note, list the S-line page number for the corresponding equation reference in the book.

6. Use a compass and provide an azimuth, from North, to the nearest one degree to each reference point from the point being referenced. Show the azimuth of each line drawn (e.g., angled road, fence, wall).

22-7.03 Drawing Details

If a point is revisited after a considerable length of time, some, if not most, of the references will be missing. Therefore, document sufficient detail to increase the likelihood that something will exist in the field that ensures finding the point. Place the point number and the designation number in the lower left corner of the section-corner card. All points will have coordinates placed in the book after

traverse adjustments are made. Have an assistant check the information gathered. Use the following guidelines in developing the drawing.

1. Show all notations and drawings on field-book paper. If the drawing must be redone for clarification, place the original in the back of the book until the final check. Keep the original reference drawing in the field book.

2. Use a straightedge, protractor, and template for drawing a circle, rectangle, tree, etc., and make the drawing as graphically accurate as practical. However, for clarity, an angle or distance may have to be exaggerated graphically to avoid clutter.

3. Measure all distances horizontally. Choose tie points such that the measurement will be as level as practical.

4. Draw and specify fence lines, tree lines, edge of pavement including road name or number, edge of field, etc.

5. For a PI, draw the deflection of the line in the appropriate direction and specify the Δ angle.

6. If a corner post is used, specify the direction of the fence lines and label which side or corner of the post where the reference nail was set.

7. If a reference is set and measured to, state what device was used, e.g., N&C for nail and bottle cap.

8. If a reference is set and described with a particular height, then for consistency describe each such reference in the same manner. Measure and document height to the nearest 0.1 ft.

9. Ensure that everything written is legible, especially the distances.

10. Place each distance parallel to the line, not across it. Illegibility results if a figure is placed over a line.

11. Enter each distance measured in feet to two decimal places. Include the unit of measurement, e.g., 97.45′. Include the decimals even if they are zero.

12. For a tree size, show the diameter at breast height (DBH) to the nearest 0.1 ft.

13. For a decimal measurement of less than 1 ft, include a zero at the beginning of the documented, e.g., 0.1 ft post. If the decimal point becomes illegible, the distance will be read as 1 ft.

14. Take each reference measurement using a feet-and-decimals tape. If the original measurements must be taken in feet and inches, show the distance in the units used to measure with, then convert and show the distance in the desired units in parentheses; e.g., 7'-2¾" (7.23').

15. If references are all in a straight line, then draw it as such, e.g., three fence posts.

16. In referencing to repetitious objects (e.g., fence posts, railroad ties), specify the object by the number of them away from the control point (e.g., 3rd tie, 5th post).

17. The desired number of references is four. Specify three references only if a reasonable fourth tie is not available. If there are fewer than three ties available, then state N.O.R.A. (No Other Reference Available) or N.R.A. (No Reference Available).

18. In referencing a section corner, indicate the following:

    1. how the found monument fits original county surveyor's ties;
    2. the physical condition of the monument;
    3. the relationship to the surface of the ground; and
    4. the uncertainty of the found monument.

22-8.0 CONVENTIONAL SURVEY

All surveying information for an INDOT project shall be collected using electronic surveying techniques. Conventional or hand-written survey submittals are no longer acceptable. The following is for reference only regarding previous project survey submittals.

22-8.01 Nomenclature

The survey party is expected to use consistent nomenclature in survey work and notebooks. Figure 22-8A provides a sample illustration of nomenclature use. Figure 22-8B defines the nomenclature terms.

106-8.02 Conventional and Topographic Lines and Symbols

Figure 22-8C provides the conventional and topographic lines and symbols that should be used.

22-8.03 Abbreviations

The abbreviations shown in Figure 22-8D are established through common usage and should be used in note keeping in preference to spelling out words to save time and space. The abbreviations shown in Figure 22-8E are not as established, but may be used at the option of the individual taking the notes where necessary or convenient to save time and space, provided the manner of usage is such as to make the abbreviation clear. For example, the abbreviation *Loc.* for locust is used in connection with the symbol for a tree, followed by its diameter in inches, for example, *15-in. Loc*. *Rec.*, for recommend, is used in recommending that certain work should done or used in design and construction, for example, *49 + 56, Rec. 15-in. pipe*, meaning that a 15-in. pipe is recommended at Station 49 + 56 under the road to be constructed.

INDIANA DEPARTMENT OF TRANSPORTATION
Driving Indiana's Economic Growth

100 North Senate Avenue
Room N758
Indianapolis, Indiana 46204-2216 (317) 232-5533 FAX: (317) 232-0238

Mitchell E. Daniels, Jr., Governor
Michael W. Reed, Commissioner

, 20

NOTICE OF SURVEY

Dear Property Owner:

Our information indicates that you own or occupy property near the subject proposed highway project. Our employees will be performing a survey of the project area in the near future. It may be necessary for them to come onto your property to complete this work. This is permitted by law per Indiana Code IC 8-23-7-26. They will show you their identification, if you are available, before coming onto your property. If you have sold this property, or it is occupied by someone else, please let us know the name and address of the new owner or current occupant so we can contact them about the survey.

At this stage, we generally do not know what effect, if any, our project can eventually have on your property. If we determine later that your property is involved, we will contact you with additional information.

The survey work will include mapping the location of features such as trees, buildings, fences and drives, and obtaining ground elevations. The survey is needed for the proper planning and design of this highway project. Please be assured of our sincere desire to cause you as little inconvenience as possible during this survey. If problems do occur, please contact our field crew or contact me at the telephone number or address shown above.

Sincerely yours,

Project Manager

:

SURVEY INTERVIEW REPORT

Route: Des No.: Project No.:

County: Location: of

Name of person interviewed: Date:

Name of interviewer:

Has occupant received the *Notice of Survey* letter? Yes ☐ No ☐

If different from letter, correct occupant's name and address is as shown below:

Name:
Address:

Suggestions, special requests, attitude of individual interviewed:

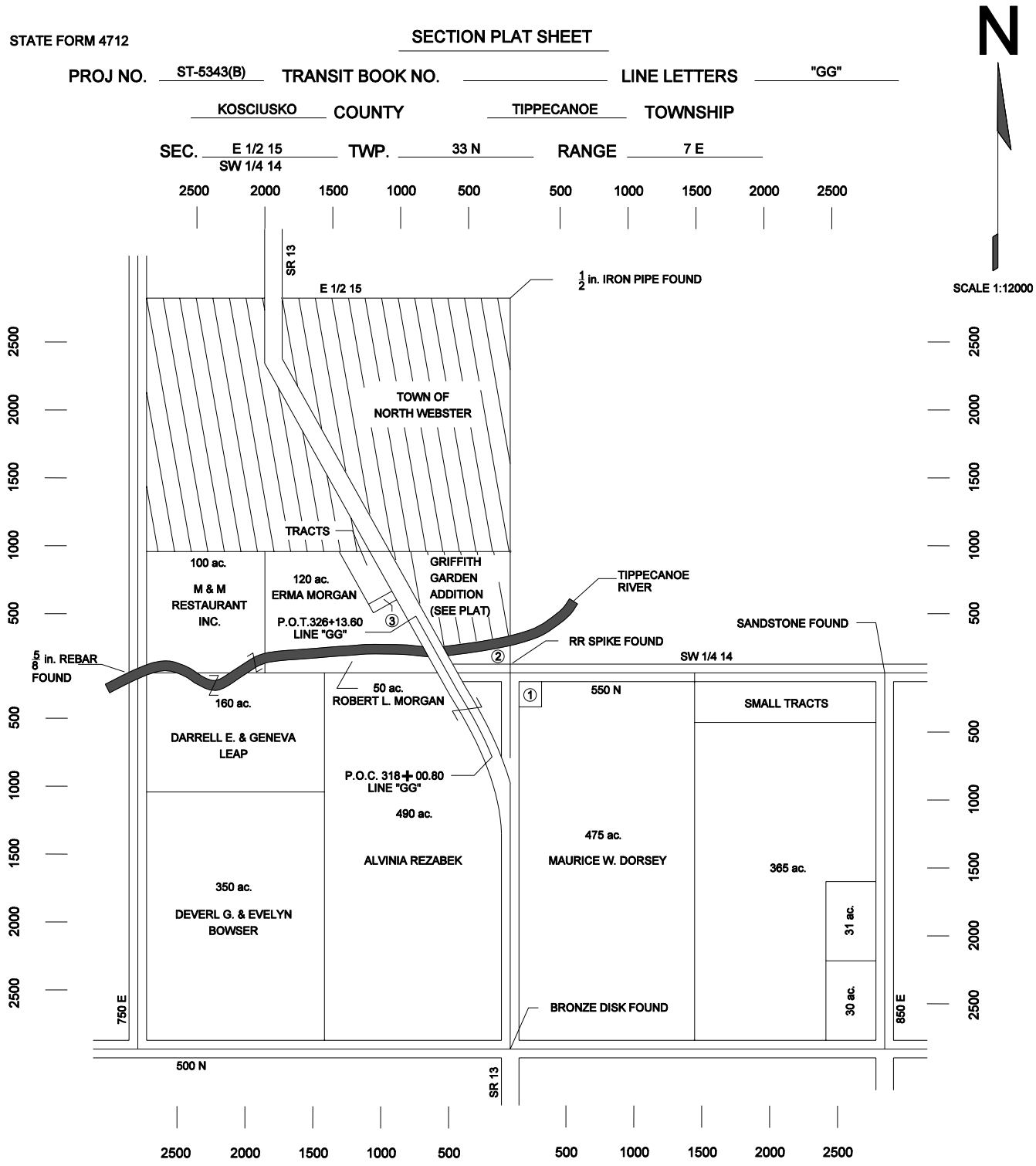
STATE FORM 4712

SECTION PLAT SHEET

PROJ NO. ST-5343(B) TRANSIT BOOK NO. _____ LINE LETTERS "GG"

KOSCIUSKO COUNTY TIPPECANOE TOWNSHIP

SEC. E 1/2 15 SW 1/4 14 TWP. 33 N RANGE 7 E



PROPERTY OWNERS

①	EARL & RUTH STUTZMAN	0.70 ac.
②	ESTHER & HELEN GRIFFITH	1.30 ac.
③	KATHRYN & LYNN FELLER	0.50 ac. (116 ft FRONTAGE)

DATE: JULY 16, 1979 SURVEY BY: PARTY #1 - JOHN A. DOE

SECTION PLAT SHEET

Figure 22-4A

(Note: This is not to scale.)

PROJ. NO. ST-141-1(C) LINE "A" PG. 10 OF 30

NAVD '88 LEVEL DATUM
START BENCH LEVEL NOTES

POINT	PLUS	H.I.	MINUS	ELEV.	ADJ. ELEV	
E 247	2.83	635.81√		632.98√		U.S.C. & G.S. BENCH MARK DISK SET IN THE SIDEWALK ON THE
	4.26	634.58√	5.49	630.32√		S.E. END OF THE R.C. GIRDER, STEEL BEAM, & STEEL TRUSS
TBM 3 "A"	9.46	635.11√	8.93	625.65√		BRIDGE OVER FLATROCK RIVER, 18.33 ft LT. OF STA. 370+78.47 "A"
	4.23	634.82√	4.52	630.59√		BT. SPK. IN PWP. #738-142 AT STA. 365+63.46 "A", 49.36 ft LT.
	4.02	634.68√	4.16	630.66√		
TBM 2 "A"	10.79	635.09√	10.38	624.30√		BT. SPK. IN PWP. #738-138 AT STA. 358+54.43 "A", 53.12 ft LT.
	5.80	638.25√	2.64	632.45√		
TBM 1 "A"	1.01	638.24√	1.02	637.23√		BT. SPK. IN PWP. 82.93 ft LT. OF STA. 353+20.34 "A"
	3.06	635.20√	6.10	632.14√		
TBM 2 "A"	10.30	634.60√	10.90	624.30√	624.31√	
	4.34	634.85√	4.09	630.51√		
	4.02	634.56√	4.31	630.54√		
TBM 3 "A"	8.73	634.37√	8.92	625.64√	625.65√	Thursday, August 11, 2005
	5.25	635.95√	3.67	630.70√		Clear & Hot
E 247			2.97	632.98√	632.98√	Notes & Instrument DWS
	+78.10√		-78.10√			Level Rod BRJ
	632.98√		711.08√			E 247 to TBM#1 & Return
√ by MAS	711.08√		632.98√			
	END	BENCH	LEVEL	NOTES		
						LEVEL EQUATION:
						LINE "A" PROJ. F-170(4) IS 0.14 ft ABOVE LINE "A" STA. 370+78.47
						LINE "A" = 632.92 PROJ. F-170(4) NGVD '29
						LINE "A" = 632.78 THIS PROJECT NAVD '88
						0.14 DATUM DIFFERENCE

BENCH LEVEL NOTES

Figure 22-5A

Survey Book

For

Structure No. 9-52-6793 over Hawk Creek

3.400 mi north of SR 14

Project No. ST-144-1(A)

Des. No. 03 15648

If found, please return to, or contact:

Engineer of Location Surveys
Room N642
Indiana Government Center
100 North Senate Avenue
Indianapolis, Indiana 46204-2217

Phone (317) 232-5309

FRONT FLYLEAF EXAMPLE

Figure 22-6A

PROJ. NO. NH-G200(19) LINE "P" PG. 1 OF 30

BRIDGE SURVEY

TRANSIT & LEVEL BOOK #1

U.S.R. #31 PROJECT NO. NH-G200(19)

COLUMBUS TWP. BARTHOLOMEW CO.

LINE "P" STA. 100+00.00 TO 213+22.00

LINE "S-1-P" STA 50+00.00 TO 58+20.00

LAND SURVEYOR'S STAMP GOES HERE

INITIAL & DATE HERE

INSTRUMENT DATA

SOKKIA SET XL TOTAL STATION NO. 15634 HORIZONTAL
CIRCLE LEAST COUNT 1 SECOND EDM MEASUREMENT
ACCURACY +/- (0.01 ft + 0.01 ft) MEAN SEA ELEVATION.

INDIANA DEPARMTENT OF TRANSPORTATION

LOCATION SURVEY SECTION

CHIEF OF PARTY	E. C. HOFFMAN
INSTRUMENTMAN	R. J. FISH
INSTRUMENTMAN	R. W. McCAIN
TOPOGRAPHER	K. R. BUNSOLD
RODMAN/CHAINMAN	L. M. HIGGENBOTHAM
RODMAN/CHAINMAN	O. A. RANDOM

INDEX

SURVEY STARTED 9/28/94 SURVEY COMPLETED 10/31/94

INDEX SHEET
Figure 22-6B

GENERAL INFORMATION

STR. # 3-40-6560 OVER MUSCATATUCK RIVER
PROJ. F-199-4(2) LINE "A"
VERNON TWP. - JENNINGS CO.

Located in the Northwest Quarter of Section 11, T-6-N, R-8-E, 0.24 mi Northwest of the junction of State Road 7 and State Road 3 and 2.99 mi south of the junction of State Road 7 and State Road 3.

Alignment and stationing was established by recovering the old road survey (1929) PI at Station 815+31.2 ft and then centering on the present structure at each end. All 3 points were in line. Stationing was established using this PI as a starting point, and should match the original stationing. Alignment should also be the same as the original. See plans for Project 164 (1929), sheets 6, 7, and 8. Also see the old bridge plans for Project 7.

Level datum is IFC and WRC using TBM VFMR 80 for this project elevation = 639.79 ft. This same datum was used for Aerial Survey and Kelsplotter, which is being used in conjunction with ground survey for this project.

This survey datum is 326.40 ft higher than the old road and bridge project datum. See page 36 of this book for level equation and old road and bridge plans (1929) Projects 164 and 7.

The present structure was State-built in 1930 as a Reinforced Concrete Arch with 5 spans at 80 ft each with 0°00' skew and 22 ft clear roadway. The bridge was repaired in 1956. The original structure number was 7-40-957.

The present State Road 7 and 3 is a blacktop over concrete roadway varying in width from 24 ft to 28 ft and has shoulders of varying width.

The original charter of Vernon and various maps, show the Corporation Line of Vernon to be on the low water mark at the south edge of the river's channel being at the foot of the hill on the south end of the present structure at that time and, at the present time, at the location of a small running channel. There were at that time, according to local residents, two channels, one at the south end of the structure and one at the north end of the structure. The main channel is now at the north side of the structure and it is shown now on all newer maps that the corporation line is at the low water mark on the north edge of the present main channel.

The purpose of this survey is to show underwater elevations to be used by the Photogrammetry Team to complete the contour maps and also to establish alignment and stationing, to survey property lines, to locate underground utilities, limited topography, stream profile, and other incidentals.

SAMPLE GENERAL-INFORMATION PAGE

Figure 22-6C

STREAM DATA

The drainage area is 196.0 mi^2 (12,540 ac). This value was obtained from the drainage book prepared by the U.S. Department of the Interior, Geological Survey, page 124.

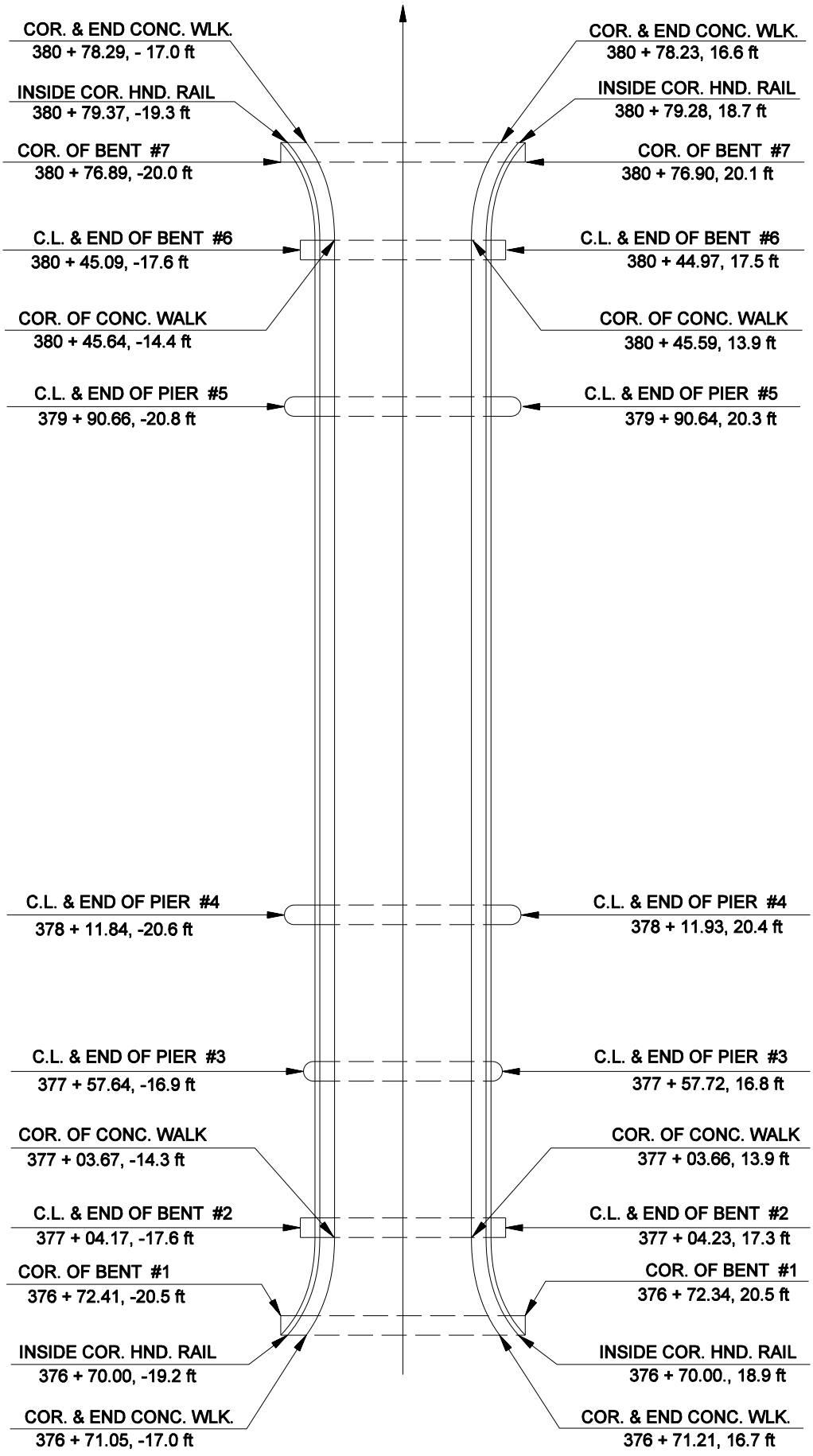
The stream rises slowly and lowers slowly. The main channel is new at the north side of the structure and has been for many years, but another channel was at the south end of the structure before this structure was built. This information was obtained from an old atlas and local residents.

About 230 ft of the river bottom is along the centerline and about 500 ft up- and downstream is an island built up of mud, sand, and loose rock. This island is vegetated with willows and small sycamores that catch quite a bit of small- to medium-sized drift and probably slow the flow of water during high water period. A set of plans is on hand, dated 1957, which proposed to clear out a similar situation at this location. Whether it was done is not known. If it was, it is probably just as bad or worse now. Such set of plans shows the main channel to be on the south side of the structure.

High-Water Elevation = 633.5 ft (1897 and 1961)
Low-Water Elevation = 605.6 ft (present water elevation minus 0.50 ft)

STREAM-DATA SAMPLE

Figure 22-6D



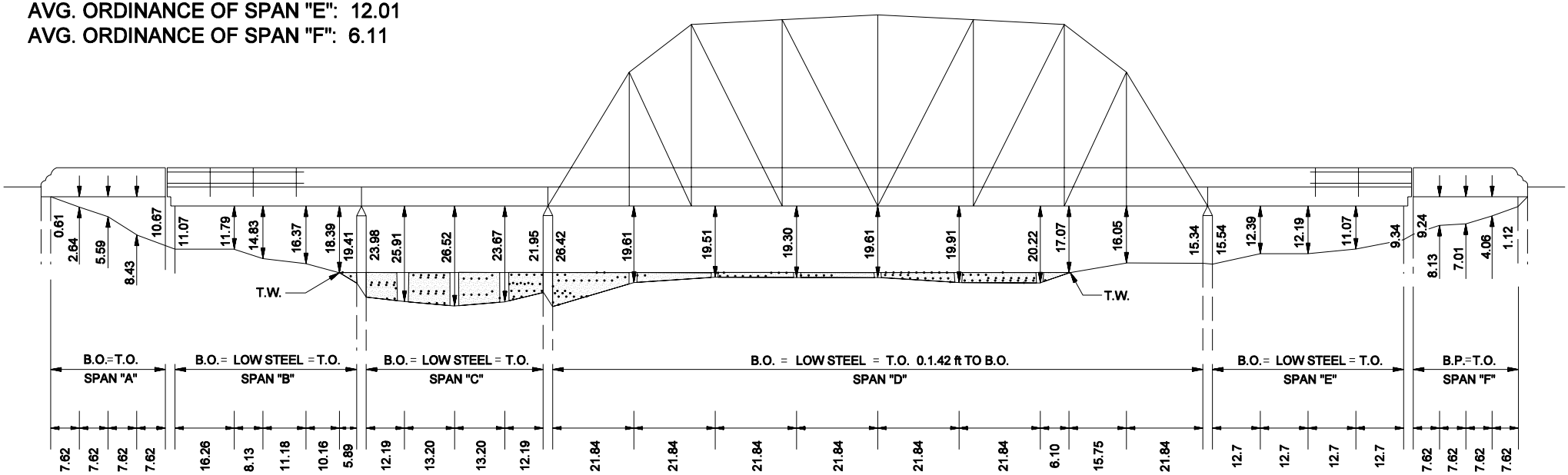
PRESENT STRUCTURE

Figure 22-6E

PRESENT STR. BUILT IN 1941 BY I.S.H.C. AS 6 SPAN STR.

1 - R.C.G. SPAN @ 30.5 ft, 2 - S.B. SPAN @ 52 ft, 1 - S.T.T. SPAN @ 180 ft,
1 - S.B. SPAN @ 52 ft, & 1 - R.C.G. SPAN @ 30.5 ft ON 0 DEG. SK.
C.L. RDWY = 28.5 ft VERT. CLR. 15.0 ft

AVG. ORDINANCE OF SPAN "A": 6.92
AVG. ORDINANCE OF SPAN "B": 15.33
AVG. ORDINANCE OF SPAN "C": 24.76
AVG. ORDINANCE OF SPAN "D": 19.13
AVG. ORDINANCE OF SPAN "E": 12.01
AVG. ORDINANCE OF SPAN "F": 6.11



PRESENT STRUCTURE PROFILE VIEW

Figure 22-6F

CABLE TELEVISION:

T.C.I. OF INDIANA
1600 WEST THIRD STREET
BLOOMINGTON, IN 47402

ELECTRIC:

PUBLIC SERVICE OF INDIANA
1100 WEST 2ND. STREET
BLOOMINGTON, IN 47402

GAS:

INDIANA GAS COMPANY, INC.
P. O. BOX 966
BLOOMINGTON, IN 47402

SANITARY SEWER:

CITY OF BLOOMINGTON
1969 SOUTH HENDERSON
P. O. BOX 1216
BLOOMINGTON, IN 47402

TELEPHONE:

AMERITECH
4517 EAST INDIANA BELL COURT
BLOOMINGTON, IN 47401

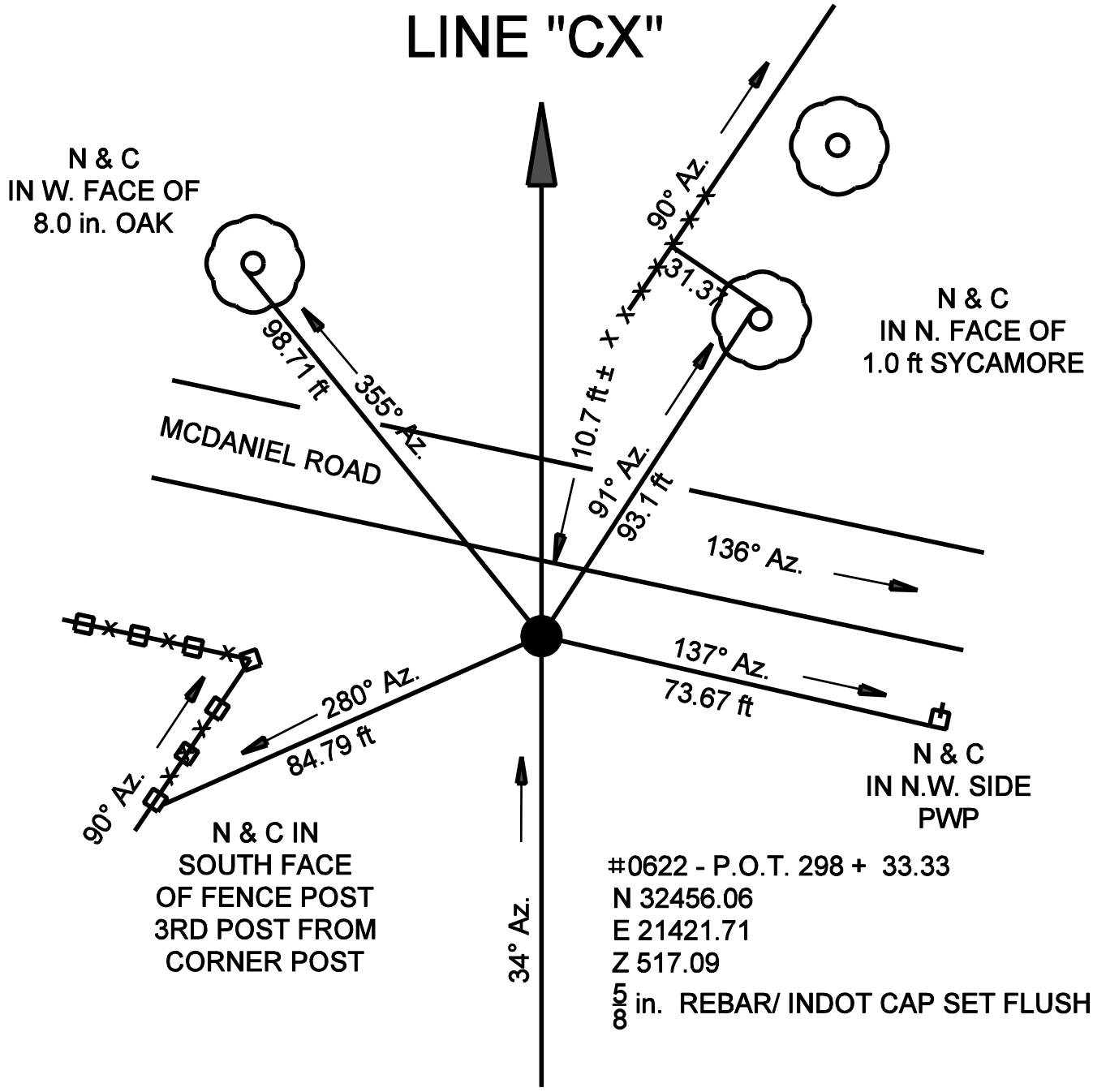
WATER:

CITY OF BLOOMINGTON UTILITIES
1969 SOUTH HENDERSON
P. O. BOX 1216
BLOOMINGTON, IN 47402

Note: There may be other utilities other than these that are listed that were not notified by underground Indiana, and no evidence was discovered as to their identity.

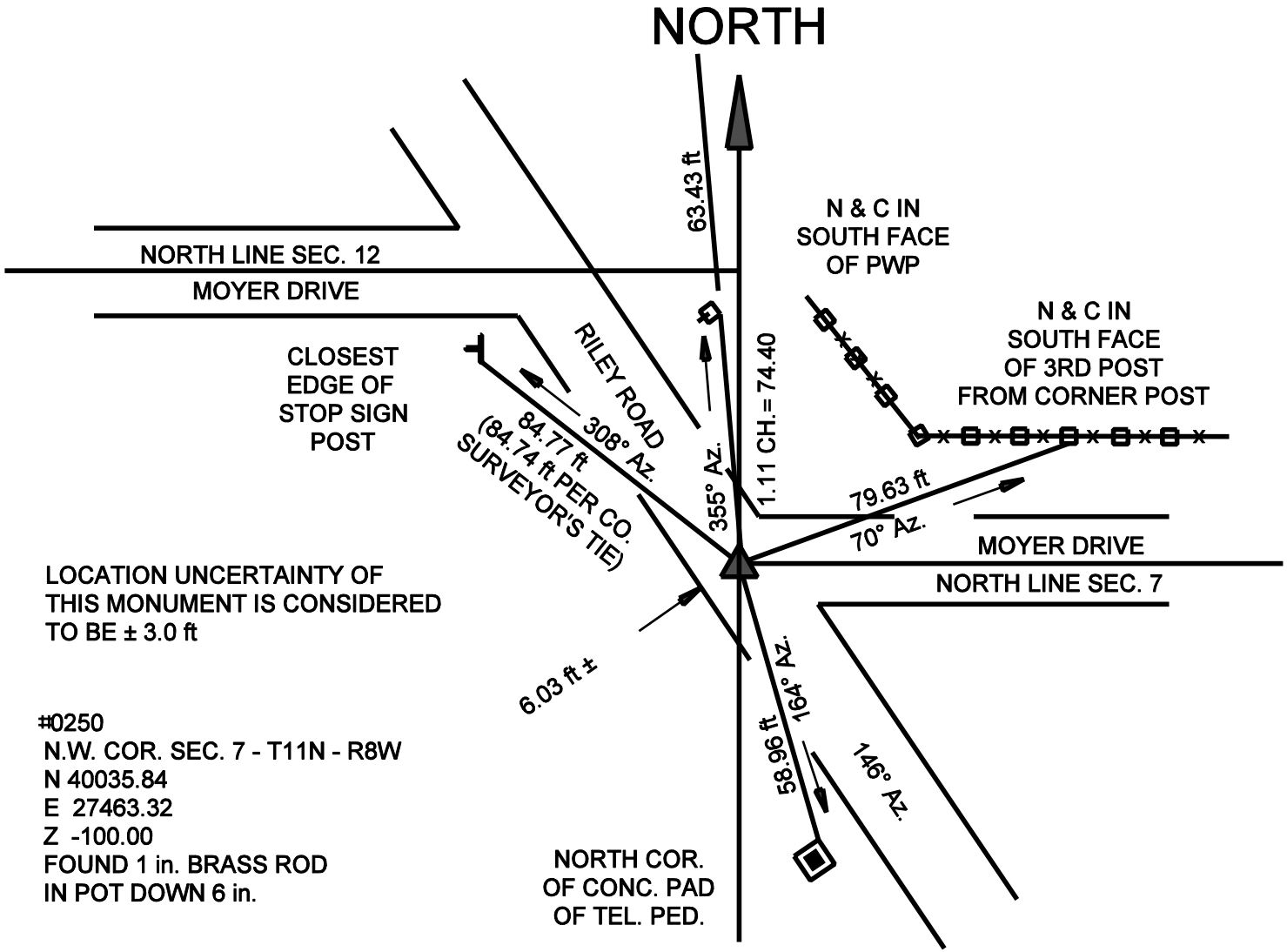
Note: Underground Utilities Contract # 943706042

PUBLIC UTLITIES
Figure 22-6G



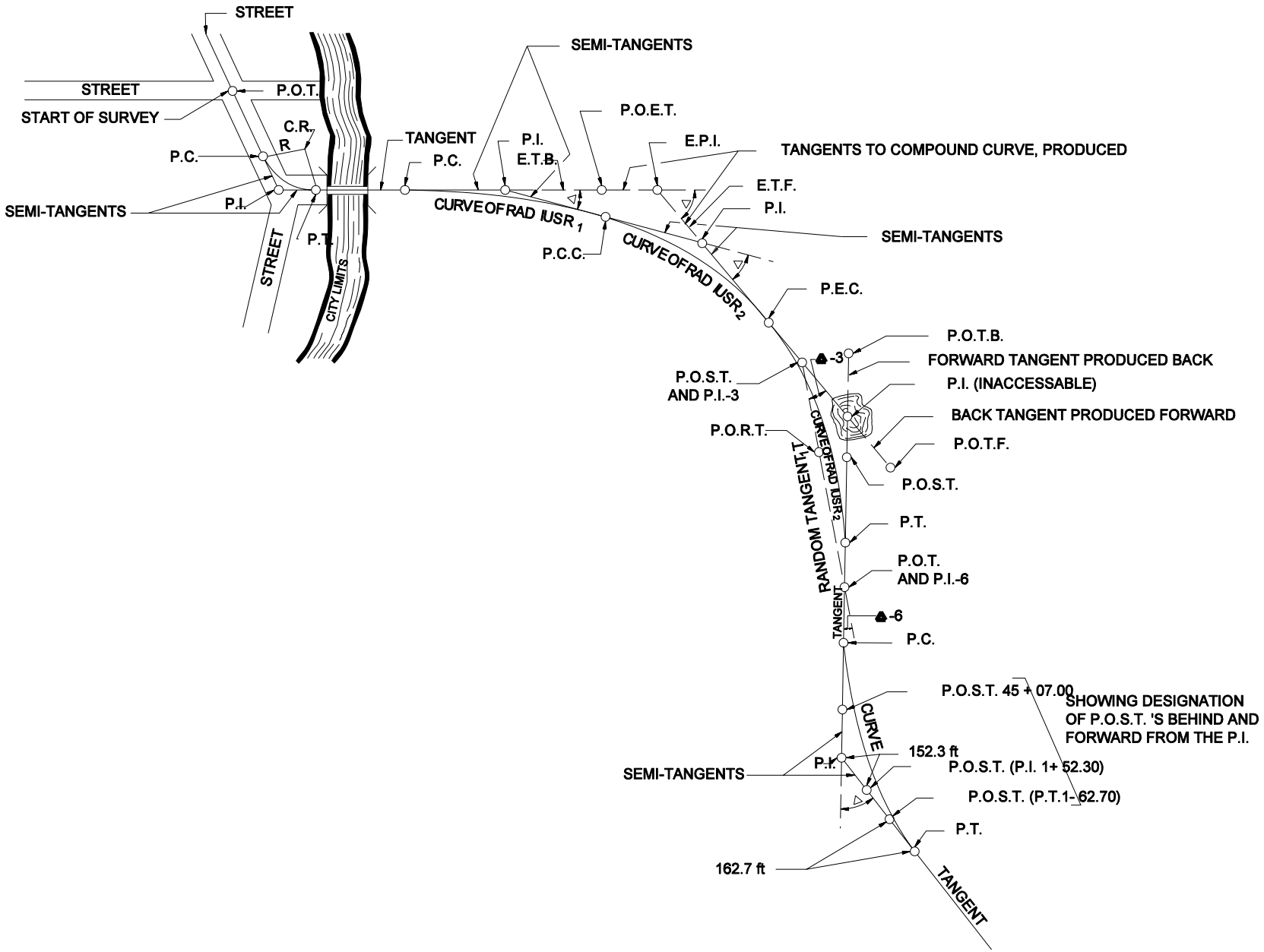
CONTROL REFERENCE POINT

Figure 22-7A



SECTION CORNER REFERENCE POINT

Figure 22-7B



SAMPLE ILLUSTRATION OF NOMENCLATURE USE

Figure 22-8A

P.I.	Point of Intersection, the point where two tangent lines intersect.
P.I.-1, P.I.-2, etc.	Denotes points on the semi-tangents of a curve, or elsewhere, at which angles are turned when the P.I. itself is inaccessible, the algebraic sum of the angles turned at these points being the total deflection that would be turned at the P.I. if it could be set and used.
E.P.I.	External P.I., the intersection point made by two tangents to a compound curve produced to meet outside the regular P.I.s.
P.C.	Point of Curve, the point where a tangent ends and a curve begins.
P.T.	Point of Tangent, the point where a curve ends and a tangent begins.
P.C.C.	Point of Compound Curve, the common point where a curve of a given radius ends and another curve of a different radius begins.
P.E.C.	Point of Equal Curve, the common point where a curve of a given radius ends and another curve of the same radius begins.
P.O.C.	Point on Curve, any point on the arc of a curve.
P.O.T.	Point on Tangent, any point on tangent line.
P.O.S.T.	Point on Semi-Tangent, any point on the semi-tangents of a curve.
P.O.R.T.	Point on Random Tangent, a P.O.T. on the random line between a P.I.-1, P.I.-2, or P.I.-3, etc.
P.O.T.F.	Point on Tangent (Produced) Forward, any point on the backward semi-tangent of a curve, produced ahead, through and beyond the P.I.
P.O.T.B.	Point on Tangent (Produced) Backward, any point on the forward semi-tangent of a curve, produced back, through and behind the P.I.
C.P.	Center Point, the center of a circle of which an arc used, usually of small radius, is a part. C.P. is often times set if the radius is 100 ft or less.
B.S.	Backsight, the point on which the total station is backsighted.
F.S.	Foresight, the point on which the total station is foresighted.
P.O.E.T.	Point on External Tangent (see Figure 22-8A).
E.T.B.	External Tangent Backward (from E.P.I.)
E.T.F.	External Tangent Forward
Δ	Delta, the deflection angle at the P.I. or total angular turn of a curve.
Δ-1, Δ-2, etc.	Angles turned at P.I.-1, P.I.-2, etc., their algebraic sum being Δ.

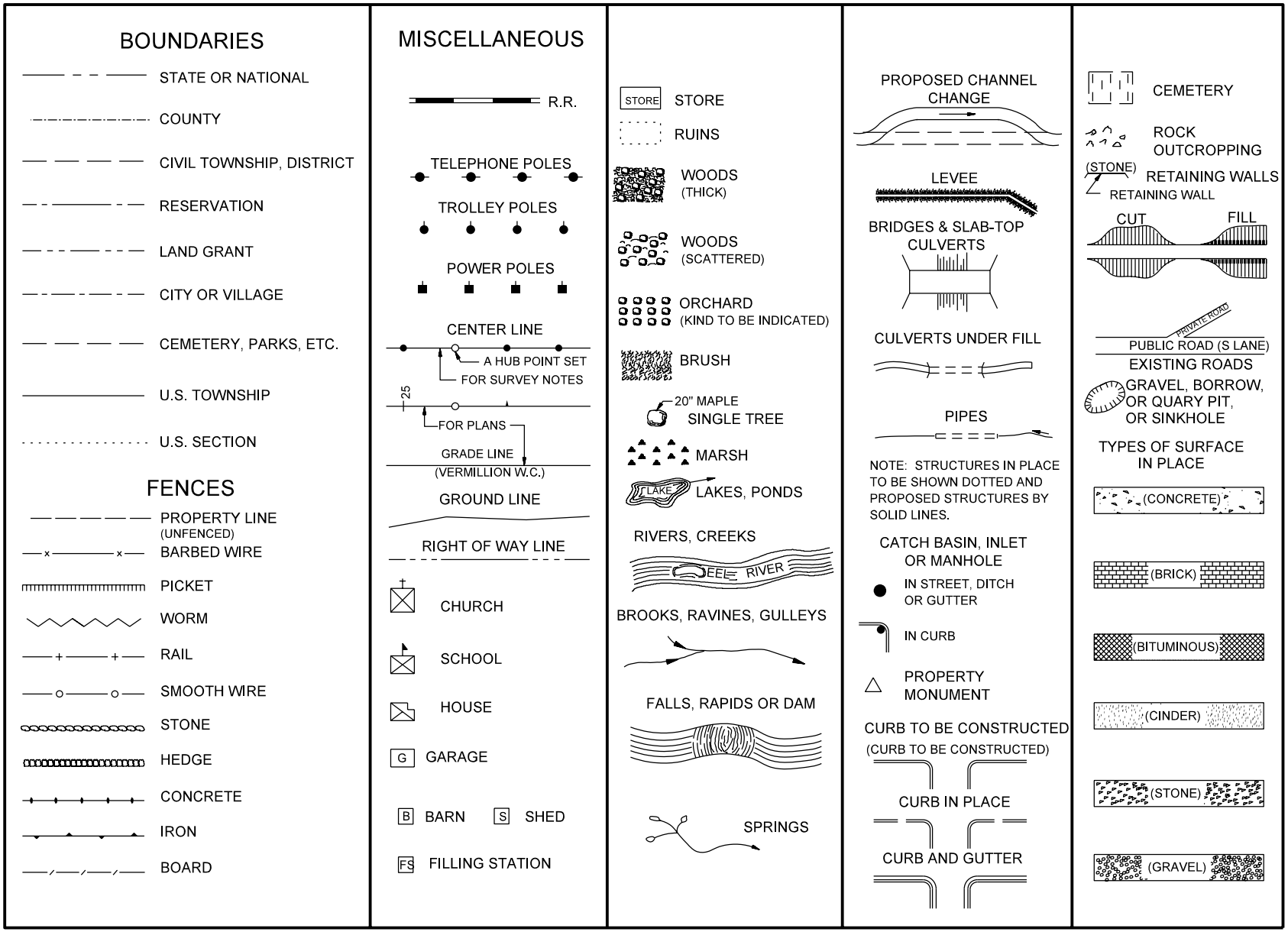
D	Degree of Curve	M.B.	Magnetic Bearing, read from needle, without correction for variation.
E	External of a Curve	C.M.B.	Corrected Magnetic Bearing, bearing obtained from needle reading corrected for variation.
T	Semi-Tangent of a Curve		
L	Length of a Curve		
R	Radius of a Curve		
LC	Long chord of a curve.	O.B.	Observed Bearing, true bearing obtained from observation on Polaris, or the Sun.

T.P.	Turning Point, a temporary point on which the rod is set in making a turn in leveling.
B.M.	Bench Mark, a solid point set or already established, the elevation of which is determined in leveling to provide a permanent elevation reference point.
T.B.M.	Temporary Bench Mark, a bench mark for temporary use but not intended to remain as a permanent B.M.
H.I.	Height of Instrument, in level work the elevation of the instrument line of sight when level is set up.
B.S.	Backsight, the rod reading when backsighting with the level to obtain the H.I.
F.S.	Foresight, the rod reading when foresighting with the level to obtain the elevation of any point.

Note: In establishing the centerline of a survey, the original or first line established is designated as Line "A." If an alternate line is established, it becomes Line "B," with any succeeding alternates as Line "C," Line "D," etc. If a revision of a line is to be run of a line run previously by others, and it is not known how many letters have been used for alternates, the revision line should be identified as Line "M." In establishing preliminary lines, the first one run is "P-1," the next, "P-2," etc. For side roads, the letter S should be used, the first one being "S-1," the next "S-2," etc. Y-lines should be labeled according to the corner in which they lie, thus a Y-line in a northeast corner connecting a survey with S.R.100 would be "Y-100-NE." Where alternate line "B" connects, the line designation would be"YB-100-NE."

NOMENCLATURE FOR USE IN CONVENTIONAL SURVEYS

Figure 22-8B



CONVENTIONAL AND TOPOGRAPHIC LINES AND SURVEYS

Figure 22-8C

Sta.	Station
℄	Centerline
P.L.	Property line
F.L.	Flow line
W.E.	Water's edge
H.W.	High water
Ord. H.W.	Ordinary H.W.
L.W.	Low water
Rd.	Road
Rdwy.	Roadway
Hwy.	Highway
Pub.	Public
Priv.	Private
R.R.	Railroad
Rwy.	Railway
Elec.	Electric
R.	Right
L.	Left
N.	North
E.	East
S.	South
W.	West
p.	Page
pp.	Pages
Sec.	Section
R/W	Right-of-way
Dist.	Distance
c.-c.	Center to center
o.-o.	Out to out
in.-in.	Inside to inside
F.T.	Farm title
V.P.	Vitrified clay pipe
C.I.P.	Cast iron pipe
C.G.M.P.	Corrugated galvanized metal pipe
B.I.P.	Boiler iron pipe
Conc. P.	Concrete pipe
Wd.B.	Wood box
M.H.	Manhole
Br.	Bridge
Conc.	Concrete
Grav.	Gravel
Bit.	Bituminous
Asph.	Asphalt, asphaltic
Brk.	Brick
Pav.	Paving, pavement
Ft.	Foot, feet
In.	Inch, inches
Yd.	Yard, yards
Mi.	Mile, miles
sq.	Square
cu.	Cubic
Elev.	Elevation
T.P.	Turning point
B.M.	Bench Mark
N&C	Roofing Nail in Bottle Cap

COMMON ABBREVIATIONS FOR NOTE KEEPERS

Figure 22-8D

Off.	Offset
Adj.	Adjusted
Ref.	Reference
Rec.	Recommend
Aver.	Average
Approx.	Approximate
S.R.	State road or route
U.S.R.	U.S. route
C.L.	Corporate limits
C.L.	City limits
Sec. L.	Section line
H.	House
B.	Barn
G.	Garage
S.	Shed
C.C.	Corn crib
W.C.	Water closet
F.S.	Filling station
Gas. P.	Gasoline pump
F.P.	Fence post
Tf.P.	Telephone pole
Tg.P.	Telegraph pole
Pw.P.	Power pole
Lt. P.	Light pole
Br. P.	Brace pole
Gy. P.	Guy pole
F. Hyd.	Fire hydrant
Sdwk.	Sidewalk
Cb.L.	Curb line
Cb. In.	Curb inlet
Gut.	Gutter
M.H.	Manhole
I.P.	Iron pin
W.H.	Wood hub
I.P.F. or W.H.F.	Flush with ground
I.P.L. or W.H.L.	Lightly buried
I.P.B. or W.H.B	Buried below plow
B. Spk	Boat spike
R.R. Spk.	Railroad spike
X-Sec.	Cross-section
T.B.	Top of bank
F.S.	Foot of slope
T.O.	Top opening
T.P.	Top of pipe
Chan. Chg.	Channel change
Hdw.	Headwall
Abut.	Abutment
Wgw.	Wingwall
Br. S.	Bridge seat
T.H.R.	Top of handrail
Wh.	White
Blk.	Black
Yel.	Yellow
O.	Oak
S. Map.	Soft maple
H. Map.	Hard maple
Wal.	Walnut
Hick.	Hickory
Wil.	Willow
Syc.	Sycamore
Chy.	Cherry
W. Chy.	Wild cherry
Apr.	Apricot
Pch.	Peach
Pers.	Persimmon
Pop.	Poplar
Cot.	Cottonwood
Sass.	Sassafras
Loc.	Locust

ADDITIONAL ABBREVIATIONS FOR NOTE KEEPERS

Figure 22-8E

TABLE OF CONTENTS

LIST OF FIGURES

Figure Title

CHAPTER 23 [Rewritten Apr. 2011]

ELECTRONIC DATA-COLLECTION SURVEY

23-1.0 GENERAL

An electronic data collector may be used to collect field survey information for a highway-improvement project. There is hardware and software available to collect and interpret this information. However, it is not within the scope of this Chapter to provide procedures and guidelines for every situation. All electronic survey data collected by or for the Department shall be compatible with InRoads design and survey software in use by the Department, unless approved otherwise (See Section 26-1.02).

Implementing electronic data collection does not alter the amount or type of survey information required for a highway-improvement project. All the information that is required for a conventional survey is still necessary and is provided in survey-book format.

The correct location of each topographical feature is plotted by computer from the electronic data. Coordinates or station and offset values need not be shown on the plot unless the survey is submitted as a final product and the design is to be completed by others. However, all topographic features must be identified.

Property-corner markers, easements, existing right-of-way lines, fences, or other evidence of ownership, and section and subdivision lines and corners and similar information which are ordinarily shown within the limits of the survey must be plotted and identified with coordinates or station and offset values shown on the plot.

All plotting should be conducted using the line types and symbols as determined by the Department.

A road plan provides all major topographical features that affect the ground surface and that influence the interpolation or generation of contours and cross sections. This includes such features as follows:

1. building;
2. road;
3. top of bank;
4. toe of slope;
5. ditch flow line;
6. edge of water;
7. edges of stream;

8. lake;
9. quarry;
10. wall; or
11. other feature that represents abrupt changes in slope or surface elevations.

Each spot elevation should be depicted on the plot together with the elevation of each shot.

A section or other corner tie requires a separate plot that includes all traverse and closure data or GPS coordinates with projection details, together with the following:

1. relative positional accuracy;
2. description of monument; and
3. evidence of perpetuation or origin and references for each corner.

A differential-level circuit for elevation control should be performed and shall include a description and location (i.e., station and offset) for each benchmark. The submitted level data shall include closed circuit-adjusted elevations for all control points and TBMs, together with closure information.

Submittal of a conventional section plat and conventional notice of survey is required. See Chapter 106 for preliminary research requirements.

23-2.0 GUIDELINES AND PROCEDURES

23-2.01 Field Book

An electronic-data-collection field book is a skeletal field book that includes supplemental data for the survey. Information pertaining to topography and the ground model is included in the data-collector files. The following provides information relevant to the electronic field book.

1. The field-book format is letter-size paper.

2. Set up the field book in the sequence as follows:

    a. flyleaf page;
    b. Table of Contents page;
    c. General Information;
    d. Stream Data, if applicable;
    e. present-structure tie-in, if applicable, with station-offset and/or coordinates with supporting metadata;
    f. public utilities;
    g. alignment line “A,”;

h. bench tie-in circuit;
i. bench level notes;
j. level notes;
k. level notes for present structure, if applicable;
l. high-water levels;
m. testimony of local residents, if applicable;
n. section-corner references;
o. aerial survey marker references, if applicable;
p. miscellaneous envelope (see Chapter26 for contents); and
q. check guides (see Figure 23-2A, Guide for Checking Survey Book). An editable version of this form appears on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/).

23-2.02 Alignment Baseline and Data

Information pertaining to establishing the alignment baseline and collecting alignment data is provided in Section 22-5.0. See Figure 23-2B, Alignment Sketch.

23-2.03 Bench Level

The guidelines and procedures relative to running a bench level and collecting bench-level data are discussed in Section 22-5.0.

23-2.04 Data-Collector Preparation

The procedure to aid in the preparation of the electronic data collector is as follows:

1. select the instrument;

2. select the job settings;

3. configure the reading for collecting data in raw-data SDVA format (i.e., slope distance vertical angle);

4. select the input type to accommodate english units of measure; and

5. input data tolerances.

23-2.05 Keyboard Input

The keyboard input that is required includes the following:

1. designation number;

2. project number;

3. old or new structure number, as applicable;

4. name of survey firm;

5. names of survey-party personnel;

6. project description and location;

7. coordinates for all centerline and adjusted control points;

8. centerline stations, line letters, and monument type;

9. start date of survey;

10. end date of survey; and

11. additional survey or pickup survey notes, including dates or other description information. Indicate whether the information is additional survey or pickup survey data.

23-2.06 Setting Temporary Control or Fly Stations

1. Station Location. Set each temporary control station beyond the roadway in a visible location.

2. Survey Control. Set each temporary control station from the survey control.

3. Third-Generation Control. A third-generation temporary control station is not permitted. If an additional temporary control station is necessary, return to the survey-control line and backsight a control-line point. The additional temporary control station can then be set.

23-2.07 INDOT String-Label Conventions

For a copy of the current list of INDOT string labels, contact the Office of Land and Aerial Surveys.

23-2.08 Topography Plot

The key information that should be shown on a topography plot is described below.

23-2.08(01) Building

Identify each building type that extends within the limits of the survey including the following:

1. accurate location;
2. perimeter dimensions; and
3. a brief description (e.g., frame, brick, concrete, number of stories, residential, commercial, etc).

Round and record all dimensions to the nearest 0.1 ft. The extent of coverage from the baseline varies, and the amount of coverage is determined either from the Engineer's Report or the Office of Land and Aerial Surveys. See Figure 23-2C, Topography Plot Example, for an example of showing a building on a topographic plot.

23-2.08(02) Fence

Identify each fence with at least two points on each tangent of the fence including fence corners. Figure 23-2C provides an example.

23-2.08(03) Tree or Forest

If a wooded tract is encountered, show its limits, and approximate the number and prevailing kinds and sizes of the trees within the survey limits right and left of the baseline. Apart from a forest, show each individual tree of appreciable value, particularly each tree or shrub located on a lawn, etc., and that is within the proposed right-of-way limits. Show each fruit tree. See the examples in Figure 23-2C.

23-2.08(04) Field

The limits of a pasture, truck patch, garden, berry patch, lawn, or park that are within the survey limits should be recorded on the topography plot. Figure 23-2C provides an example.

23-2.08(05) Utilities

Each utility should be identified on the topography plot including the following:

1. electric line;
2. telephone line;
3. cable-television line;
4. water line;
5. gas line;
6. oil line;
7. sewer line (e.g., sanitary, storm);
8. manhole;
9. fire hydrant;
10. transmission-line tower;
11. power line; or
12. underground oil- or gas-transmission line.

A power-transmission line must be tied to the baseline by locating either the centerline of each high-tension tower or all four legs. Both right and left distances from the center of the closest tower must be recorded. The easement width must be obtained from the utility company and placed in the survey envelope. Power, telephone, or telegraph poles are observed to the center of the pole. Identification numbers which appear on the poles should be shown on the topography plot. Utility companies prefer that underground utility lines be located and marked by their employees. Further discussion regarding utilities is provided in Section 22-2.0. Utilities should then be located by the survey party and recorded in the topography notes as illustrated in Figure 23-2C, Topography Plot Example.

23-2.08(06) Roadway or Path

Each public road, private road, or field entrance should be located on the topography plot together with a complete description (e.g., type, purpose or use, width, type of surface, condition). The need to survey an S-line is determined by the Office of Land and Aerial Surveys prior to the party's assignment to a project. The length and coverage limits required for an S-line is predetermined by the Office. The topography plot also should include the location and description of each sidewalk, curb, gutter, retaining wall, or other similar item. Figure 23-2C illustrates examples of locating the items discussed herein.

23-2.08(07) Railroad

If working within the right of way of a railroad company, proper written notification and a request for flaggers during survey work should be made to the railroad company prior to entering its right of way. Where railroad switch or mainline tracks are encountered, locate the centerline of track and the gauge side of each rail to the nearest 0.01 ft. Locate each switch or frog point within the survey limits both right and left of the baseline. Surveying a separate line (e.g., "RR-1-A") both right and left of the baseline and along the centerline of the tracks is warranted. Such survey line runs from left to right across the baseline using station 50+00.00 at the equation point on the baseline. However, if railroad plans are available, it is permissible to survey a railroad line on the railroad stationing. An accurate distance must be obtained that relates to an identifiable feature along the railroad, e.g., milepost, bridge. Railroad plans may be available from the county surveyor's office if unavailable from the Utilities and Railroads Division.

23-2.08(08) Natural Drainage Feature

Each natural drainage feature should be identified on the topography plot. Identify the limits, direction of flow, extreme- and ordinary-high-water elevations, and other relevant information for features as follows:

1. quarry;
2. gravel pit;
3. stream;
4. lake;
5. pond;
6. marsh;
7. spring;
8. sinkhole; and
9. dry run.

A drainage area of 100 ac or less should be determined in the field and recorded in the survey notes. The high-water elevations are recorded in the level notes. An example of providing natural drainage features is illustrated in Figure 23-2C, Topography Plot Example.

23-2.08(09) Geographical Feature

Depict rock, shale outcrop, peat bog, or muck area on the topography plot by identifying the area limits. Rock or muck soundings are taken where required, and recorded in the level book. Each ditch, tile drain, catch basin, or curb inlet must be depicted together with information describing its

location, size, direction of flow, type, and depth below surface. Figure 23-2C provides examples of locating the items discussed herein.

23-2.08(10) Structure

The topography plot should identify each bridge, culvert, or small structure. Report in the survey notes, together with corresponding sketches, sufficient details regarding each structure's condition and future usefulness. A structure that is 20 ft or longer is considered a bridge. Figure 23-2C illustrates an example of the appropriate method to identify a structure.

23-2.08(11) Sign

Each sign that is within the survey limits, e.g., traffic, public, private, should be shown on the topography plot. Sign dimensions should be determined and recorded to the nearest 0.1 ft. The sign message should also be identified.

23-2.08(12) Mailbox

The topography plot should show each mailbox within the limits of the survey. The size and type of post support and the number of boxes should also be indicated.

23-2.08(13) Guardrail

Where guardrail is shown on the topography plot, record the X, Y, and Z values of the top of the beam rail where it meets the blockout or post. Both horizontal and vertical breaks should be shot. See Figure 23-2D, Guardrail Survey Point.

23-2.08(14) Property Line

An important objective of a project survey is to collect sufficient data to adequately describe the right-of-way requirements. However, performing a full retracement of each property affected is not an objective of the survey. As such, the following statement should be recorded on the General Information page.

> *The purpose of this survey is to collect data for the design of a highway improvement, and to provide a basis for describing right-of-way required for the project. It is not a property retracement survey.*

> *All apparent property lines or corners, or subdivision or section corners shown are based on physical evidence or testimony. For example, a fence between two houses can be identified as an apparent property line.*

The survey party should gather all information pertaining to evidence, physical or otherwise, of property lines including the following:

1. fence;
2. iron pipe;
3. rebar;
4. stake;
5. hedge row;
6. tree line;
7. field divide; and
8. testimony.

Where located, record these items in the survey book as, for example, *apparent property line*, or *apparent corner* (i.e., *App. PL* or *App. Cor.*). Locating markers should be conducted with a high degree of accuracy. Where a property line exists without evidence or testimony, a statement should be recorded in the topography plat indicating, *no evidence of property line* (*NEPL*). The locations of property lines should not be computed so they can be plotted for the survey. Record only the physical evidence or testimony. A property-owner's name should be recorded on each side of a property line. If evidence or testimony is unavailable, property deeds may be used to determine the general limits of ownership.

Where a subdivision is involved, it is necessary to locate the subdivision corners within the project limits. At least one additional corner beyond the project limits is required to indicate direction. If subdivision corners are unavailable, the individual lot corners should be identified. The number of corners required is based on a prudent search and should represent a consensus of surveys conducted in the area.

Identical procedures should be followed to locate property-corner markers of metes-and-bounds descriptions. An accurate location of each property-corner marker is required as previously indicated. A reasonable and prudent search should be made for existing markers within the project limits. If the last deed of record is examined, the monument corners referenced in the instrument should be located and, if not found, should be indicated. Not all property-corner monuments need be located. However, property-corner monuments should be located for each property line which intersects the centerline or is within the survey limits. However, the purpose of the survey is not to retrace the entire description in the field.

Copies of subdivision plats and metes-and-bounds descriptions should be transmitted to the Office of Land and Aerial Surveys along with the completed survey books.

23-2.08(15) Right-of-Way Line

Physical evidence of a right-of-way line should be identified on the topography plot including the following:

1. fence;
2. property-corner marker;
3. utility poles;
4. edge of field; and
5. right-of-way markers.

Physical evidence of property and right-of-way limits should be recorded in the data collector. For a right-of-way marker, locate and record the center of the back edge of the marker. All other monuments are to be located at the center of the monument.

23-2.08(16) Graveyard, Burial Ground, or Cemetery

In the absence of a fence surrounding an observed graveyard, burial ground, or cemetery, a line that best encloses the area should be shot in as a string "NG". If a fence is present, it should be coded as fence and a material shot taken inside of the area.

23-2.09 Procedures for MXRoad User

Although it is preferred that all collected survey data to be submitted in InRoads format, there can be a project or circumstance that may necessitate the use of previously-accepted data formats such as MXRoads. However, approval prior to collecting and transmitting electronic survey data in a format other than InRoads must be obtained. As a reference, the following are the procedures that should be considered by an MXRoad user.

1. 201s (straight);

2. 202s (curve);

3. 203s (parallel line);

4. circles;

5. rectangles;

6. offset for an object that cannot be seen due to obstruction is as follows.

    a. An angle offset is made by observing the horizontal angle with one reading and the vertical angle and distance with another. The two are then combined into one observation record.

    b. A single-distance offset is made by observing a prism located at a known distance from the target point. The direction from the prism to the target is normal to or along the line of sight from the instrument to the prism. The instrument measures the angle and distance to the prism. The offset distance and the offset direction are input into the data collector.

7. taping;

8. closing;

9. repeat shot;

10. discontinuities;

11. a P-note, related to a single point, and immediately following the observation (e.g., P 1234 0.15 CMP outlet); and

12. an S-note, related to a single string, and placed after the first or last shot in that string or in between (e.g., S UT01 200-pair cable owned by Ameritech).

23-2.10 Checking Shots

At least once every half hour, or as conditions dictate, the horizontal circle reading on the backsight should be checked. If a discrepancy of only a few seconds is found, the circle may be reset, and data collection may continue. If a greater discrepancy is found, the source of error should be determined and corrected. At least once during each setup, a check shot to a known point should be taken. If the same setup is used during the morning and afternoon, a check shot should be taken during each session. A check shot should be conducted on a known point such as a centerline control point. This reconciles and verifies the horizontal angle, the vertical angle, and the distance between the control points.

23-2.11 Data-Processing Checks

The items that should be checked during data processing are as follows:

1. string crossings;
2. triangles;
3. contours;
4. corrupt discontinuities;
5. format of notes;
6. validity of codes; and
7. single-point strings.

23-2.12 Survey Transmittal

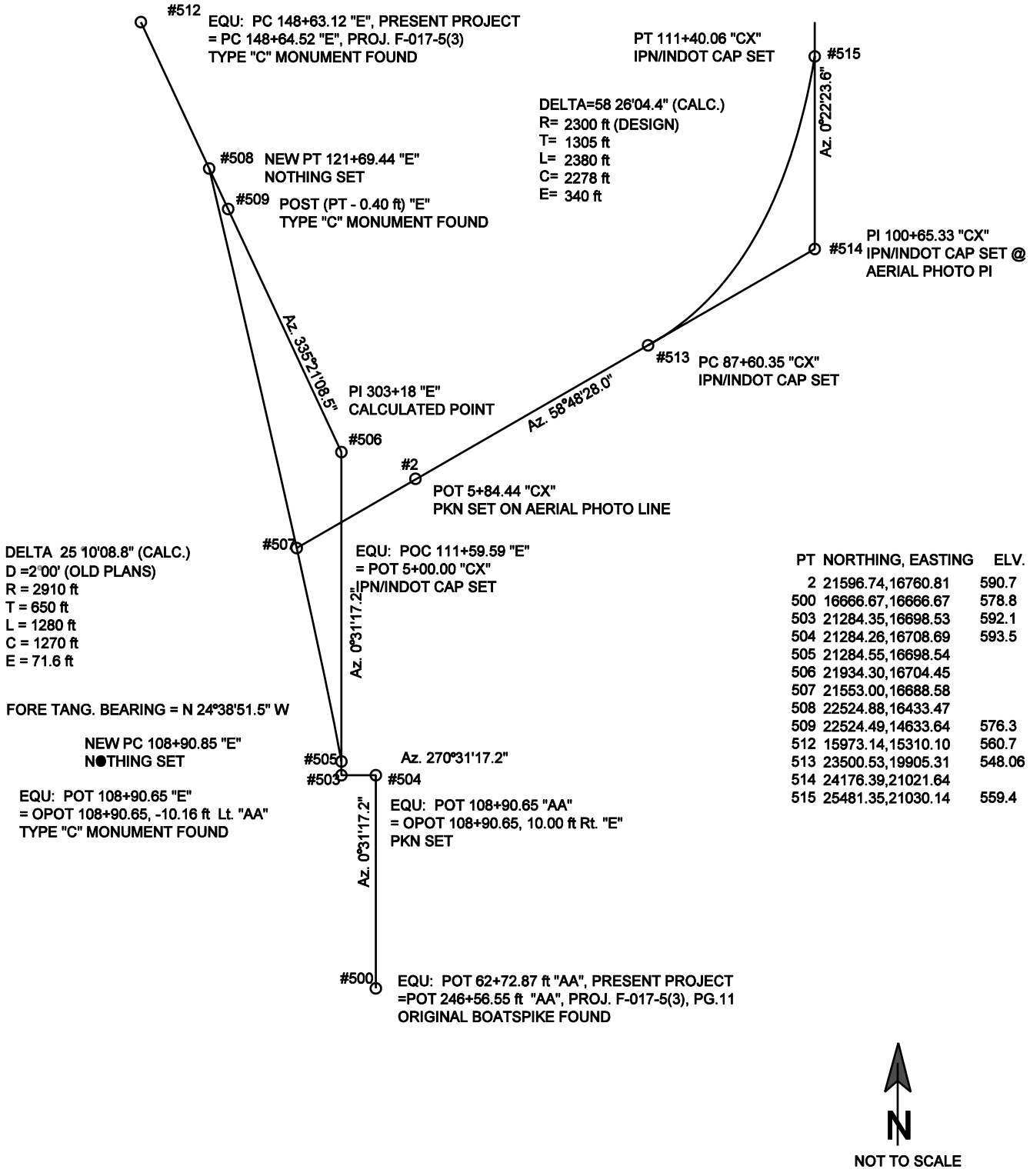
Chapter 26 discusses the procedures for transmitting a survey to the Department.

SURVEY-BOOK CHECKLIST Survey Book No.

Items with an X in the box next to them apply to this book.

1. ☐ Check Guide inserted in back of book.
2. ☐ Book Number on front flyleaf.
3. ☐ Return address on front flyleaf.
4. ☐ Front flyleaf notation [Book No., Project No., Des. No., Route No., Terminal Points of Project, County, brief description of each line, and Instrument data.]
5. ☐ Title page and Index complete.
6. ☐ Pages numbered.
7. ☐ Section Plats complete, with State and County routes, Streams, RRs, Towns, Villages, Cornerstones, Property Owners, Survey Centerlines; Sec. No., Township and Range; Civil Township.]
8. ☐ Project Number and Line letters at tops of pages.
9. ☐ Continuation notes within book, or book-to-book cross reference.
10. ☐ Start and end of each line shown with equations and cross references to other surveys.
11. ☐ Control Points labeled and coordinates shown.
12. ☐ Alignment data shown and checked.
13. ☐ References shown and checked.
14. ☐ Bearings calculated, checked, and sources fully described.
15. ☐ Daily notations; Date, Party, Weather Conditions of each day's work.
16. ☐ Centerline points correctly placed; Curves red-lined in topography.
17. ☐ Details of topography, buildings, etc., near line likely to be damaged by construction
18. ☐ Distance to near graves in cemeteries.
19. ☐ Section, Quarter Section, and Property corners located.
20. ☐ Public Utilities, Gas and Water mains, Telephone and Power lines, and Cable Television ownership noted.
21. ☐ Underground Utilities Reference Number noted on public utilities page.
22. ☐ Underground Oil and Gas transmission lines shown; Easements and address of owner noted.
23. ☐ Names of Cities and Towns.
24. ☐ State and County routes; types of surfaces noted.
25. ☐ Details of existing structures near line.
26. ☐ Structures up- and downstream.
27. ☐ Drainage areas and recommendations.
28. ☐ High-water elevation and date, and source and date of information.
29. ☐ Section Corners referenced and shown in the book and on the section corner reference cards.
30. ☐ Source of level datum.
31. ☐ Bench mark descriptions complete.
32. ☐ Legal flowline elevations of county ditches.
33. ☐ Elevations of low wire of overhead transmission lines.
34. ☐ Level equations with other surveys shown, and explained.
35. ☐ Enough topography coverage to satisfy study report.
36. ☐ Shots on near structures, and sketches showing structures.
37. ☐ Centerline points correctly placed.
38. ☐ Book is clean.

Checked By:



PT	NORTHING, EASTING	ELV.
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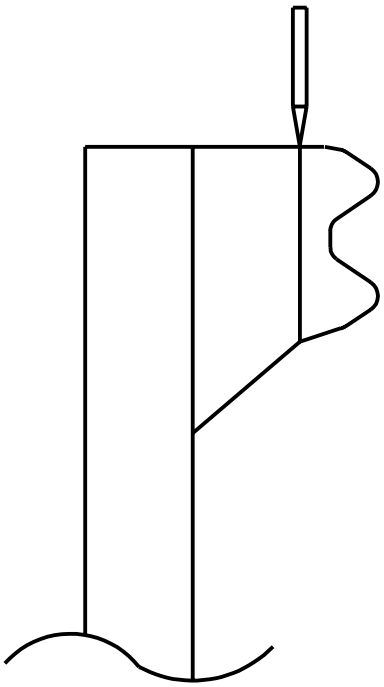
500	16666.67,16666.67	578.8
503	21284.35,16698.53	592.1
504	21284.26,16708.69	593.5
505	21284.55,16698.54	
506	21934.30,16704.45	
507	21553.00,16688.58	
508	22524.88,16433.47	
509	22524.49,14633.64	576.3
512	15973.14,15310.10	560.7
513	23500.53,19905.31	548.06
514	24176.39,21021.64	
515	25481.35,21030.14	559.4

ALIGNMENT SKETCH
Figure 23-2B

Figure 23-2C, Topography Plot Example, is not yet available but will be supplied to users and owners of Part III of the new Indiana Design Manual when it is developed.

Topography Plot Example
Figure 23-2C



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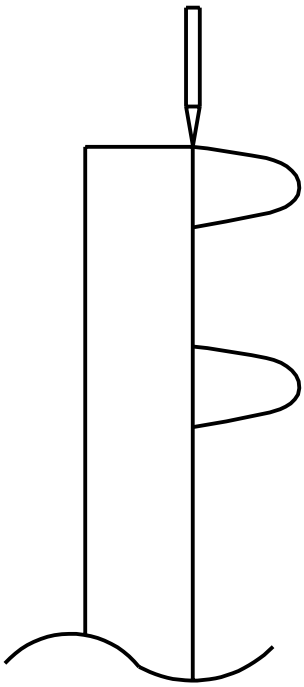
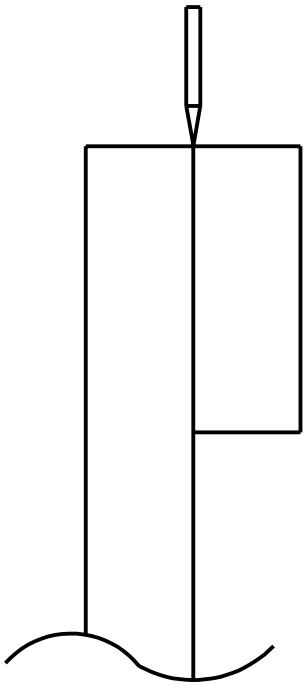
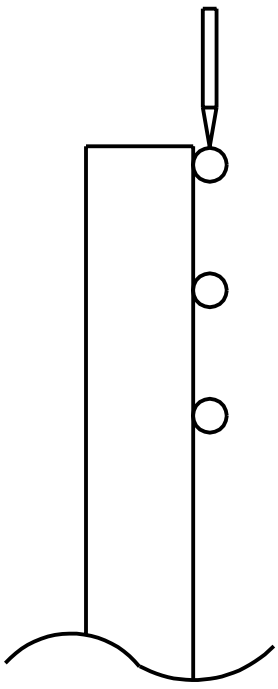


ALUMINUM



WOOD



CABLE

GUARDRAIL SURVEY POINTS

Figure 23-2D

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CHAPTER TWENTY-FOUR

AERIAL PHOTO CONTROL SURVEY

An aerial survey of a highway project produces a long, thin photographic mosaic that encompasses the survey limits of the project. Ground control points (i.e., panel points) and GPS technology are used to establish and maintain survey control during project development. A GPS survey is ideal as the traverse angles of a conventional survey do not close on a long highway project. This Chapter provides guidelines and procedures for implementing an aerial photo control survey.

24-1.0 GUIDELINES AND PROCEDURES

24-1.01 Research

The Engineer's Report includes information pertaining to the aerial-photo control survey (i.e., project location and flight information). The Report specifies the size of the panel points that are necessary for ground control during the aerial survey. It also specifies control location and the distance between successive controls. Upon receipt and review of the Engineer's Report, research should be performed to establish project-control monumentation.

Traditional research entails a review of the USGS quadrangle maps that encompass the project. A supplement to this base is the use of geodetic-control diagrams. Unfortunately, the availability of these diagrams is limited as they are no longer published by NGS. There are some, however, that are still maintained by NGS.

It is desirable to tie the aerial-photo control into the USC&GS triangulation network, especially if GPS is utilized. For example, if GPS is used, only one horizontal monument should be tied into the network. As practical, the vertical control should be based on NGS or USC&GS NAVD 1988 datum. The accuracy of another agency's datum (e.g., USGS, INDOT) is not as reliable because some of its recorded bench marks were based upon an estimated project elevation or were established by trigonometric observations. At least two vertical benchmarks should be used. A third is desired in order to resolve conflicts in elevation and to verify elevation transfers. If additional right of way is required, section corners should be tied into the survey as well. Chapter Twenty-two provides additional information pertaining to section corners, subdivision corners, and property corners.

24-1.02 Field Work

The located centerline control points, section corners, and property corners should be used as ground control points. Do not set road nails randomly, near the centerline or near property lines, as they may be confused with centerline and property-corner monumentation. If a panel point location is desired near the centerline, position it on or beyond the pavement edge. If the panel point must be located near the centerline, set the panel point without a road nail. Instead, use a non-standard marker such as a roofing nail.

A cross shape has been traditionally used as the configuration of the panel point. However, a chevron shape is preferred by the Department. A non-standard marker should be driven either at the center of the cross or at the tip of the chevron panel point. This point should be referenced if the road is chipped and sealed before control can be run.

If a conventional survey is being conducted, panel points may be established with a side shot. However, ensure that two sets of angles are taken as a verification check. Elevations may be carried with the traverse as long as the elevations close to third-order accuracy. The necessary measurements and computations should be made to substantiate the validity of results.

24-1.03 Accuracy and Precision

Unless GPS technology is used during the survey, a horizontal circuit should be run and closed with an unadjusted precision that is more accurate than 1:20 000.

Elevations should be run to third-order accuracy as discussed in Chapter Twenty-two. As practical, the elevations should be tied to an NGS or USC&GS NAVD 1988 datum benchmark to achieve a more-reliable source of elevations.

24-1.04 Supplemental Survey Data

An aerial-photo control survey is conducted in conjunction with, and not in place of, a project's ground survey (i.e., electronic or conventional), as an INDOT project requires survey control and information beyond that which can be provided by aerial photographs alone. For example, a project may depend on information that is either relative to topographic features that are not distinguishable from the air or not directly related to ground topography (e.g., owner names, company names, addresses). The following should be considered where an aerial-photo control survey is necessary.

1. Survey Equation. Where an equation to another survey is necessary, it is impractical to expect that the required degree of accuracy will be obtained from aerial photography. Ground-survey operations should be conducted to satisfy this objective.

2. Feature Proximity. It is beneficial to detail the topography of features that are in close proximity to the proposed right of way. For example, ground-survey details may reveal that a building can be saved by steepening the backslope or by constructing a retaining wall.

3. Utility Pole. As an aerial photograph is shot normal to the prevailing terrain surface, utility poles rarely appear in the photograph. Where they do appear, however, it is difficult to identify the type of pole. This information must be obtained in the field.

4. Underground Utility. The location of a subsurface feature such as an underground utility, cannot be determined aerially using conventional photographic-film media. A ground survey must be employed to verify the location of such an item. Section 22-2.0 discusses the appropriate procedures for coordinating with utility companies during the survey.

5. Body of Water. It is difficult to determine the elevation of an underwater feature such as a stream bed or lake bottom by employing the methods of conventional aerial photography. If water is involved, determine underwater elevations during the ground survey.

6. Substantially-Valued Tree. A tree of substantial value (e.g., fruit tree, hardwood tree, shade tree) that is close to the right-of-way line may become the subject of negotiation between the owner and the Department. The location of such an item is critical and should be determined by the ground-survey party.

7. Obscured Visibility. There may be a need to determine the topography of an area that is obscured from an aerial view (i.e., under tree canopy, building overhang). Such topography should be collected using ground-survey techniques.

Other information that is required during the project survey but cannot be adequately obtained from an aerial observation includes the following:

1. physical evidence of researched section, property lines, and corners;

2. drawings of section plats and key maps;

3. descriptions of bearing sources;

4. city or corporation limits;

5. field-tile locations;

6. storm- or sanitary-drainage-structure locations;

7. locations of utility lines;

8. utility company names and addresses;

9. present-structure profile drawings;

10. profile of project baseline;

11. edges of pavement;

12. temporary benchmarks that are set and described;

13. completed level circuit;

14. elevations of drainage structures including headwalls, tops of openings, flowlines, tops of manhole rims, etc.;

15. elevations of overhead lines that are in close proximity to the project limits;

16. profile of railroad tracks;

17. high-water elevations; and

18. other features that do not appear in an aerial observation and are critically located to the project.

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CHAPTER TWENTY-FIVE

GPS Survey Control Network

25-1.0 GENERAL

The primary purpose for employing the global positioning system (GPS) is to establish more-accurate survey control in road design by improving angular control on a long, narrow traverse. Employing GPS technology saves time during the survey because the conventional traverse and the level circuits need to be run in only one direction.

The traditional use of the United States Coast and Geodetic Survey (USC&GS) for horizontal control results in a repeatability error that is outside an acceptable tolerance. A GPS control survey can minimize such error because it will facilitate a reference to state-plane coordinates (SPC) which will allow future control to be re-established within a tolerance of only about 0.1 ft. Establishing control by referencing SPC will become increasingly important once the Federal Base Network/Cooperative Base Network (FBN/CBN), formerly known as the High Accuracy Reference Network (HARN), has been completed and adjusted. If a section corner or centerline-control monument is based on adjusted FBN/CBN SPC, it can be readily and accurately re-established by use of a local monument that is also based on FBN/CBN SPC.

This Chapter provides guidelines and procedures for employing GPS technology and establishing a GPS survey-control network.

25-2.0 GUIDELINES AND PROCEDURES

25-2.01 Horizontal Control

Where practical, an INDOT project survey should be based on North American Horizontal Datum 1983 (NAD 83) with adjusted FBN/CBN SPC. The SPC should only be used for reference purposes or to re-establish control. The topography data should not be collected under SPC.

The SPC should be transformed to a local coordinate system upon completing the control network. Such a capability is available in most GPS software packages. To achieve optimal results, create a local Transverse Mercator projection for a north-south strip and a local Lambert Conformal Conic projection for an east-west strip, or an Oblique Mercator projection for an angled strip. Establish the local coordinate system on a value that is not an SPC (e.g., 10 000, 10 000). For a distance within the conventional measurement range (e.g., < 5500 ft), the difference

between local grid and actual ground measurements should be negligible, thus minimizing the need for SPC grid-to-ground conversions.

Both the FBN/CBN SPC network coordinates based on NAD 83 horizontal datum, and the local grid coordinates, should be submitted for each centerline control point or section corner. The SPC data should not be used for general topography. Until the adjusted FBN/CBN coordinates are published, constrain the final GPS adjustments to only one NAD 83 horizontal control.

25-2.02 Vertical Control

The Department prefers that the North American Vertical Datum 1988 (NAVD 88) be used for the vertical control of a project that is based on National Geodetic Survey (NGS) benchmarks. Many of the existing GPS software packages require that NAVD 88 datum be used for elevation calculations. The National Geodetic Survey includes all of the previous records of the USC&GS database which should not be confused with the U.S. Geological Survey (USGS). The accuracy of other datum (e.g., USGS, INDOT) is not as dependable because some of the recorded benchmarks were based on estimates or trigonometric observations.

All NGS data for the State is available on computer CD. Copies may be purchased from the National Geodetic Survey. Optionally, the NGS data may be obtained through the internet under Products and Services at http://www.ngs.noaa.gov. The data may be extracted by a PID, a station name, or an area that is defined by latitude and longitude.

To maintain vertical control, at least three reliable benchmarks should be established. These benchmarks should be spaced evenly within the network. Only one benchmark should be fixed at a time, as the orthometric height is constrained during final GPS adjustment. Compare the difference between the calculated and the published elevations before constraining to other orthometric benchmark elevations.

25-2.03 Research

A source for obtaining horizontal and vertical controls is the NGS geodetic control diagrams. These diagrams illustrate the position of each horizontal monument, including the lines of observation, and the level circuit between each vertical benchmark. Unfortunately, geodetic control diagrams are no longer published by NGS, and their availability is limited. Computer mapping software is available that will process NGS control data and produce graphical displays. The standard USGS quadrangle maps should identify a majority of the horizontal and vertical controls that may be required for a project.

During the research effort, the name of a particular monument should be identified so that its location description and its published data may be obtained. The monument's latitude and longitude should be recorded for use in plotting GPS obstructions during schedule planning. Only one NGS horizontal control is required to tie a project to the SPC system. However, one large geometrically-solid triangle may be necessary if the control's location is far from the project (e.g., up to a 12-mi radius for static observations).

The GPS network should incorporate as many existing monuments as practical. Existing centerline control and section-corner monuments should be researched and located during the survey. Road plans and field books may be obtained from the Planning Division's Research and Documents Library Team. Information pertaining to section corners may be obtained from the county surveyor's office. Other useful information may be acquired by researching deeds for surrounding property or by interviewing local surveyors. Property owners must be given advanced notice (i.e., Notice of Survey) before a survey party can access monuments or section corners on private property. Chapter Twenty-two provides additional information regarding preliminary research and survey notice.

25-2.04 Reconnaissance

Preliminary research will identify most of the control points within the survey limits, with a general description of the monument. However, a field reconnaissance should be employed to physically locate the monument and to find or set additional project controls. Such an operation may require that the centerline location be calculated from existing points so that additional centerline control can be staked out to know where to look for a known monument.

If a monument is a potential candidate for inclusion in the GPS network, satellite vehicle (SV) obstructions (e.g., trees, buildings, power lines) should be plotted, as illustrated in Figure 25-2A, GPS Station SV Obstruction Chart, and logged in the computer. A schedule of observation times can then be computed. Reference drawings should be made on the back of the obstruction chart. See Figure 25-2B, Reference Drawing. These drawings should be made for each GPS monument that is either found or set.

Because there may be an unforeseen delay in returning to the project site, each monument should be marked and referenced. Each section corner, either found or apparent, must be referenced and recorded. Figure 26-1C illustrates the Department's format for a section-corner reference card. Once the FBN/CBN system is completed, adjusted, published, and used in the network, the SPC should be placed on all reference drawings.

25-2.05 Network Design

As practical, at least one NGS horizontal control monument and three NGS vertical control monuments should be incorporated in the control network. Additional random monuments may need to be set to create a geometrically strong network.

Two pairs of intervisible points, one pair located at each end of the project, are required so that beginning and ending bearings may be used to close the conventional traverse angles. For a project longer than 3 mi, an additional pair, located near the center of the project, should be considered so that two shorter traverses can be constructed. This should minimize errors that are associated with closing a long traverse.

The control networks should be collected using either static or fast static observations. Either kinematic or real-time kinematic (i.e., RTK) observations may be used for other singular control points. Where a random point must be set for the purpose of general control or strength-of-figure, do not set the monument near the centerline or a property line as the random point can then be mistaken for such monumentation. All control points should be kept within the project right-of-way or on public property. The spacing of the final centerline control monuments and the benchmarks should not exceed 1000 ft.

25-2.06 Scheduling

Prior to developing a schedule, determine the date upon which the field observations will be conducted. If GPS observations have not been conducted recently, a new ephemeris should be collected because satellite orbits are altered frequently. An old ephemeris is not reliable. After plotting the obstructions and computing the observation times for all points in the GPS control network, a schedule should be made to accommodate those points having limited visibility. To avoid rescheduling, the ephemeris should be less than one week old. A new ephemeris should be collected the day before conducting the scheduled observations, and the schedules should be checked for alterations.

The best geometric control network is one that is composed of triangles similar to a steel bridge structure. A single observation session produces a number of measured baselines that is equal to the number of receivers used minus one. Therefore, the optimal number of receivers to use in network design is four. However, with more forethought and difficulty, the task may be conducted with two or three receivers.

The first observation setup should be on the fixed horizontal control point. If four receivers are being used, three receivers should be set up in a triangular configuration that will measure the three desired baselines. The fourth receiver (i.e., the dummy) should be set at a point on the next desired triangle. For each subsequent observation session, the farthest receiver is moved to the next point in the network. During each session, it is ideal to obtain a measured baseline for each

leg of the triangle. This will produce redundancy for more-accurate least-squares-adjustment results.

For fast static observations that are collecting L1 and L2 frequencies with P-code, the required time for a 15-s epoch is as follows:

1. 20 min or longer for four an observable satellite vehicle;
2. 15 to 20 min for five satellite vehicles; and
3. 8 to 10 min for six or more satellite vehicles.

A schedule may incorporate 15-min observation periods with an average of 25-min relocation times similar to the example provided in Figure 25-2C, Fast Kinematic GPS Observation Sheet. Each session's receiver must collect data simultaneously from the same satellites during the same minimum time period. Radio communication between each receiver's operator is desired so that, if a problem occurs, an allowance can be made to immediately avoid an erroneous observation session.

25-2.07 Equipment Preparation

Charge all batteries before conducting the field observations. Check and adjust tribrachs for both level and optical plummet. Tighten the tripods to eliminate wobble. If a prism pole is used in a kinematic observation, adjust the spirit bubble so that an accurate location can be obtained. Set the correct parameters for the type of observations being made on all receivers (e.g., type of observation, type of antenna, type of antenna height measurement, the epoch time length, the local time zone). The file name is the concatenation of a unique four-character name of the observed monument, the Julian date, and the session number (e.g., BASE1941). Ensure that a sufficient number of observation forms have been prepared for all of the planned sessions.

25-2.08 Field Observations

A failure to adhere to the planned observation schedule will produce an erroneous session. If radio contact cannot be maintained between receiver operators, adhering to the planned schedule becomes important. If a receiver battery needs to be changed, it should be changed during a scheduled move because the data-collection period must be both synchronized and continuous. Some receivers have the capability of maintaining power during a battery change. Points that do not have to be a part of the control network may be collected by employing GPS kinematic observations. The observation forms provided in Figure 25-2D, GPS Field-Data Sheet, and Figure 25-2E, Special Situation and Station Description Sheet, should incorporate the following information.

1. project name;

2. project location;

3. USGS quadrangle-map identification;

4. observation date;

5. type of receiver and antenna including serial numbers;

6. observer's name;

7. station name and identification;

8. each session's start and stop observation times;

9. antenna heights and how they were measured (e.g., true vertical, slope to ground plane); and

10. conflicting occurrences including the time span (e.g., a battery change, a large truck that stopped and obscured the target for more than 1 min).

Review the observation forms for potential problems that can be corrected during a subsequent session in the field.

25-2.09 Downloading Receivers

Review the data-collection observation forms for changes that may be required in the file information. Download the data from each receiver and check file names, point names, antenna heights, and fixed-control information.

25-2.10 Data Processing

One control point should be fixed both horizontally and vertically (i.e., ellipsoidal height) for baseline processing. To process baseline data, specify the generation of all baselines and select the set of independently-measured baselines. Review the ratios, reference values, and solution types of the detailed summary to determine measurement quality. The results should then be saved. Visually check the network map for gross errors. Determine the closure on both the network perimeter and additional circuits and check the vertical benchmarks. Save and print the results. Baseline closures should be more accurate than 1 in 100 000. If an observation session is erroneous, then recompute the observation times under a different time frame and repeat the observation session. Once quality data has been collected for each baseline, begin the least

square's adjustment and constrain to only one fixed horizontal control monument. The results should be compared with other known quantities so that particularly erroneous points can be isolated. Upon completing the fully-constrained adjustment and the time frame, repeat the observation session. Quality data should be changed to State Plane Coordinates (i.e., either east or west). Save and print the results for reference purposes. A local plane coordinate system then should be created. This can be either a Transverse Mercator projection for a north-south route, a Lambert Conformal Conic projection for an east-west route, or an Oblique Mercator projection for an angled route. The planes will be so close to the ground that the resulting difference between grid and ground distances will be negligible. The result should then be saved and printed as it will become the control for all ground work. Verify the results during the bench-level circuits and the conventional traverse which will need to be run in order to set the centerline control and the fly stations for topography.

25-2.11 Conventional Traverse

After the network is finalized, the conventional traverse for local control and centerline stakeout can begin at the two intervisible GPS control points, then continued to the next two intervisible GPS control points. Centerline control points should not be spaced at more than 1000 ft. Run a bench-level circuit between either benchmarks or GPS control points. Temporary benchmarks should be set, where practical, within the right of way and should not be more than 1000 ft apart.

25-2.12 Submittals

So that other projects with common control monumentation may benefit from previously collected data, the information to be submitted is as follows:

1. raw .data files that have been downloaded from receivers;
2. copies of the GPS station satellite vehicle obstruction charts;
3. GPS field-data sheets;
4. a network diagram illustrating the measured baselines; and
5. adjusted SPC and Local Projection coordinates with projection definition.

The network diagram should be provided on a copy of the USGS quadrangle map. By maintaining a database of raw project data, multiple networks may be tied and processed together.

A standard program function for transferring data is to make a backup copy of all project files. For Trimble receiver software, this function is located under the menu selection; GPSurvey, Desktop, Project, Backup. If the GPS data has been collected using another brand of receiver

software, the data transfer may require the use of the RINEX file format. The Department requires that all data be backed up in both formats (i.e., standard and RINEX) before it is deleted.

A hardcopy of the results should also be submitted. This should include the following.

1. Processed Baseline Summary. A detailed summary of the processed baseline that provides the ratios, reference values, solution types, and the quality of the measurements shall be included.

2. Closure Log. Include a closure log that provides the combinations of network loops and the validity checks of the measurements. This should include the outer perimeter and the inner loops and benchmark loops. All combinations of loops should be investigated to locate the weakest link in the network. The precision and the delta misclosures for the Northing, Easting, and the elevation should be identified for each loop.

3. Summary of Covariances. Include a summary of covariances that provides the precision on each baseline resulting from the redundancy of measurements.

4. Map-Projection Transformation Sheet, SPC. A map-projection transformation sheet that illustrates the transformation parameters from the geodetic coordinates (i.e., latitude, longitude) to map coordinates (i.e., State Plane Coordinates east or west) for each point should be included. This should include the coordinates, the scale, and the convergence angle.

5. Map-Projection Transformation Sheet, Local Coordinates. Include a map-projection transformation sheet that provides the transformation parameters from the geodetic coordinates to map coordinates for each point in the local coordinate grid. This should include the type of projection in addition to the coordinates, the scale, and the convergence angle.

6. Final Coordinate Adjustment Summary. The final coordinate adjustment summary for each point should also be included. This should indicate the points that are fixed horizontally or vertically. The summary also should indicate whether the elliptical or the orthometric height was held fixed. The orthometric height is preferably held fixed.

7. Long Inverse Printout. Include printouts of long inverses (i.e., full-information inverses) between control points and indicate the inverse information for the local grid and the geodetic ground distances. This should be conducted for a short, a long, and an average distance. In comparing this information, the locally-defined grid distance should be within 0.03 ft of the ground distance.

This information should be compiled and printed from the software through a standard report selection. If the software does not have this capability, contact the Production Management Division's Surveys Team for alternatives.

STATION NAME: *K 71 RESET 1956* PID: *KA0837* QUAD MAP NAME: *MANSFIELD*

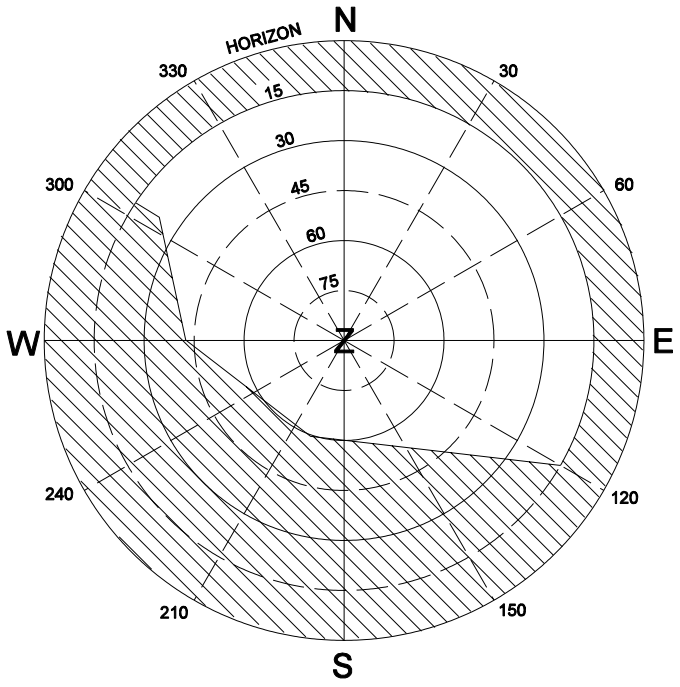
DATE: *7-2-96* LATTITUDE: *87°06' 19" W*

OBSERVER: *JOHN SMITH* LONGITUDE: *39° 43' 21" N*

NAVD 88 ORTHOMETRIC HEIGHT: *737.66 ft 3rd ORDER*

HORIZ. AZ. GEOID HEIGHT: *-108.83 ft*

VERT. ∠ ELLIPSOIDAL HEIGHT: *628.83 ft*



OBST#	DESCRIPTION	FROM AZ.	FROM ELEV.	TO AZ.	TO ELEV.
1	TREES	120°	15°	135°	45°
	"	135°	45°	200°	60°
	"	200°	60°	270°	40°
	"	270°	40°	305°	20°
	"	305°	20°	305°	15°
2	STANDARD 15° MASK	305°	15°	120°	15°

GPS STATION SV'S OBSTRUCTION CHART

Figure 25-2A

MONUMENT TYPE: *STANDARD BENCH MARK DISK IN CONCRETE MONUMENT*

STAMPING ON DISK: *USC&GS BENCH MARK "K 71 RESET" 1956*

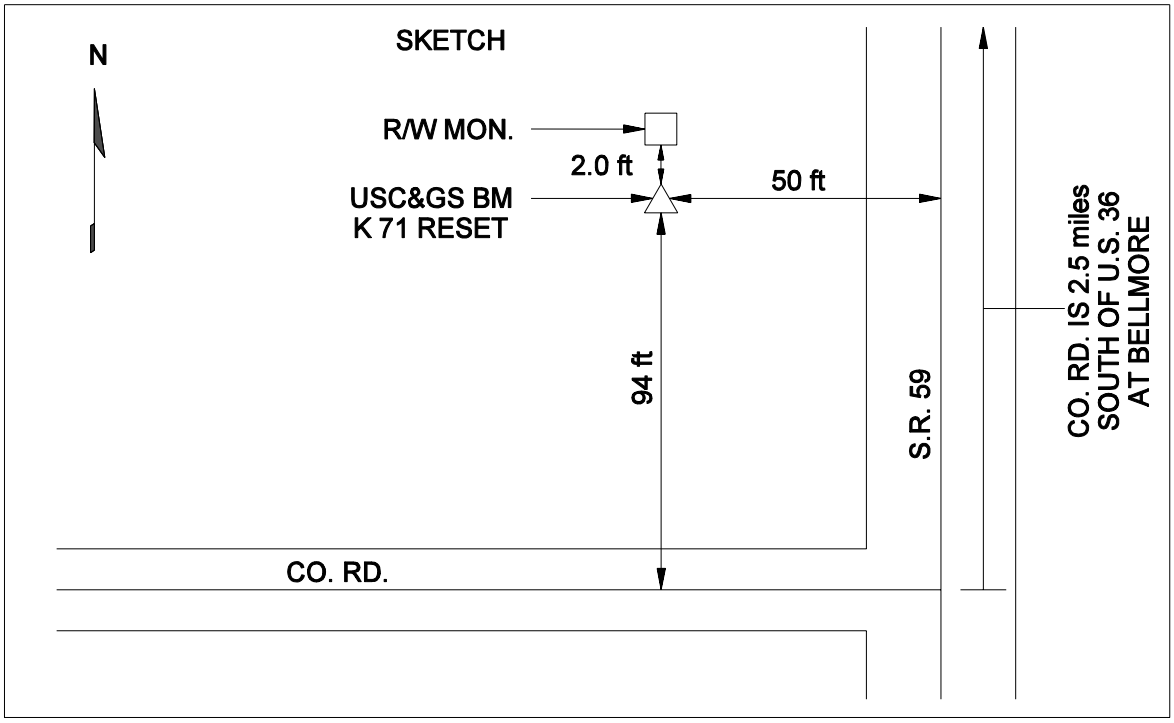
PHYSICAL CONDITION: *EXCELLENT CONDITION - PROTRUDING 0.5 ft*

COMMENTS ON SUITABILITY FOR GPS OBSERVATIONS: *SOME EXTENSIVE OBSTRUCTIONS BUT HAS POTENTIAL*

"GPS PLAN" CALCULATED OBSERVATIONS TIMES FOR: 7-12-96 15" EPOCHS WITH 5 SV's MIN.

7:54 TO 8:52 A.M. IND. TIME
9:12 TO 9:30 A.M.

TO REACH: 2.5 mi SOUTH FROM BELLMORE ALONG SR 59 FROM THE JUNCTION OF US 36, IN THE NORTHWEST QUATER OF THE JUNCTION WITH A BLACKTOP ROAD LEADING WEST, 50 ft WEST OF THE CENTERLINE OF THE HIGHWAY, 92 ft NORTH OF THE CENTERLINE OF THE ROAD LEADING WEST, 2 ft SOUTH OF A CONCRETE INDIANA R/W MARKER, AND ABOUT 5 ft HIGHER THAN THE HIGHWAY.



REFERENCE DRAWING

Figure 25-2B

FAST KINEMATIC GPS OBSERVATION
TIMES FOR DES #8574910 RACCOON LAKE
July 11, 1996

RECEIVER LOCATION	BEGIN TIME	QUIT TIME		MOVE TIME
	SESSION 1			
BASE @ BM J-71	8:35	8:50		
ROVER 1 @ BM L-71				
ROVER 2 @ 0550	9:00	9:15	ALTERNATIVE	
ROVER 3 @ 0551				
ROVER 2 MOVES TO 0550 & ROVER 3 MOVES TO 0551				25'
	SESSION 2			
BASE @ BM J-71	9:15	9:30		
ROVER 1 @ BM L-71				
ROVER 2 @ 0551	9:40	9:55	ALTERNATIVE	
ROVER 3 @ 0550				
ROVER 3 MOVES TO BM K-71				25'
	SESSION 3			
BASE @ BM J-71	9:55	10:10		
ROVER 1 @ BM L-71				
ROVER 2 @ 0551	10:20	10:35	ALTERNATIVE	
ROVER 3 @ BM K-71				
ROVER 1 MOVES TO 0618				25'
	SESSION 4			
BASE @ BM J-71	10:35	10:50		
ROVER 1 @ 0618				
ROVER 2 @ 0551	11:00	11:15	ALTERNATIVE	
ROVER 3 @ BM K-71				
ROVER 2 MOVES TO 0617				25'
	SESSION 5			
BASE @ BM J-71	11:15	11:30		
ROVER 1 @ 0618				
ROVER 2 @ 0617	11:40	11:55	ALTERNATIVE	
ROVER 3 @ BM K-71				

FAST KINEMATIC GPS OBSERVATION SHEET
Figure 25-2C

PROJECT NAME: DESIGN # 8574910		LOCATION:	RACCOON LAKE
OBSERVER: JOHN SMITH		QUAD MAP(s):	MANSFIELD
RECEIVER TYPE: TRIMBLE 4000 SSI	(ROVER3)	SERIAL NUMBER:	11640
ANTENNA TYPE: TRIMBLE COMPACT L1/L2 W/GROUND PLANE		SERIAL NUMBER:	24895

****

SESSION FILE NUMBER:	16401931 SESSION 1	16401932 SESSION 2	16401933 SESSION 3	 SESSION 4
STATION NAME:	0551	0550	BMK71	
TYPE OF MONUMENT	"+" ON HDWL	US CORP/ENG BM MM13	USCGS BM K 71	
JULIAN DAY:	193	193	193	
MM DD YY:	7-12-96	7-12-96	7-12-96	
GREENWICH TIME - START:	13:48:15	START: 14:21:30	START: 15:12:15	START:
(TO BE COMPLETED AT LOG - IN) STOP:	14:15:30	STOP: 14:55:45	STOP: 16:57:15	STOP:

****

ANTENNA HEIGHT MEASUREMENTS

TYPE OF MEAS.: UNCORRECTED TO EDGE OF GROUND PLANE

BEGIN	1ST 5.41 ft	1ST 5.89 ft	1ST 4.85 ft	1ST ft
	2ND 5.43 ft	2ND 5.89 ft	2ND 4.85 ft	2ND ft
	3RD 5.42 ft	3RD 5.89 ft	3RD 4.86 ft	3RD ft
	MEAN 5.42 ft	MEAN 5.89 ft	MEAN 4.85 ft	MEAN ft
END	1ST 5.41 ft	1ST 5.89 ft	1ST 4.85 ft	1ST ft
	2ND 5.43 ft	2ND 5.89 ft	2ND 4.85 ft	2ND ft
	3RD 5.42 ft	3RD 5.89 ft	3RD 4.86 ft	3RD ft
	MEAN 5.42 ft	MEAN 5.89 ft	MEAN 4.85 ft	MEAN ft

****

INDIANA LOCAL TIME	START: 8:48	START: 9:21	START: 10:12	START:
	STOP: 9:15	STOP: 9:55	STOP: 11:57	STOP
SYNC RATE: SET TO 15" EPOCHS	MIN. SV's: 4	ELEV. MASK: 15 deg	MAX. PDOP: 7	

WEATHER: SUNNY, MILD, SLIGHT WIND

SPECIAL INSTRUCTIONS:

POINT # 0551 IS A CUT "+" ON TOP CENTER OF HEADWALL ON NORTH SIDE OF DAM ROAD AT OFFICE.

POINT #0550 IS A U.S. CORPS OF ENGINEERS BENCH MARK "MM 13" WITH A GIVEN ELEVATION OF 712.44 ft (217.152 m) (DATUM UNKNOWN).

POINT BMK71 IS USC&GS BENCH MARK "K 71 RESET 1956".

USE BACK OF SHEET TO DESCRIBE ANY ABNORMALITIES NOTED DURING THE SESSIONS

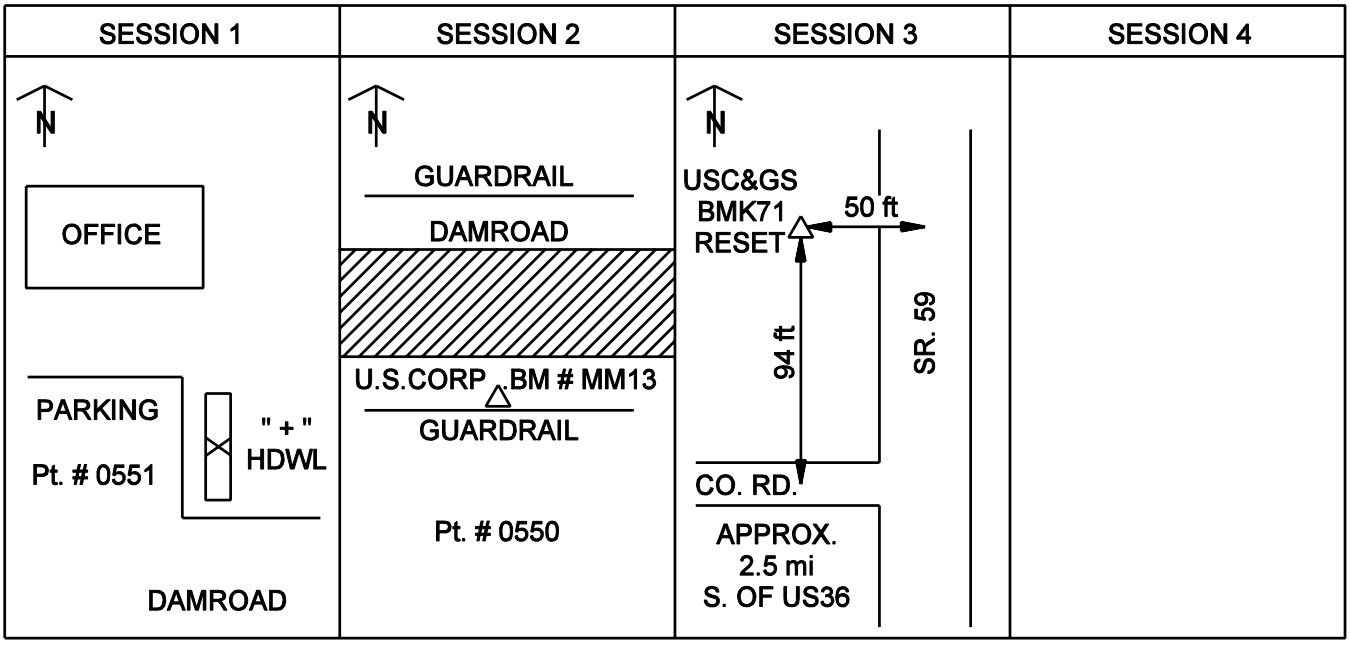
GPS FIELD DATA SHEET - STATIC OBSERVATION

Figure 25-2D

SPECIAL SITUATIONS (INCLUDE THE TIME OF THE OCCURRENCE)

CHANGED DEAD BATTERIES BETWEEN SESSIONS 3 & 4 AT 15:42 (10:42 LOCAL)

STATION DESCRIPTION



SPECIAL SITUATIONS AND STATION DESCRIPTION SHEET

Figure 25-2E

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Figure **Title**

CHAPTER 26 [Rewritten Apr. 2011]

SURVEY TRANSMITTAL

Transmitting accurate and consistently-formatted survey data to the designer will facilitate an efficient and cost-effective project design. Regardless of the survey method, each electronic survey-data submission shall be in a format that is compatible with the Department's current versions of survey and design software in use. Each submission shall be compatible with InRoads design and survey software. However, with prior written approval from INDOT, a consultant may be permitted to submit electronic files that are in accordance with previously-accepted formats on a project by project basis (See Section 26-1.02). If the survey submittal is for a design consultant's CADD system, the files may be transmitted in a format compatible with the consultant's design application. However, a submittal of the survey data shall also be provided to INDOT that is compatible with the Department's current software. A complete survey transmittal should incorporate all relevant survey information, whether electronic or not.

This Chapter provides the content, style, and format requirements for a survey transmittal that is acceptable to the Department. The guidelines and procedures described herein also include the types of files and the documentation formats that should be utilized in project design.

26-1.0 GUIDELINES AND PROCEDURES

Providers of land-surveying services are required to embrace current technology to improve the quality, consistency, and accuracy of survey data collected in the field and to satisfy INDOT standards. To effectively and efficiently exchange electronic information, INDOT requires standardized file formats that provide compatibility between data collectors, data processors, and data users; and which allow for future reuse of the data by the Department or its consultants.

26-1.01 InRoads Format

Considering that INDOT has adopted Microstation and InRoads as its standard drafting and design software applications, respectively, the CAD Support Team has developed standard resource files such as design templates (seed files) and survey-data processing (.xin) files. The most current INDOT *seed.dgn* and *survey.xin* files made available through the CAD Support Team shall be used.

The Department has established a standard naming convention for all InRoads survey files to make the data more portable so that all users can easily recognize and use the files created by

others. The conventions also provide information on file contents at a glance. Each InRoads survey file submitted to INDOT shall use the format and provide the content as described below.

DES#_SRxx Name.extension

Key:
DES#: designation number for project as provided by INDOT
SRxx: route number of project, for example: SR37, SR162, I64, US150
Name: descriptive name of information in file, for example: Topo, LCRS Plat
Extension: file extension name, for example, .xin, .dgn, .fwd

The files to be submitted to INDOT for each survey are as follows:

1. Des #_SRxx Control Points.fwd
2. Des #_SRxx LCRS Plat.pdf
3. Des #_SRxx LCRS Plat.dgn
4. Des #_SRxx Survey Alignment.alg
5. Des #_SRxx Survey Book.docx
6. Des #_SRxx Survey Surface.dtm
7. Des #_SRxx Survey Surface Boundary.dtm
8. Des #_SRxx Survey.xin
9. Des #_SRxx Topo.dgn
10. Des #_SRxx Topo.fwd

26-1.01(01) Minimum File Requirements

Each file shall include, at a minimum, the data described below.

1. Des #_SRxx Control Points.fwd. This file includes all centerlines, a partial list of fly stations (random control points), bench marks, and United States Public Land Survey (USPLS) subdivision corners, including corners of properties not within USPLS areas, necessary to describe acquisition parcels.

    a. Centerline. All centerline points of each survey line within the survey shall be included in this file.

        (1) The code for centerline points shall be “PSSA”.

        (2) Notes for each “PSSA” shall include location (e.g., POT, PC, POST, etc.) stationing, line letter, PI information (delta angle, degree of curve or radius length, tangent length, arc length, and external length), description

of monument, and location of top of monument relative to ground surface or pavement surface.

b. Fly station. All fly stations traversed through, during establishment or reestablishment of survey lines, shall be included in this file. All fly locations set during topographic collection shall not be in this file, but shall be included in the "Des #_SRxx Topo.fwd" file.

(1) The code for fly station shall be "FLY".

(2) Notes for "FLY" shall include the description of the monument and location of top of monument relative to ground surface or pavement surface for each point.

c. Bench Marks. These used for survey data collection shall be included in this file.

(1) Monuments shall be coded in accordance with the .xin file provided by INDOT.

(2) Bench-mark notes shall include the name and description of each monument, a description of the structure that the monument is placed in or on, the station and offset from the survey line, and the survey-line letters.

Examples: BM#1, Boat Spike in root of 21-in. oak tree, 125 ft left of Station 123+45, Line "A". INDOT BM 19 V 1030, disc in north end of concrete headwall, 55 ft right of Station 35+25, Line "S-1-A".

d. USPLS Corners. These, or corners of properties not within USPLS areas, necessary to describe acquisition parcels, shall be included in this file.

(1) Monuments shall be coded in accordance with the .xin file provided by INDOT.

(2) Notes for monuments shall include the location of the corner.

Example for area within USPLS: "N ¼ Corner of Section 34, T2N, R2W". Example for area not within USPLS: "NE Corner of Division "C" of the Vincennes Commons Lands".

(3) Notes shall include a description and location of each monument relative to the ground surface or pavement surface.

2. Des #_SRxx LCRS Plat.pdf. This file is a copy of the Location Control Route Survey Plat (LCRS) as recorded in the County Recorder' office, for the survey project. This copy shall have the seal and signature of the Licensed Land Surveyor in responsible charge, and all recording information placed on the LCRS by the County Recorder.

3. Des #_SRxx LCRS Plat.dgn. This Microstation file shall include multiple models of the following.

   a. The LCRS used to generate that for recording with the County Recorder. This shall be provided for design reference and use.

   b. Survey control points and references, which include the following:

      (1) description of point along alignment (e.g., POT, PC, POST, etc.);

      (2) stationing of survey-line point (e.g., 123+45.67, etc.);

      (3) line letter (e.g., "A", "S-1-A", etc.);

      (4) description of monument (e.g., 5/8 in. rebar with cap stamped INDOT 0005, Mag Nail with washer stamped INDOT 0005, etc.);

      (5) location of top of monument relative to ground surface (e.g., Flush with surface, 0.1 ft below ground surface, protruding 0.4 ft above ground surface, etc.);

      (6) description of reference monument (e.g., Nail in Bottle Cap in 15-in. Maple, Nail in Bottle Cap in Corner Fence Post, X Cut in Concrete Headwall, etc.); and

      (7) azimuth to nearest degree, and distance to nearest 0.01 ft, from control monument to reference monument.

   c. USPLS corners, or corners within areas not part of the USPLS, and references, including, at a minimum, the following:

      (1) descriptions of USPLS corners (e.g., W ¼ Corner of Section 24, T3N, R5W);

      (2) descriptions of monuments not within USPLS areas (e.g., NE Corner of Division "C" of the Vincennes Commons Lands);

(3) description of monument (e.g., 9” x 6” stone with “S 24 W ¼” cut on side of stone);

(4) location of top of monument relative to ground surface (e.g., Flush with surface, 1.5 ft below ground surface, protruding 0.7 ft above ground surface, etc.);

(5) description of reference monument (e.g., Nail in Bottle Cap in 15-in. Maple, Nail in Bottle Cap in Corner Fence Post, X Cut in Concrete Headwall, etc); and

(6) Azimuth, to the nearest degree, and distance, to the nearest 0.01 ft, from control monument to reference monument.

4. Des #_SRxx Survey Alignment.alg. This file includes all alignments of the survey project.

a. In writing Survey (“Des #_SRxx Control Points.fwd”) to Geometry, in the “Project Name” box, enter “Survey Alignment“.

b. In creating alignment, in “Name” box, enter “A” for Line “A”, etc.

c. If there is an “S” line, under “Survey Alignment”, name alignment “S-1-A”, “S-SRxx-A”, etc.

d. For the description of each alignment, use the applicable route name (e.g., SR 1, CR 250 W, etc.).

e. The alignment shall have the correct stationing applied.

f. Save as “Des #_SRxx Survey Alignment.alg”

5. Des #_SRxx Survey Book.docx. This file includes all supplemental survey information not found in other files. The .docx format is preferred. However, .doc or .pdf is also acceptable. It shall include the following:

a. front page notations, i.e., Des No., Route No., Terminal Points of Project, County, brief description of each line;

b. title page and completed Table of Contents;

c. dates of survey start and survey completion;

d, names of survey crew members;

e. Des number and page numbers at top of each page;

f. Surveyors Report, in accordance with IAC-865, as a minimum requirement;

g. start and end of each line shown with equations and cross references to other surveys;

h. control points labeled, with location (e.g., POT, PC, POST, etc.), stationing, line letters, location relative to surface (e.g. flush, 0.1' below ground level, etc.), and coordinates shown;

i. alignment data shown and checked;

j. references shown and checked, if LCRS not prepared. If an LCRS was prepared, this information will be on the recorded LCRS;

k. source of bearings described;

l. utility ownerships within limits of survey, with mailing addresses, with a notation of utilities not within limits;

m. Underground Utility Reference Number placed on Utilities page;

n. high-water elevation and date, with source and date of information;

o. source of level datum;

p. bench-mark descriptions completed;

q. level notes for all bench marks used for survey;

r. legal flow-line elevations of county ditches; and

s. level equations with other surveys shown, and explained.

6. Des #_SRxx Survey Surface.dtm.

a. In writing Survey to Surface, in "Surface Name" box, enter "Survey Surface" and save as "Des #_SRxx Survey Surface.dtm".

b. For more than one surface within a survey project, use “Survey Surface A”, etc. (see “Des #_SRxx Topo.fwd” below).

c. All string crossings shall be resolved.

d. Upon completion of the survey, with all corrections of field data completed, a “Survey Surface” shall be created. After determining this surface to be correct, create a boundary string named “Boundary” by connecting all points and strings along the exterior of the survey that are to be included in the triangulation. “Survey Surface” will contain the survey surface and the exterior “Boundary” feature. This surface shall be saved as “Des#_SRxx Survey Surface.dtm”.

7. Des #_SRxx Survey Surface Boundary.dtm.

a. After creating the boundary string around the survey perimeter, as described in item 6d above, such boundary shall be saved in a separate surface file as “Des #_SRxx Survey Surface Boundary.dtm", which shall include only that feature.

b. For more than one boundary around a survey project, use “Survey Surface Boundary A” for the boundary of “Survey Surface A”, etc. (see “Des #_SRxx Topo.fwd” file, item 9, below).

8. Des #_SRxx Survey.xin. This is the InRoads “xin” file used for the survey project. InRoads standards for survey data processing have been set up in this file. This file includes the INDOT standards for Feature Codes, Feature Styles, and Feature Filters, Dialog Box Settings, Linestyles, Lineweights, colors, and other settings. This file is critical for use in the InRoads Survey Process, and for accurate DTM and geometry object creation. Additional Names Symbology or Styles should not be added in order for the .xin file to be consistent with the current MicroStation settings. Utilities will therefore function properly.

a. It shall be a copy of INDOT.xin, as provided by the CAD Support Team, at the time of project inception.

b. All modifications to .xin shall not affect the ability of submitted files (.dtm, .alg, .fwd) to interact with later versions of .xin in an error-free manner. Feature names, symbology, etc. shall not be changed.

9. Des #_SRxx Topo.dgn. Secondary display items, such as Contours, Triangles, and Survey Graphics, may be written to additional .dgn files and provided as references.

a. MicroStation files shall be used with InRoads for the survey project.

b. It shall be in accordance with the appropriate unitary system for the survey, i.e., US Survey Feet, seed files as provided by CAD Support.

c. The features to be displayed on separate levels, as defined by INDOT.xin, shall be as follows:

(1) DTM features;

(2) existing contours;

(3) existing triangulation;

(4) survey alignment with annotation;

(5) survey field-book data written to graphics, including symbols, names. elevations, notes, and codes.

10. Des #_SRxx Topo.fwd. This file includes all topographic data for the survey project.

a. All topographic data shall be included in one field book (i.e., Des #_SRxx Topo.fwd"). An exception is if there are isolated survey locations in a lengthy project, for example structure replacements in a resurface project, as discussed below.

b. Under "Survey Data" in InRoads, create a new book named "Des #_SRxx Topo".

c. Import the data collector (controller) or text file into InRoads to create a field book. Save the created field book as "Des #_SRxx Topo.fwd".

d. Data imported from a collector (controller) or a text file shall not have a file name containing more than 15 characters. A file name longer than this will be truncated within InRoads to 15 characters after the field book is saved and then loaded again at the next session. This is not the name of the field book as required in item 10c above, but it is the name of the data file used to create the field book.

e. If more than one survey site is included in the survey project, for sites that are not near each other, create a different .fwd file for each site. For example, for two or more small structure replacements in a resurface project, use "Des #_SRxx Topo A" for the first site (south to north, or west to east) and "Des #_SRxx Topo B" for the second site, and continue using the same procedure.

26-1.01(02) Aerial-Survey File Requirements

1. All files created by an aerial survey shall follow the established InRoads survey file naming and technical conventions.

2. In naming these files, they shall have the suffix "_Aerial" appended at the end of the file name, prior to the file extension, i.e., "Des #_SRxx Topo_Aerial.fwd".

3. If a combination of aerial and ground surveys is submitted, they shall be combined into a single .dtm survey surface.

26-1.02 Other Formats

Although it is preferred for collected survey data to be submitted in the InRoads format as described above, there can be a project or circumstance that necessitates the use of previously-accepted data-submittal formats. For this situation, approval to collect and transmit electronic survey data in a format other than the current version of survey and design software in use must be obtained from INDOT. A written request must be submitted to the appropriate designer and survey-program director through the project manager. Approval will be required prior to the start of field work.

26-2.0 OTHER SURVEY INFORMATION

A complete survey transmittal includes other survey information that is relevant to the project. This is described below. A submittal may be downloaded directly into the INDOT Electronic Records management System (ERMS) or the current version of INDOT's electronic document repository. However, each submittal shall include the minimum amount of information as outlined below, whether in electronic format, hardcopy, or a combination of the two.

1. Survey-Envelope Contents. The survey envelope should be a 9-in. x 12-in. manila envelope, or comparable type. It shall include all property-owner-interview sheets and the recorded LCRS. All other information should be packaged in a separate envelope and submitted with the completed survey.

   Figure 26-2A, Survey-Envelope Label, illustrates how the survey envelope should be labeled. The outside of the survey envelope should include the following:

   a. route number and location description as it appears on the schedule sheet;

b. designation number;
c. project number, if available;
d. structure number, if applicable;
e. county;
f. district;
g. date of survey;
h. survey-party personnel, with designated party chief; and
i. list of envelope contents.

2. Survey Book. The survey book, a hardcopy or .pdf version, shall be submitted with the final survey materials.

3. Miscellaneous Envelope. See Figure 26-2B, Miscellaneous Envelope. The miscellaneous envelope should be placed in the back of the survey book and should include the following:

a. copies of section plats to indicate adjoining property owners;
b. copies of digital photographs; and
c. section-corner reference cards (see Figure 26-2C).

4. Property Deeds. Property deeds that are within the survey limits and those deeds which appear necessary for other reasons shall be obtained by the survey party. Property deeds shall be submitted with the field survey and forwarded to the Office of Real Estate.

5. Subdivision Plat. Subdivision plats and town plats, if applicable, should be placed in the envelope that is submitted to the Department.

6. LCRS. An LCRS is required for an INDOT project that requires the purchase of right of way. The LCRS shall, at a minimum, comply with the requirements established by IAC 865 when conducting a route survey. A copy of the recorded LCRS is required for use by the Office of Real Estate. The recorded LCRS shall be submitted on 24" x 36" media (see Section 14-3.03); however the exact size of the recorded document is subject to requirements of the appropriate Office of the County Recorder. See Figure 26-2D, Location-Control Route-Survey Plat Example. The following guidelines are intended to aid in developing an LCRS to satisfy IAC 865, but are not intended to replace the surveyor's judgment as to what should appear in the survey.

a. The LCRS size may be reduced to satisfy specific requirements for recordation. The reduction should be considered in choosing font sizes and line thickness for the original-sized version.

b. Indicate the scale along with a graphical representation of the scale. A standard engineering scale shall be utilized. Consideration shall be made to ensure legibility at reduced scale that may be required for recordation. See Section 14-3.05(01).

c. Indicate the location of the project by identifying all roads on the plat. If no intersecting roads are within the project limits, include a description for the location in the surveyor's report.

d. Units shall be in US Survey feet. The U.S. Survey foot is defined based on 1 m = 39.37 in. The following conversion factor will be utilized:

1 meter = 3.280833333 U.S Survey feet.

e. Show all edges of pavement, fences, centerline points found or set, approximate locations of apparent property lines, buildings, etc. INDOT uses a separate plat for the LCRS and the Right of Way plat. For the LCRS, showing the right of way is not required. Only physical evidence of right of way is shown. The property lines shown on the field plat are for graphical representation only. They are not intended for a property retracement and may not be to scale.

f. Indicate all centerline points, random control points, and reference baseline points that are set. The stationing used on the centerline should be shown and the basis of the stationing indicated in the surveyor's report. Section corners should also be graphically indicated on the plat where feasible due to scale considerations. All points should have references drawn according to the type of monument (e.g., centerline, section corner, subdivision corner, survey marker, etc.). The arrow for a centerline point indicates the direction of the alignment. For a section corner, the arrow indicates the direction for north. This should be shown in the reference boxes. See Figure 26-2D, Location-Control Route-Survey Plat Example.

g. Indicate as to whether the monument was found or set, and include a description in the surveyor's report. This should include the size, type of monument, vertical description (e.g., flush, buried, protruding), location to physical features around the monument, origin (if known), uncertainty, etc.

h. The location of the monument can be identified with an angle and distance, station and offset, or a coordinate system. Coordinates shall be reproducible with the information contained on the LCRS. Include all necessary information so that this may be accomplished. INDOT uses an assumed ground coordinate system. However, survey control ties shall be referenced to the Indiana State Plane Coordinate System. The metadata required and identified in 865 IAC Rule 12 in

referencing state plane coordinates or utilizing Global Positioning System (GPS) shall be included.

i. Show the property owners' names on the plat at the time of the survey.

j. Include all title-block information known at the time the plat is transmitted to the Office of Real Estate.

7. Recorded Plats. The recorded surveys that were obtained from the recorder's office should be submitted with the survey.

8. Plans. Copies of plans that have been obtained from the Central Office, district office, or other sources should also be submitted to the Department.

9. Electronic Data Submittal. All data or information submitted in digital format shall be copied to and stored on compact disc or digital video disc optical storage media, a copy of which shall be included with the submittal. A submittal can require larger memory storage capacity. If so, approval to submit data on media other than standard discs must be obtained prior to submittal. All submitted discs shall be labeled with the appropriate route number, designation number, location description, survey start and finish dates, and disc number. Disc labels shall not be hand written. The text on the label shall be in the Arial font with a minimum point size of 10. See Figure 26-2E.

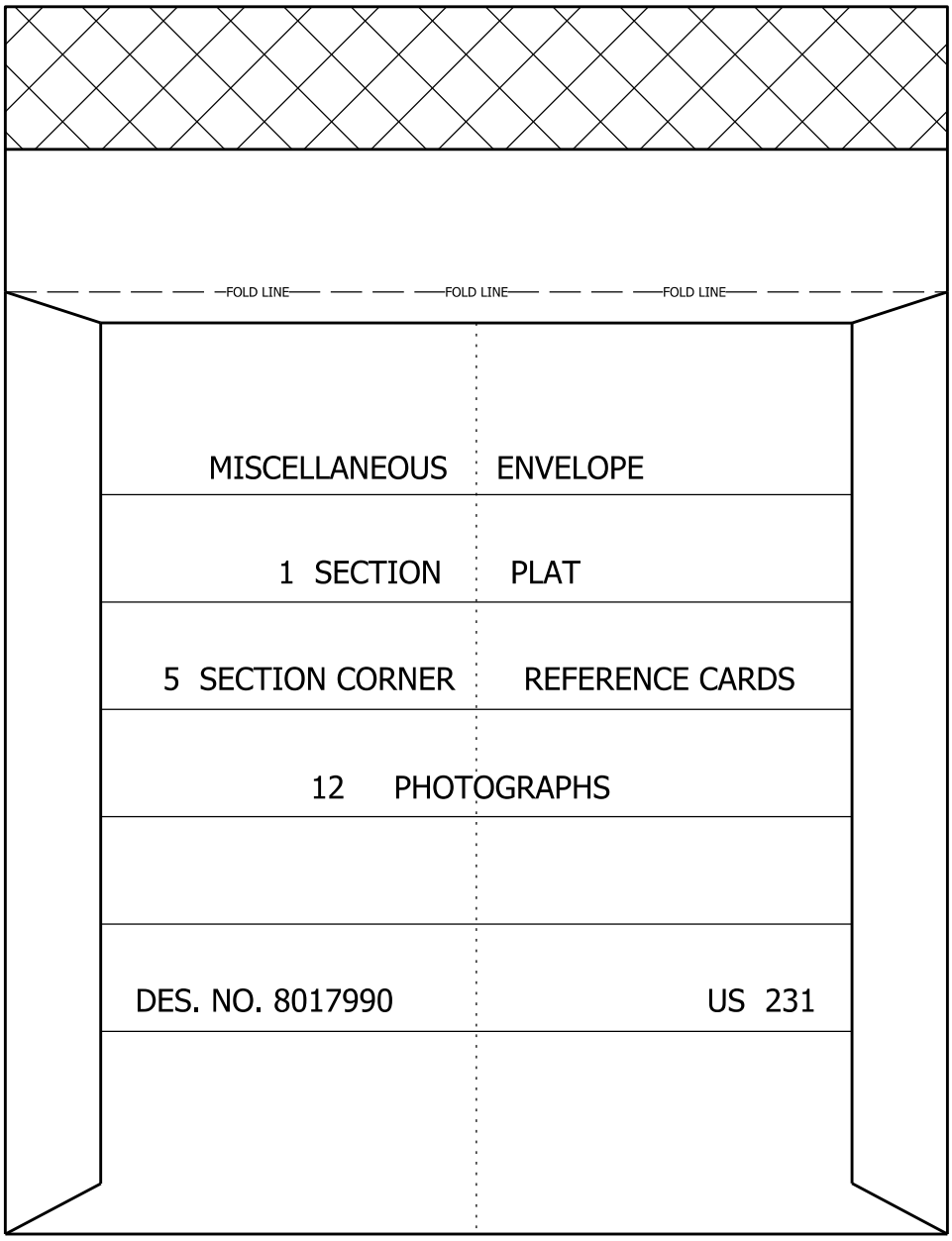
U.S. 231 - BRIDGE OVER FIRST CREEK, 4.0 mi SOUTH OF S.R. 558
DES. NO. 8017990
PROJECT NO. F-075-6(008)
STRUCTURE NO. 231-14-3524 (OLD), 231-14-7332 (NEW)
DAVIESS COUNTY
AUGUST 1994
SURVEY CREW #4 (R. C. HOWELL)

ENVELOPE CONTAINS

1. SECTION PLATS
2. SURVEY NOTICES

SURVEY-ENVELOPE LABEL

Figure 26-2A



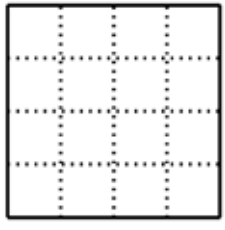
MISCELLANEOUS ENVELOPE

Figure 26-2B

SECTION _____, TOWNSHIP _____, RANGE _____

(Description of Corner Location) _____

_____ COUNTY, INDIANA

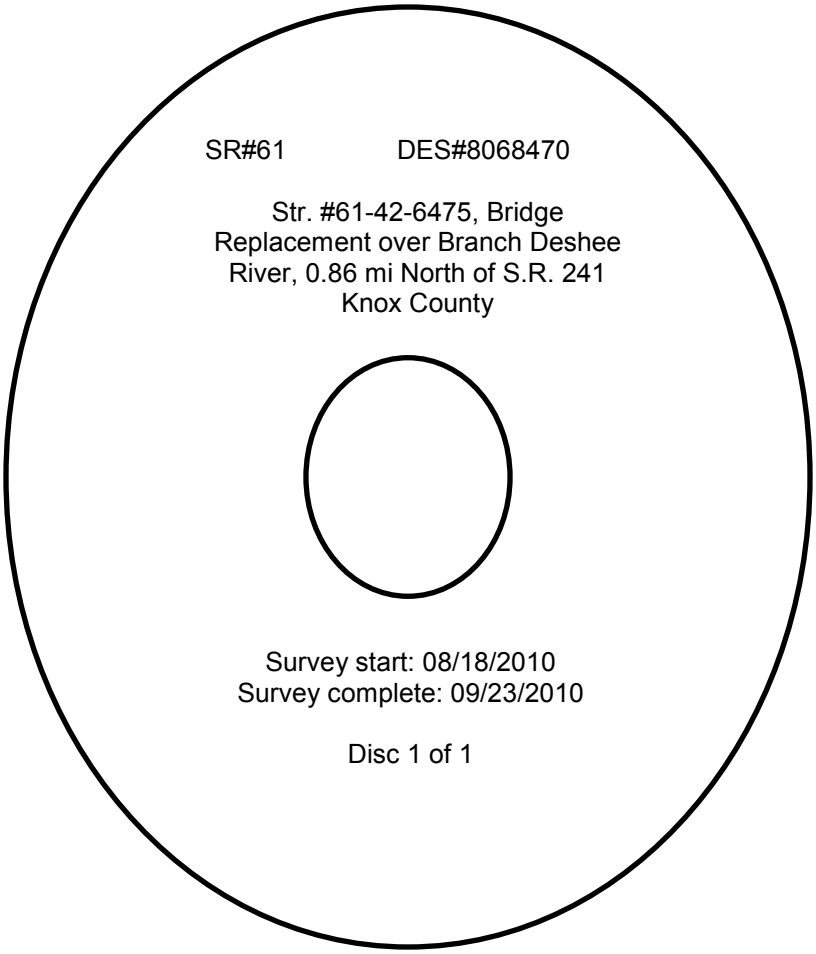


TYPE OF MON.: _____
DEPTH: _____
UNCERTAINTY: _____
BY: _____
DATE: _____
DES. NO.: _____

State Form 40180

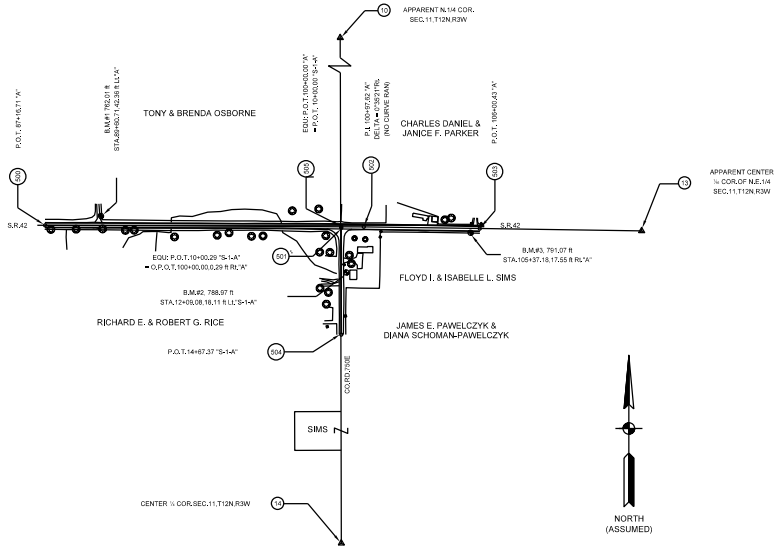
SECTION-CORNER REFERENCE CARD

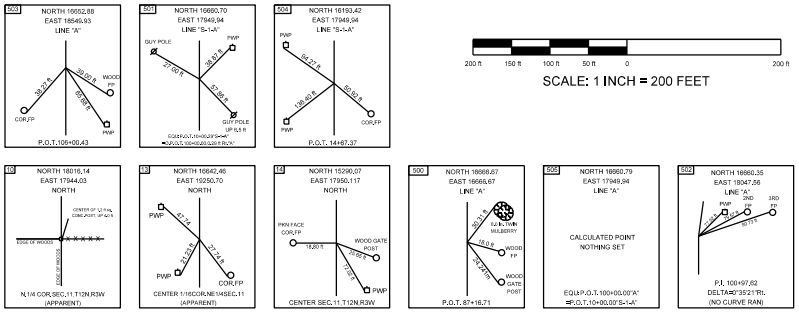
Figure 26-2C



SAMPLE DISC LABEL

Figure 26-2D





SURVEYORS REPORT

FOR

ROUTE SURVEY-INDOT PROJECT NO. STP3267(3) PAGE 1 OF 1
DES # 9607380 DATE SEPT.17,1997

GENERAL:

- ALL MONUMENT REFERENCE TIES ARE SHOWN ON THE ROUTE SURVEY PLAT.
- SHOULD ADDITIONAL USPLS CORNERS BE NEEDED WHERE NONE WERE FOUND, THEY SHOULD BE REESTABLISHED AND TIED INTO THIS SURVEY.
- ITEM NUMBERS ARE ACTUAL FIELD SURVEY POINT NUMBERS USED FOR CONTROL AND TOPOGRAPHY.

ALIGNMENT WAS ESTABLISHED BY CENTERING ON THE PAVEMENT AT THE TOP OF THE HILL JUST EAST OF CO.RD.750E AND USING A BRASS PLUG IN A STEEL POT ½ MILE EAST OF CO.RD.750E. SAID POINT BEING A ⅛ SECTION CORNER. SAID POINT ON HILL DESIGNATED AS A P.I. IN ORDER TO KEEP ALIGNMENT IN THE C.L. OF THE ROAD TO THE WEST. NO CURVE WAS RAN.

STATIONING WAS DETERMINED BY USING THE FIELD REPORT ON THIS PROJECT, CALLING THE INTERSECTION OF S.R.42 AND CO.RD.750E AS STA 1+000.000 ON LINE "A" AND STA 10+000,000 ON LINE "S-1-A" WHICH RUNS SOUTH, THERE ARE NO PLANS AVAILABLE FOR THIS PROJECT.

LEVEL DATUM IS ON NAVD 88 DATUM USING "ISHC PUTN C-1" WHICH WAS INCLUDED IN AN NGS SECOND ORDER CLASS 0 DIFFERENTIAL LEVEL RUN BY NGS IN 1946 AND HAS THE PID #KA0490. SAID BENCH MARK IS IN SW ABUTMENT OF STRUCTURE OVER MILL CREEK WEST OF PROJECT.

THE PURPOSE OF THIS SURVEY IS TO INCREASE THE INTERSECTION SIGHT DISTANCE AT S.R.42 AND CO.RD.750E. A T-INTERSECTION, FOR MORE DETAIL INFORMATION SEE THE ENGINEER'S REPORT FOR DES.#9607380, PROJECT #STP-3267(3).

THIS DATA COLLECTION SURVEY IS FOR THE PURPOSE OF DESIGNING A HIGHWAY IMPROVEMENT PROJECT. IT IS NOT A PROPERTY RETRACEMENT SURVEY. WHERE APPARENT PROPERTY LINES, CORNERS, SUBDIVISION, OR SECTION CORNER INFORMATION IS SHOWN, IT IS BASED ON PHYSICAL EVIDENCE OR TESTIMONY AND VERY LITTLE DEED ANALYSIS WAS DONE.

10. USED THE TOP CENTER OF A 1.2 ft X 1.2 ft CONCRETE FENCE POST, 4.0 ft HIGH FOUND AT THE APPARENT NORTH ¼ CORNER OF SEC.11,T12N,R3W. POST HAS MARKINGS ON TOP, BUT UNABLE TO READ. NO RECENT RECORDS OF THIS CORNER WITH THE COUNTY SURVEYOR. UNCERTAINTY IS ESTIMATED TO BE +/- 10 ft.

13. FOUND BRASS PLUG IN A STEEL POT AT THE APPARENT CENTER ¼ CORNER OF THE N.E.1/4 OF SEC.11,T12N,R3W, LOCATED IN THE C.L. OF S.R.42 AND CO.RD.775E. ACCORDING TO THE PUTNAM CO.SURVEYOR'S OFFICE, THESE STEEL POTS WERE PLACED WHEREVER AN EXISTING MONUMENT WAS FOUND WHEN THE RD. WAS REPAVED A FEW YEARS AGO AND IS AN APPARENT PERPETUATION OF THE CORNER. CORNER UNCERTAINTY IS NEGLIBLE.

14. FOUND IRON PIN WITH A YELLOW PLASTIC CAP STAMPED: "ROSS HOLLOWAY RLS 50530" AT THE CENTER OF SEC.11,T12N,R3W. IN THE C.L.OF CO.RD.750E, AS PER INFORMATION OBTAINED FROM THE CO.SURVEYOR'S OFFICE. CORNER UNCERTAINTY IS NEGLIBLE.

500. SET PK NAIL FLUSH IN THE CENTER OF THE PAVEMENT. ORIGINAL MONUMENT. THEREFORE THERE IS NO UNCERTAINTY.

505. CALCULATED POINT FOR CENTERLINE INTERSECTION. NO MONUMENT SET.

502. SET PK NAIL FLUSH IN THE CENTER OF THE PAVEMENT. ORIGINAL MONUMENT. THEREFORE THERE IS NO UNCERTAINTY.

503. SET PK NAIL FLUSH ON LINE BETWEEN #502 AND #13. ORIGINAL MONUMENT. THEREFORE THERE IS NO UNCERTAINTY.

501. SET PK NAIL FLUSH ON LINE "S-1-A", MISSING LINE "A" BY 0.029m. ORIGINAL MONUMENT. THEREFORE THERE IS NO UNCERTAINTY.

504. SET PK NAIL FLUSH IN THE CENTER OF THE PAVEMENT. ORIGINAL MONUMENT. THEREFORE THERE IS NO UNCERTAINTY.

SURVEY STARTED
7-7-97
SURVEY COMPLETED
7-15-97
ROUTE PLAT SHEETS
1 of 1

FIELD SURVEYOR STATEMENT

THIS SURVEY, TO THE BEST OF MY KNOWLEDGE AND BELIEF, IS EXECUTED ACCORDING TO THE PROVISIONS OF 865 I.A.C. 1-12-20 REGARDING ROUTE SURVEYS, EXCEPT THAT ANY DATA SHOWN REGARDING THE LOCATION OR DESCRIPTION OF THE EXISTING PARCELS IS NOT PART OF THIS SURVEY.

REGISTERED LAND SURVEYOR No. LS29300018 STATE OF INDIANA LAND SURVEYOR

RECOMMENDED FOR APPROVAL

REGISTERED LAND SURVEYOR, FIELD DATE

INDIANA DEPARTMENT OF TRANSPORTATION

LOCATION CONTROL ROUTE SURVEY

HORIZONTAL SCALE	BRIDGE FILE
1:2500	
COUNTY	DESIGNATION
PUTNAM	9607380
SURVEY BOOK	PLAN SHEETS
	of
CONTRACT	PROJECT
	STP3267(3)

LOCATION CONROL ROUTE SURVEY PLAT EXAMPLE

Figure 26-2E

CHAPTER 107

Geotechnical Procedures

TABLE OF CONTENTS

LIST OF FIGURES

Figure Title

CHAPTER EIGHTEEN

GEOTECHNICAL INFORMATION FOR DESIGN

Chapter Eighteen discusses the elements of geotechnical engineering which the designer will typically be required to address during the design of a project. Chapter Eighteen does not address the analyses and procedures conducted by a geotechnical consultant or the Office of Materials Management's Office of Geotechnical Services during its investigation. If questions arise, the designer should review the geotechnical report or contact the geotechnical engineer for guidance.

18-1.0 GEOTECHNICAL REPORT

All project geotechnical considerations should be made in accordance with Figure 18-1A, Policy for Geotechnical Investigation or Geotechnical Waiver.

If, after reviewing the Policy, the designer has determined that a geotechnical investigation is warranted, he or she should provide the Production Management Division's Office of Geotechnical Services with the information shown below, so that the Office can develop a geotechnical report.

1. Project location;

2. anticipated pavement treatment (i.e., resurface, rubblize, etc.) from the Engineer's Report or mini-scope; and

3. locations where the pavement will be widened.

If there is a change in scope after the above information is provided to the Office, the designer must immediately notify the Office.

The geotechnical report provides the data obtained during the geotechnical investigation. It also summarizes the engineering analyses conducted and provides recommended treatments for the various soils and conditions encountered on the project. The following sections discuss the information that may be included in a geotechnical report.

18-1.01 General Information

The geotechnical report will include the following general information.

1. Project Description. The report will identify the location of the project (including the beginning and ending stations), provide a project-identification description, and define the scope of the proposed construction.

2. Field Investigations. The report will summarize the field and laboratory investigation procedures used on the project. It will also include the date when the field investigations were conducted.

3. Environmental Conditions. Environmental conditions that could have affected the results (e.g., climatic conditions) will be included in the report.

4. Geological Information. The beginning of the report will include a general description of the geology and soils encountered on the project. It should also provide a description of the terrain including drainage patterns, ground water elevation, bedrock information, and other specific conditions that may have value in the design of a bridge, culvert, or other structure.

18-1.02 Detailed Geotechnical Conditions and Recommendations

This portion of the geotechnical report should provide a discussion on specific problems or conditions that may affect the design or construction of the project. The report will discuss the following.

1. Features. The report will provide a detailed description of the conditions found on the project, organized according to areas of similar soils and terrain features. It will identify the types of soils found, their strengths, and their locations.

2. Recommendations. The report will provide recommendations concerning potential design and construction problems for earthwork, pavement, bridges, retaining walls, culverts, sign supports, or other structures. Where applicable, the report should provide the recommendations as follows:

    a. special embankment construction;

    b. cut slopes in soil or rock;

    c. how to treat unsuitable materials in subgrades (e.g., removal, replacement, special treatment such as lime, cement, or flyash stabilization, etc.);

    d. rock swell factors;

e. special drainage installations;

f. use of special channel lining materials;

g. landslide corrections;

h. wet soils;

i. embankment construction using recycled waste materials;

j. embankment over landfill;

k. foundations; or

l. dewatering.

3. Field Equipment. The report will list where field monitoring equipment or devices including settlement plates, lateral stakes, settlement stakes, standpipe piezometers, or water monitoring boreholes are required. The report will list the following:

a. purpose or objective of the equipment;
b. proposed locations;
c. approximate schedule for the frequency of readings; and
d. special construction controls.

The designer must note the location and quantities of the field monitoring equipment to be installed. The equipment should be listed on the plans, in a tabular format, and in the schedule of pay items. Such equipment is described in the INDOT *Standard Specifications*.

4. Boring Logs. Boring logs will be included in the appendix of the geotechnical report. These will be based on field logs and laboratory test data. Boring logs are available in an electronic format for an in-house-designed project.

18-1.03 Test Data and Engineering Analyses

The report will summarize the field and laboratory investigation procedures used in the investigations. Results of the laboratory tests on various samples will be included in the appendix of the geotechnical report in a tabular format. Each sample will be identified according to its sample number, boring number, location, depth, and results from testing. Separate tabulations will be included for classification test results, strength test results, or other special test results.

The work described in this report section will include a review and correlation of the various test results for embankment stability, material placement, and other geotechnical engineering considerations. Sketches, assumptions, calculations, etc., will be provided in the appendix of the report. Some analyses that may be included are as follows:

1. settlement analysis;
2. sand drain analysis;
3. sliding block slope stability analysis;
4. rotational slope stability analysis;
5. bridge foundation analysis for each bridge foundation; or
6. retaining structure analysis.

18-1.04 Geotechnical Profile

The geotechnical profile, if required, shows the geotechnical information on a set of plans. The following is the applicable design and construction information that may be included in the geotechnical profile.

1. Soil Test Data. Soil test data will be tabulated on separate sheets. This may include the information as follows:

    a. laboratory sample number;
    b. field sample number;
    c. boring number;
    d. station;
    e. offset;
    f. depth of sample;
    g. pH;
    h. textural or grain size classification;
    i. AASHTO classification;
    j. test results obtained from mechanical analysis;
    k. liquid limit;
    l. plastic limit;
    m. plasticity index;
    n. maximum dry density;
    o. optimum moisture content;
    p. CBR;
    q. loss on ignition; or
    r. calcium and magnesium.

2. Boring Locations. The boring locations will be plotted on the plan view. Elevation of subsurface water during boring, at the completion of boring and 24 hours later, will be shown on the profile sheets. The location and depth from which test samples were obtained will be indicated and referenced to the Soil Test Data sheet.

3. Unsuitable Materials. The locations of unsuitable material will be shown on the plan and profile views or in the cross-section sheets. This may include peat, unstable soil, wet soils, etc.

4. Soundings. If soundings are made, these may be plotted on plan and profile or cross section sheets. The limits of peat or unsuitable material to be removed, the proposed grade line, rock line, etc., will be plotted on the sounding profile and cross section sheets.

18-1.05 Incorporation of Geotechnical Report Into Contract Documents

The geotechnical engineer will review the final check prints and geotechnical evaluation report summary, and transmit his or her findings to the designer. Figure 18-1B, Geotechnical Review of Final Check Prints, should be used. An editable version of this document appears on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

After the designer addresses concerns identified in the geotechnical engineer's review, a copy of the geotechnical evaluation report summary should be included in the documents intended for incorporation into the Contract Information Book. A report prepared by the Office of Geotechnical Services, excluding boring logs, drawings, and test data, should be included in its entirety into the Contract Information book, as the extent of the report's text is only a few pages.

The designer should place a quality paper copy of the Department-prepared geotechnical report or a geotechnical report summary into the contract-documents file as is done for the environmental permits.

18-2.0 APPLICATIONS

There are numerous areas throughout Indiana where special subsurface treatments should be considered. Figure 18-2A, Indiana Counties with Special Geotechnical Concerns, identifies the counties where the designer may encounter coal mine subsidence, peat, sink holes (karst areas) and slide conditions. The geotechnical report will most often identify special requirements, and it will recommend possible solutions. The following provides basic information and guidance for treatment of common geotechnical elements the designer may encounter.

18-2.01 Coal-Mine Subsidence

Coal-mine subsidence occurs once the effects of roof collapse in an underground coal mine reaches the surface or reaches structure foundations. Figure 18-2A identifies the counties where coal-mine subsidence is a concern. Effects on the surface include sinkholes, sags, and troughs. This may result in cracks, breaks, or settlement in buildings, roads, structures, and utilities, and may change surface and subsurface drainage.

For a mine less than 150 ft deep, roof collapse is very likely to cause surface effects. A mine deeper than 150 ft seldom shows sudden, dramatic, surface collapse such as sink holes, but generally causes sags and troughs and can cause cracks and breaks in structures, etc.

The added weight of a new embankment or structure can cause collapse of a coal-mine roof that had already been near the breaking point. Other factors such as drainage changes and earthquake acceleration coefficients (in structure design) increase the probability of more collapse and subsidence.

Subsidence prevention treatment for design of a bridge or structure on a deep foundation includes drilled shafts, predrilling to a depth below the mined elevation to set pile tips, or injection of grout to fill the voids to prevent collapse. Treatment for a roadway or embankment includes grout injection to prevent subsidence and use of lightweight fill. Post-construction treatment includes wedge-and-level patching to eliminate an abrupt dip. Sinkhole-type failures can be treated as a Karst sinkhole; see Section 18-2.07. Monitoring for subsidence can be done with settlement stakes and plates.

18-2.02 Erosion Control

Erosion can occur from both surface-water flow and subsurface seepage and drainage. Soil susceptibility to surface erosion is primarily a function of the water flow and the gradation and plasticity of the soils. There are several methods to protect soils from surface flows. Each site must be treated individually. The possible options include the following:

1. removing the erodible materials and replacing them with acceptable materials;
2. using slope encasement with cohesive soil;
3. using geotextile fabrics with riprap; see Section 18-2.08(05);
4. providing erosion mats;
5. planting vegetation;
6. reducing side slopes;
7. providing sediment basins;
8. constructing special drainage channels and ditches; or
9. providing closed drainage systems.

Chapter Thirty-seven provides additional guidance on the design of temporary erosion control methods during construction.

Erosion by subsurface flows may also be a problem if soil particles are transported by the water flow. Protection against subsurface erosion is treated with spring boxes or with granular filter materials or filter fabrics which have particles or perforations sized to satisfactorily pass the water flow without permitting movement or loss of the soil particles.

18-2.03 Geotextiles or Geogrids

Geotextiles or geogrids have been proven to be an effective solution to solving many geotechnical problems. They can be used as follows:

1. to stabilize weak and saturated subsoils under a pavement surface;

2. between pavement layers to reduce cracking and to provide a moisture barrier;

3. as a soil filter for subsurface drainage (e.g., underdrains along pavement, behind retaining walls);

4. as part of an erosion control system (e.g., under riprap, as a sediment fence);

5. as part of a soil retaining wall;

6. as slope reinforcement;

7. as a separator layer; and

8. to minimize differential settlement.

The geotechnical report should identify the locations where geotextiles or geogrids should be used. The designer should contact the Office of Geotechnical Services for specifications and guidelines on the design and placement of geotextiles or geogrids.

18-2.04 Landfill Treatment

A landfill is a man-made feature which generally provides unsuitable material for the roadway substructure. The geotechnical report should identify the location of landfills and any proposed treatment. If cost effective, the most desirable option will be to excavate the landfill and replace it with acceptable backfill. However, other options may be more feasible, including surcharging, using

lightweight fills, using geotextiles, or providing ground modifications (e.g., dynamic compaction, stone columns).

18-2.05 Landslide

The term landslide is used to denote the movement of a mass of rock, debris, or soil down a slope. The type of landslide can be further defined by characteristics such as the materials in the slide, speed of the landslide, or the type of movement. Figure 18-2A, Indiana Counties with Special Geotechnical Concerns, identifies the counties where landslides may be a problem. The geotechnical report will identify the sites where landslides may be a concern.

A landslide may occur under man-made conditions (e.g., adverse grading, adjacent construction, vibration from nearby vehicles) or natural conditions (e.g., erosion, earthquakes, precipitation and runoff). Because of the nature of soils and the geologic environment in which they are found will vary from site to site, acceptable mitigation procedures will be determined for each site. The designer should review the geotechnical report to determine the appropriate measures to mitigate the landslide potential.

18-2.06 Peat Treatment

Peat soils are those soils with a high organic content. Where the organic content is approximately 10% by weight, it typically poses a stability problem and will require special consideration. Two common solutions for treating peat soil are to completely remove and replace the peat soil with acceptable foundation materials, or to use lightweight materials to reduce settlement. Peat excavation consists of the necessary excavation and satisfactory disposal of peat, muck, marl, or any other similar unsuitable material in a peat deposit together with any overlaying material which is not used in embankment construction.

Where the ground water table is below the bottom of the peat deposit, normal excavation and embankment criteria as stated in the INDOT *Standard Specifications* will typically apply. Where the peat deposit is deep or the peat deposit is all or partially below the ground water table, special treatments as discussed in the geotechnical report and INDOT *Standard Specifications* will be required. The limits of peat removal for these sections will usually be established by the 1:1 slope as shown in Figure 18-2B, Peat Excavation, Backfill, and Disposal.

When showing peat treatment on the plans, the designer should consider the following.

1. Typical Section. Indicate the removal limits as shown in Figure 18-2B.

2. Plan and Profile Sheets. Show the profile for any peat deposit within the construction limits on the profile sheet. Show this profile with a short dashed line and label it as "Peat Profile on Center Line" or "Peat Profile ___ ft Lt. or Rt. of Center Line" as appropriate.

3. Cross Sections. Use solid lines to show the peat excavation limits and peat backfill (B borrow) limits on the applicable cross sections. Mark the first peat section in any series as such to define these limits. Include the end areas and volumes for peat removal on the cross sections.

4. Approval. Submit all peat disposal plans to the Office of Geotechnical Services for approval.

18-2.07 Sink Hole

18-2.07(01) General

A sink hole is caused by subsurface voids, which may continue to enlarge, in rocks (primarily limestone) that are subject to dissolution by the passage of moving groundwater. Figure 18-2A, Counties with Special Geotechnical Concerns, illustrates the counties where sink holes may be a concern. Sink holes should be anticipated in a carbonated rock terrain. Known sink-hole locations will be shown in the geotechnical report and environmental documents. During a field review, a sink hole can be identified as a roughly circular, closed depression at the ground surface. Another identifying feature is water is flowing into a depression with no outlet. Inspection of topographic mapping and aerial photographs will also assist in the confirmation of a sink hole.

The treatment for a sink hole will vary based on the location, size of the sink hole, and environmental considerations. A sink hole will typically be capped or installed with a chimney. A capped sink hole is filled with material (e.g., rocks, concrete, gravel) and sealed so that additional surface water cannot flow into the hole. See Figure 18-2C, Typical Sink Hole Cap. The chimney treatment encourages surface water to continue to flow into the hole. However, any surface water flowing into the sink hole must be filtered. The Office of Environmental Services should be consulted regarding the filter design and detention requirements. See Figure 18-2D, Typical Sink Hole Cap with Chimney.

18-2.07(02) Exploratory Excavation

Exploratory excavation consists of the excavation of overlying soil and rock layers to determine subsurface conditions (e.g., the existence of a sink hole or cavity) and to determine the exact location, extent and size of the sink hole or cavity. In determining the quantities that should be shown in the plans for exploratory excavation, the designer should discuss the proposed treatment with the district construction engineer during the field check.

18-2.08 Slopes

18-2.08(01) Slope Stability

An earth slope of 2:1 or flatter will not require additional special considerations relative to stability. However, under restricted conditions a steeper slope may be required. Where a steeper embankment slope is proposed, riprap or other special material may be required to protect the slope from erosion and slippage. Figure 18-2E, Embankment Treatment, provides guidelines for determining the thickness of this material based on the embankment height. Before specifying a steep slope, the designer should review the geotechnical report or contact the Geotechnical Operations Team for additional guidance. Depending on the rock type, a rock cut may have faces which are nearly vertical. These are illustrated in Figure 18-2F, Typical Rock Cut Benching (< 10 ft); Figure 18-2G, Typical Rock Cut Benching (≥ 10 ft); and Figure 18-2H, Typical Soft/Weathered (Rippable) Rock Cut Benching.

18-2.08(02) Transverse Interceptor Drain

A transverse interceptor drain is typically used to collect subsurface water on an embankment where the roadway passes from a cut section to a fill section. A transverse interceptor drain is used to reduce the potential for slope slippage on the embankment. The geotechnical report should indicate where transverse interceptor drains are required. See Figure 18-2 I, Typical Transverse Interceptor Drainage.

18-2.08(03) Benching

Benching is used on an embankment to stabilize proposed fill on the existing slopes by excavating the existing material on the side slopes to eliminate a plane of weakness or to provide a greater mass of stable material at the toe of slope. Benching should be considered if the existing slope is 4:1 or steeper. The INDOT *Standard Specifications* provide the criteria for where benching should be provided on an embankment. See Figure 18-2J, Typical Benching Methods, for embankment benching.

Benching in a cut section is provided only in a rock cut to provide a debris-collection area for a rock slide. Figure 18-2G, Typical Rock Cut Benching (≥ 10 ft), and Figure 18-2H, Typical Soft/Weathered (Rippable) Rock Cut Benching, illustrate the benching procedure for a rock cut. Where soft or weathered rock is encountered, the material is often rippable (machine workable) and does not require drilling or the use of explosives as is necessary for removing hard-rock material.

18-2.08(04) Fill on Unsuitable Foundation

Where a fill will be placed on soft, wet, or other unsuitable material (e.g., peat), these materials should be removed and replaced with acceptable backfill, if economically feasible. Section 18-2.06 discusses the treatment for peat or other similar materials. If it is not economically feasible to remove the unsuitable materials, the use of geotextile fabrics, lightweight fill, or other method may be required. These should be addressed in the geotechnical report. If not, the designer should contact the Geotechnical Operations Team for information.

18-2.08(05) Placement of Geotextile Under Riprap on Slope

Riprap is often placed on an embankment side slope to prevent future erosion problems or to correct existing erosion problems. One of the most cost-effective methods for stabilizing a shallow embankment failure is to remove the failed material and replace it with riprap. The embankment should be lined with a geotextile fabric before the riprap is placed. This includes such areas as follows:

1. soil slope steeper than 2:1 (below the riprap);
2. there are erodible soils at the interface of the riprap and existing embankment;
3. there is surface runoff flowing through the riprap; or
4. there is flow of subsurface water out of the embankment into the riprap.

Where riprap and geotextile fabric are required and where the slope is steeper than 2:1, benching should also be used to anchor the new fill material (riprap). Without benching, the new fill material may slide down the slope at the interface due to a decrease in shear strength of the soil and the infiltration of water. At least one bench be provided at mid-height of the slope for an embankment height of 10 ft or less. Provide an additional bench for each additional 10 ft of embankment height. Additional benches may be required depending on the size of the benches, steepness of the slope, or thickness of the riprap. The height and width of the bench will vary according to the steepness of the slope. The height will be in the range of 2 ft to 5 ft.

Where riprap is placed on an existing slope, providing a geotextile fabric under the riprap will facilitate drainage through the riprap without the loss of soil particles at the soil surface due to erosion. The geotextile fabric should be placed as shown on the INDOT *Standard Drawings.*

18-2.09 Special Soil Treatment

Special treatment of the subgrade may be required to prepare the soil for construction. The top 24 in. of subgrade below the pavement structure must be compacted to at least 100% of standard proctor.

This may involve adding lime, cement, kiln dust, or fly ash to the subgrade; constructing drains; or replacing the unsuitable material with special borrow or aggregate. The designer should review the INDOT *Standard Specifications* for additional criteria. The Office of Pavement Engineering will make the final determination based on the results of the geotechnical investigations.

18-2.10 Structure

In order for the Office of Geotechnical Services to make suitable recommendations for a structure, it is essential that the designer provide as much information as practical (e.g., structure configuration, loads). If the designer anticipates the need for a working-stress capacity of more than 70 tons per pile, the designer should advise the Office of Materials Management at the preliminary field check. This working-stress capacity should be noted in the field check minutes. The planning and design of a structure (e.g., bridge, retaining wall, sign support, culvert) requires a determination of the strength of the proposed foundation material. For light to moderate loads, dense soils, rock, stiff clay, etc., may be adequate for a shallow foundation. Where there are clearly unsuitable materials or other considerations (e.g., scour potential), the designer may be required to design a deep foundation (e.g., piles) or remove the unsuitable material and replace it with acceptable backfill. The designer should review the geotechnical report to ensure that appropriate materials at the site are available for the proposed foundation design. Section 59-2.0 discusses the types of bridge foundations used and the criteria which influence the selection of a foundation type. Chapter Sixty-six discusses criteria for foundation design for a bridge structure.

Indiana Department of Transportation
Office of Geotechnical Engineering

Policy for Geotechnical Investigation or Geotechnical Waiver

Purpose: To establish a uniform policy regarding the need for a geotechnical investigation or a geotechnical waiver on a State or Local Public Agency (LPA) project utilizing Federal-Aid Funds.

Policy: Each project requires a geotechnical investigation with the exceptions noted below. The Office of Geotechnical Engineering or a Department-approved geotechnical consultant will conduct all geotechnical investigations. The Office of Geotechnical Engineering must approve a consultant report before the report is used in the design.

Exceptions: A project satisfying the following conditions may qualify for a geotechnical waiver. However, subgrade recommendations may still be required.

1. Preventative-Maintenance Type Project.
   a. Chip Seal, Crack Sealing, Microsurface, Single Lay HMA Mill and Overlay, or Functional HMA Overlay.
   b. PCCP Joint Sealing, Retrofit Joint Transfer, etc.

2. Rehabilitation-Type Project: Shoulder widening up to 2 ft on existing pavement with less than 2 ft of cut or fill.

3. Bridge maintenance or repair that does not include foundation work.

4. Pipe structure smaller than 36 in. diameter or pipe extension of shorter than 5 ft length.

However, if the project is in an area that contains known isolated problematic soils such as peat, marl, etc., or if the project includes fills of greater than 2 ft, a geotechnical waiver will not be granted.

Waiver Request: The project manager or the LPA design consultant must submit a request for approval with the supporting data to the Office of Geotechnical Engineering, no later than the preliminary field check.

The waiver request will include the following:

1. Project Scoping Report;
2. plans and cross sections – one set; and
3. six to ten existing-pavement photographs.

No Geotechnical Investigation or Waiver is Required: The following types of projects will not require a geotechnical investigation or geotechnical waiver.

1. Bridge Painting;
2. Pavement Marking;
3. Landscaping/Enhancement;
4. Traffic Signals;
5. Guardrails;
6. Small Signs;
7. Wedge and Level;
8. Mowing;
9. Lighting Maintenance; or
10. other project with no earthwork, foundations, or retaining walls.

Approval: The Manager of the Office of Geotechnical Engineering will either approve or deny the geotechnical waiver in writing to the project manager within 5 days.

POLICY FOR GEOTECHNICAL INVESTIGATION OR GEOTECHNICAL WAIVER

Figure 18-1A

GEOTECHNICAL REVIEW OF FINAL CHECK PRINTS

Route:
Des:
Bridge File:
Over:
Project No.:
Date of Geotechnical Report:
Date of Addenda to Geotechnical Report:

I have reviewed the Final Check Prints and the geotechnical summary for the project described above.

☐ The Final Check Prints and the special provisions are consistent with the Geotechnical Report and its addenda. No changes are required.

☐ The Final Check Prints and the special provisions are not consistent with the Geotechnical Report and its addenda. The following must be addressed.

☐ The geotechnical summary as submitted by the designer is satisfactory to include in the Contract Information book.

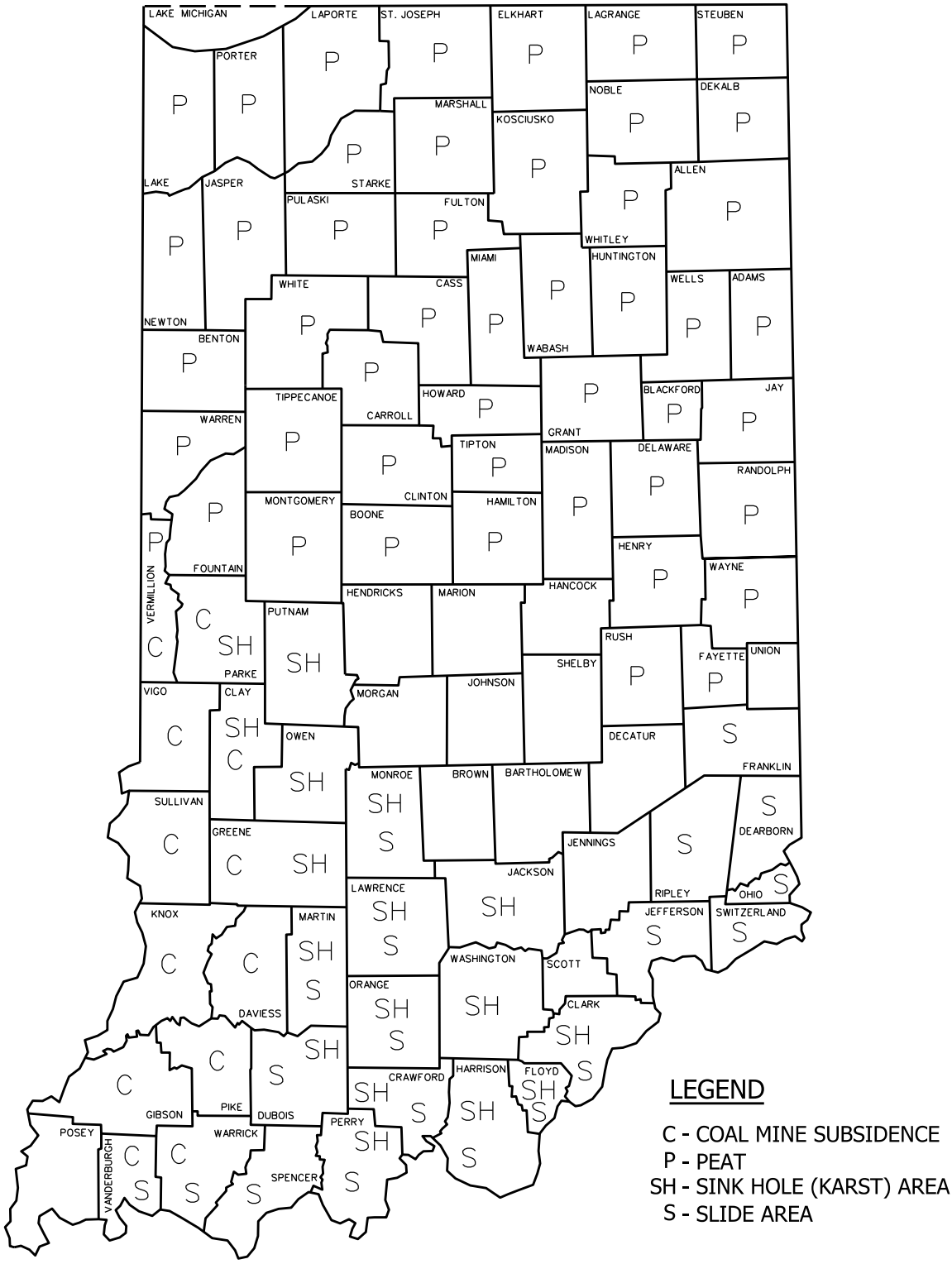
☐ The geotechnical summary as submitted by the designer is not satisfactory. The following must be addressed.

_____

Signature of Geotechnical Engineer

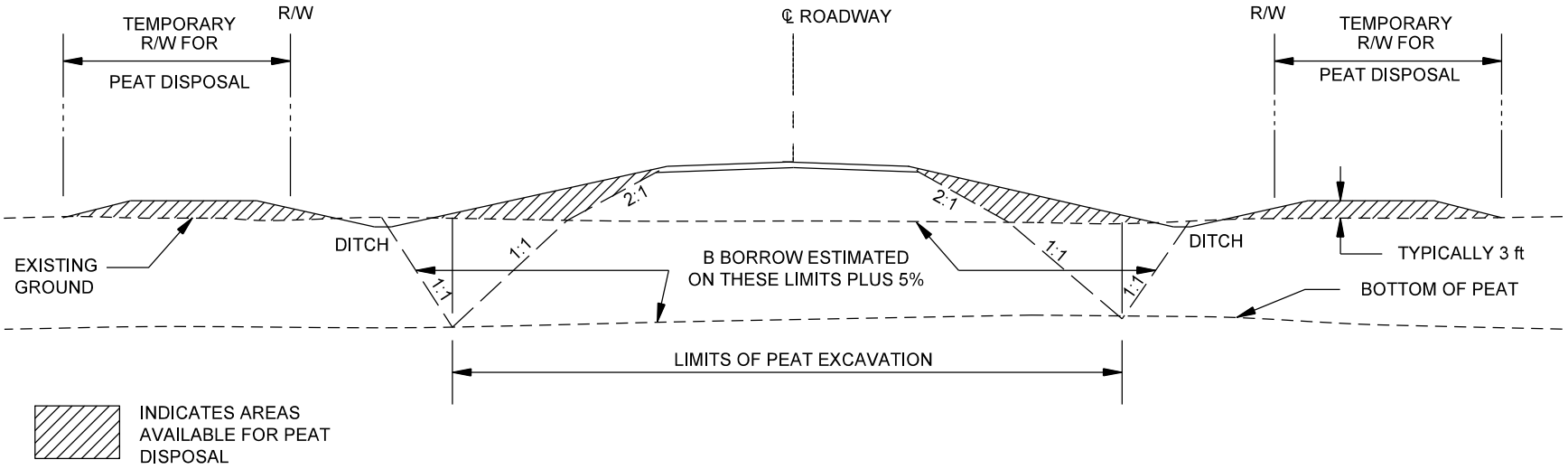
INDOT entity or consultant

date



INDIANA COUNTIES WITH GEOTECHNICAL CONCERNS

Figure 18-2A

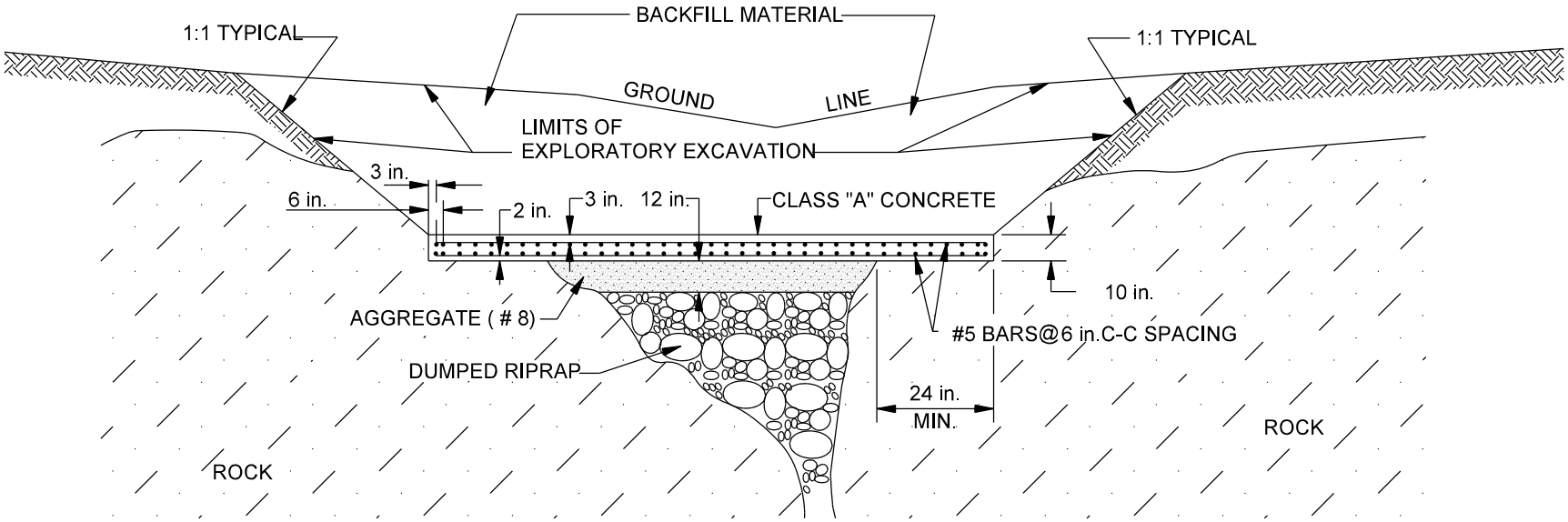


NOTES:

1. Typically, the 2:1 slope will begin at the shoulder break.
2. The B borrow quantities are determined to a point 2.0 ft above the ground water elevation.
3. Do not show the dashed lines illustrated above to determine B borrow quantities on the cross seaction.
4. Temporary right -of-way for peat disposal will typically be established equally on either side of the roadway.

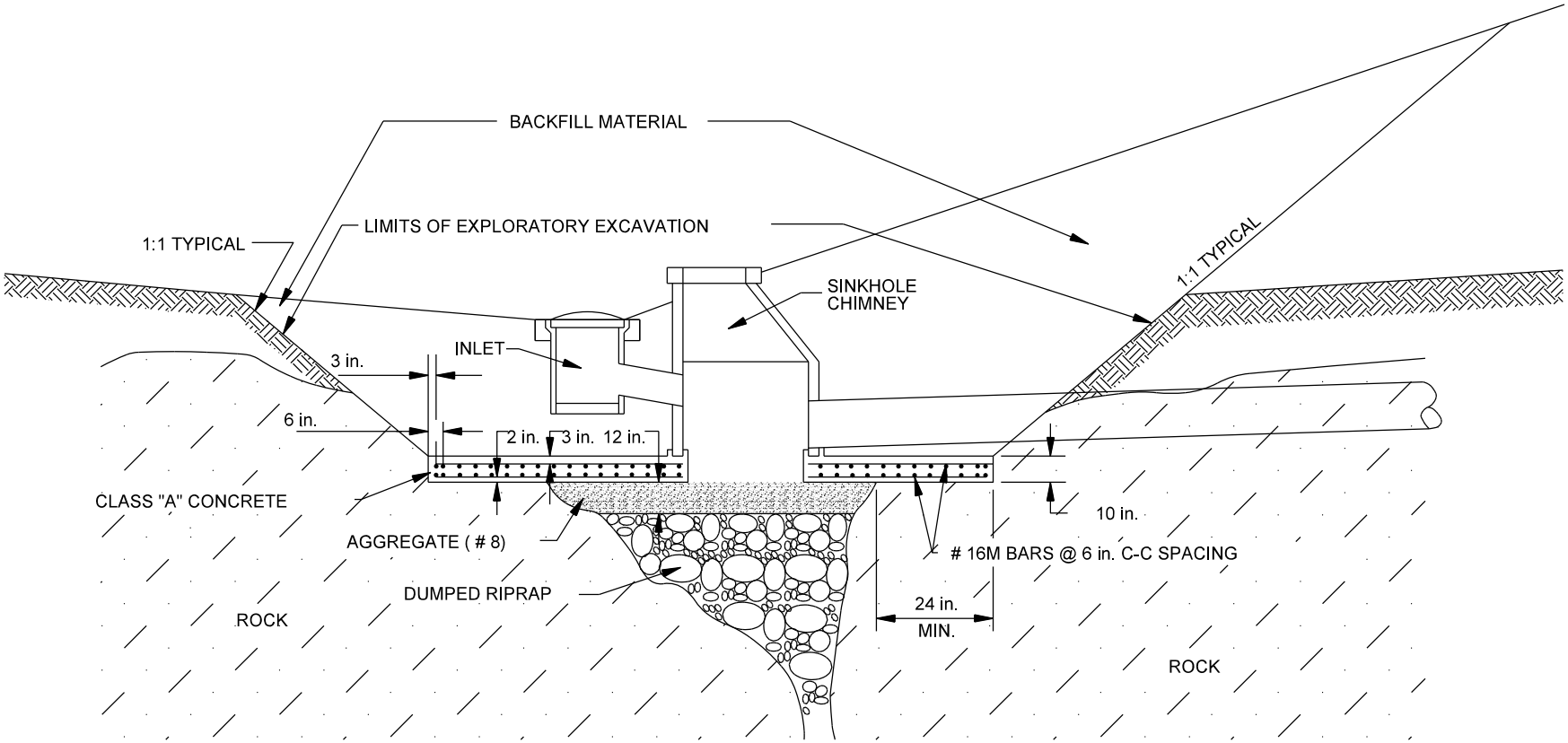
PEAT EXCAVATION, BACKFILL AND DISPOSAL

Figure 18-2B



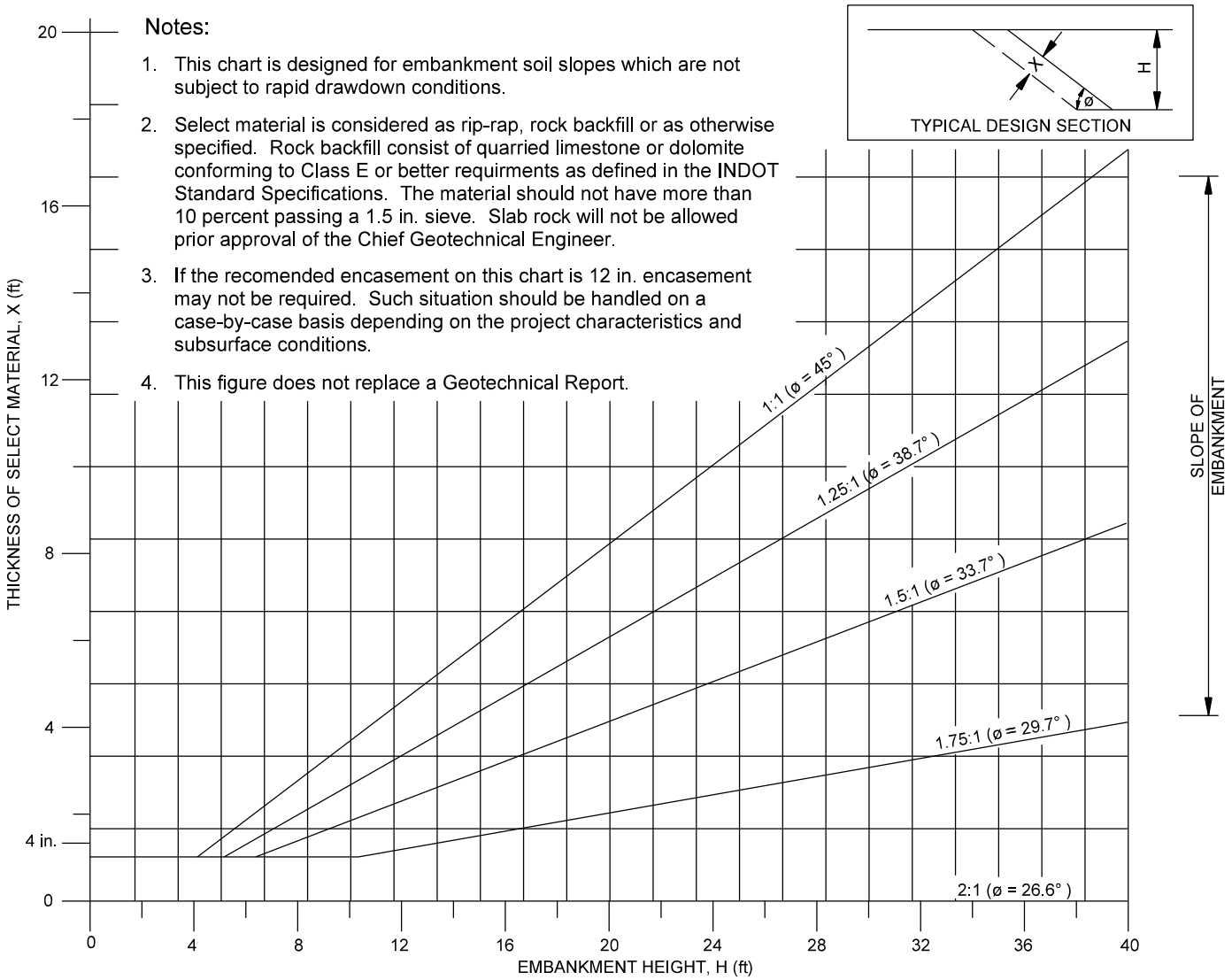
TYPICAL SINK HOLE CAP

Figure 18-2C



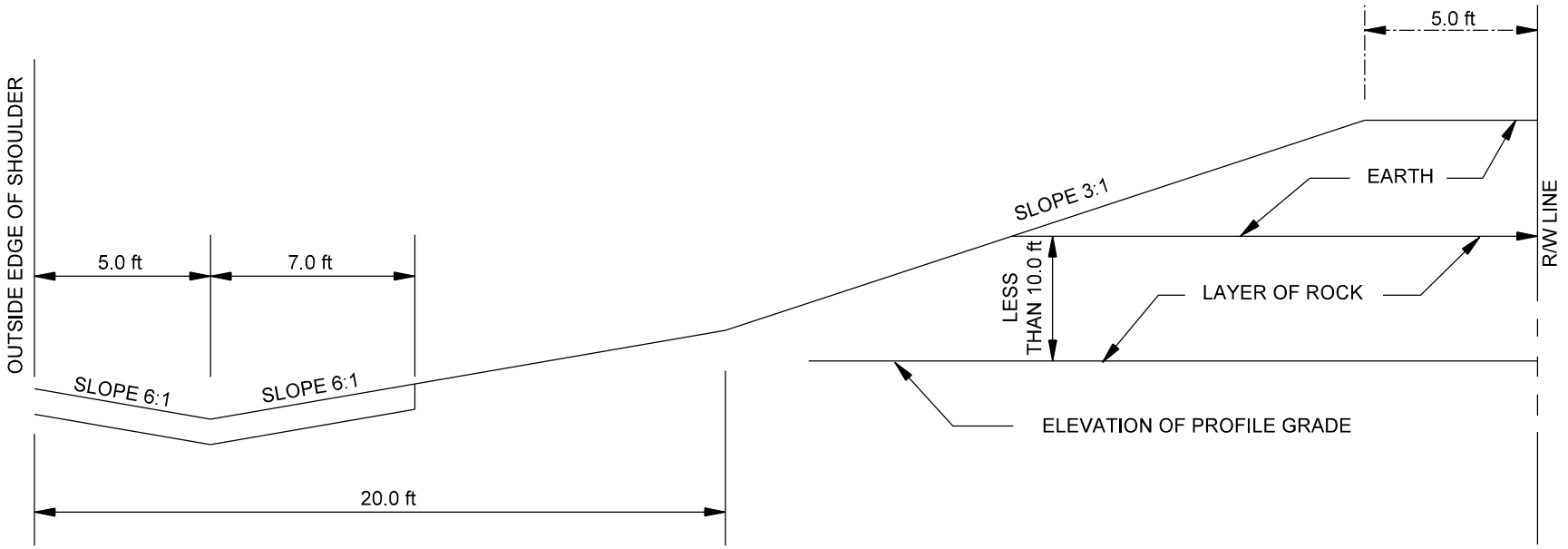
TYPICAL SINK HOLE CAP WITH CHIMNEY

Figure 18-2D



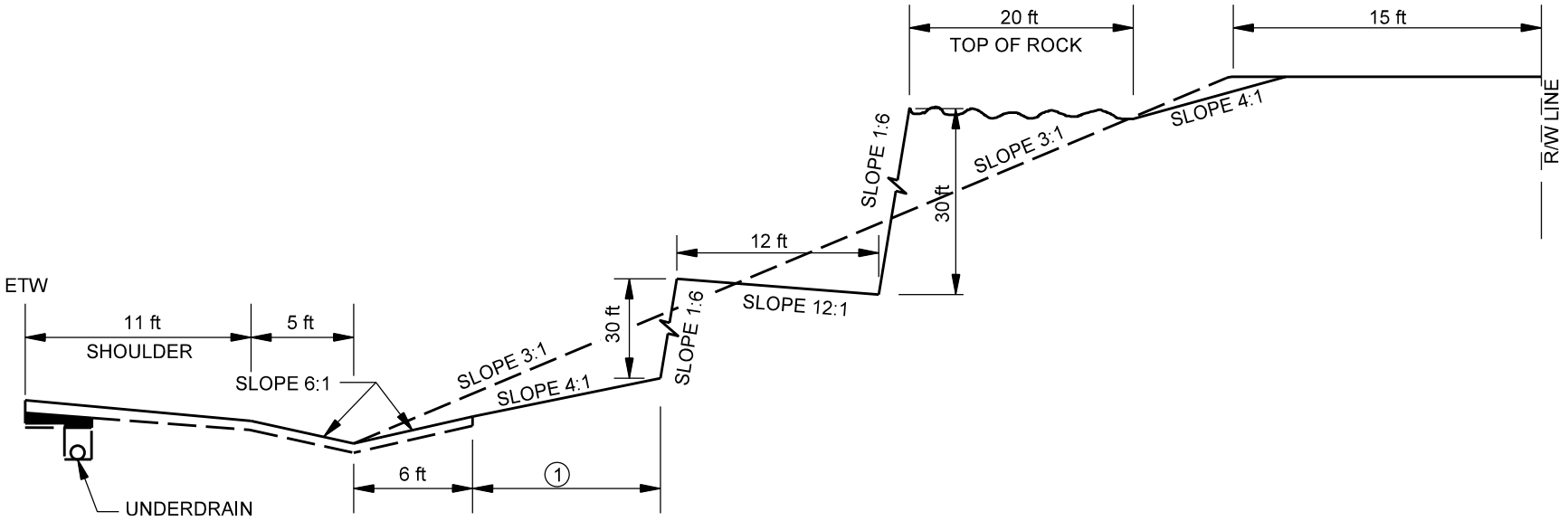
EMBANKMENT TREATMENT

Figure 18-2E



TYPICAL ROCK CUT BENCHING
(< 10.0 ft)

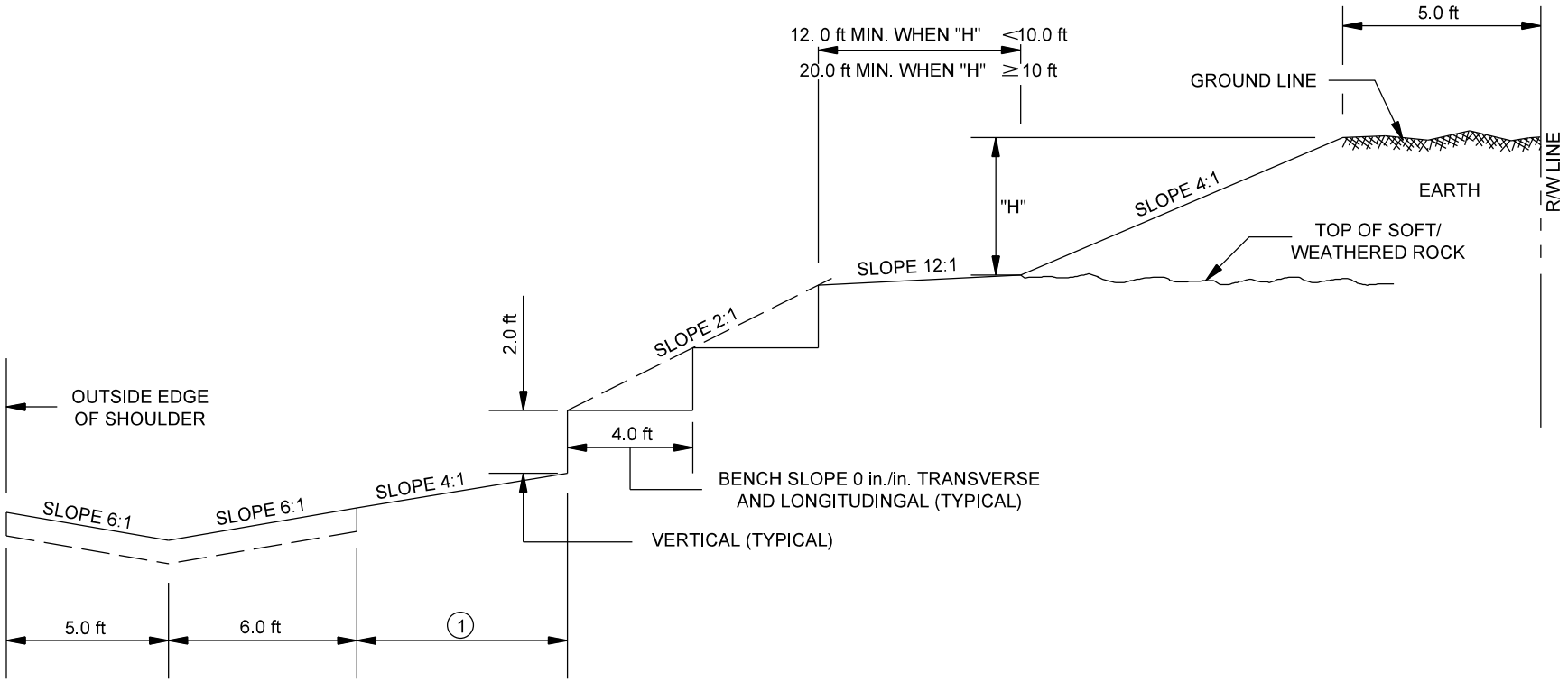
Figure 18-2F



① See Chapter Forty-nine for the applicable clear-zone criteria or Chapter Fifty-five for the applicable obstruction-free-zone criteria.

TYPICAL ROCK-CUT BENCHING
ROCK DEPTH > 10 ft

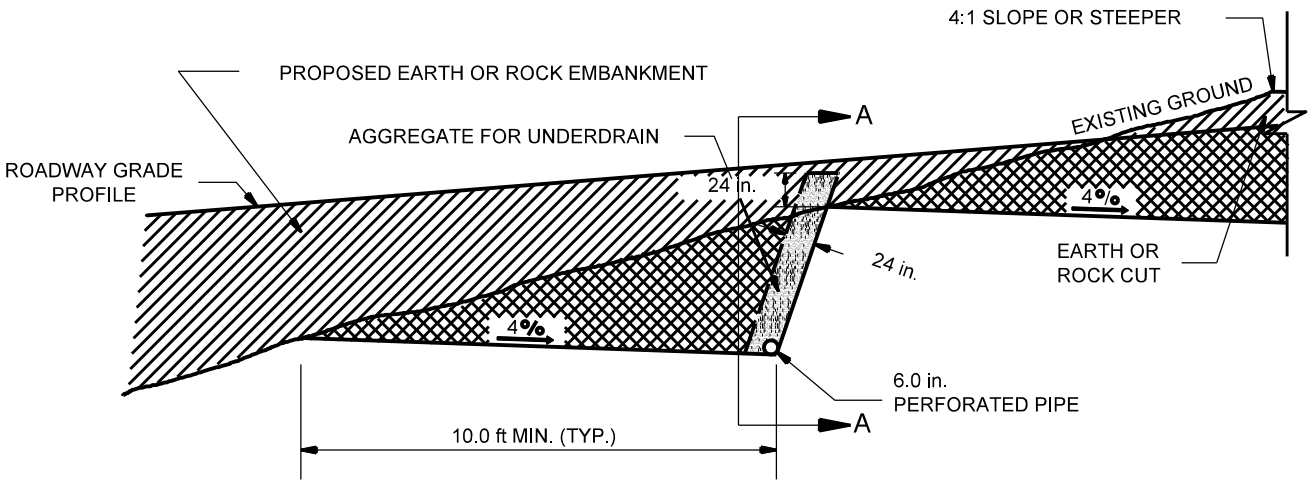
Figure 18-2G



① See Chapter Forty-nine for the applicable clear zone or Chapter Fifty-five for the applicable obstruction-free zone criteria.

TYPICAL SOFT/WEATHERED (RIPPABLE) ROCK CUT BENCHING

Figure 18-2H



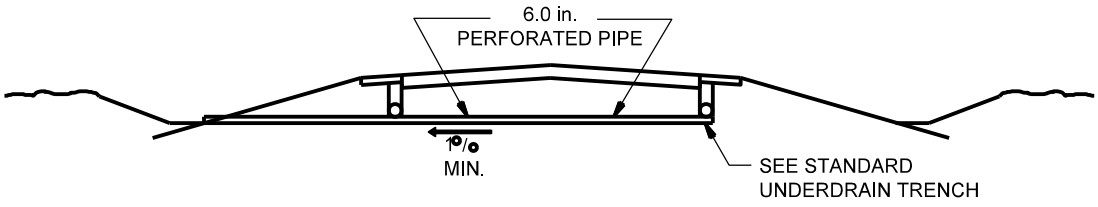
LEGEND

EARTH OR ROCK EMBANKMENT

EARTH AND/OR ROCK EXCAVATION

NOTE: BENCHING IS REQUIRED WHERE THE EXISTING GROUND IS STEEPER THAN 4:1 SLOPE.

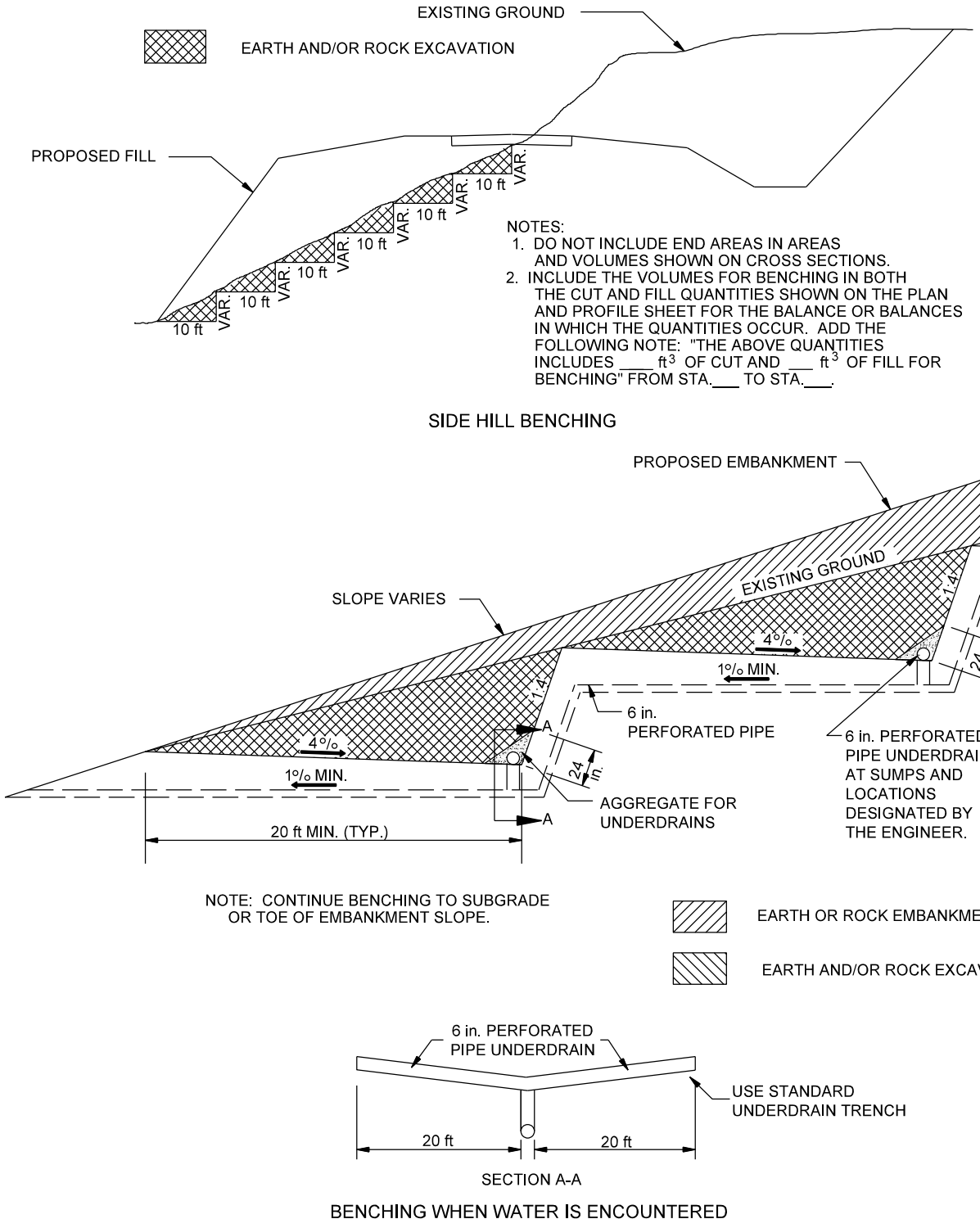
PROFILE VIEW



SECTION A-A

TYPICAL TRANSVERSE INCEPTOR DRAINAGE

Figure 18-2I



TYPICAL BENCHING METHODS

Figure 18-2J

CHAPTER 108

Quantities, Provisions, and Cost Estimating

Design Memorandum	Revision Date	Publication Date*	Sections Affected
12-12	June 2012	Jan. 2013	17-5.09

*Revisions will appear in the next published edition of the *Indiana Design Manual*.

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17-6A Mathematical Formulas

CHAPTER SEVENTEEN

Quantity Estimating

In addition to preparing clear and concise plans, as described in Chapter Fourteen, the designer should compile an accurate summary of the project quantities. This information leads directly to the project cost estimate, which combines the computed quantities of work and the estimated unit prices. An accurate summary of quantities is critical to prospective contractors interested in submitting a bid on the project. In addition to the INDOT *Standard Drawings* and the INDOT *Standard Specifications*, Chapter Seventeen provides additional guidelines on calculating quantities for a highway, bridge, or traffic project.

17-1.0 GENERAL

17-1.01 Guidelines for Preparing Quantity Computations

When preparing quantity computations, the designer should consider the following guidelines.

1. Specifications. Cross check all items against the INDOT *Standard Specifications* to ensure that the appropriate pay items, methods of measurement, and bases of payment are used. If an item is not described in the *Standard Specifications* or recurring special provisions, a unique special provision must be included in the contract documents to cover the item. Chapter Nineteen discusses how to prepare special provisions.

2. Pay Item Code Number. Every pay item has a unique number assigned to it for data processing. This code number is located in the computer programs CES and Estimator. Section 20-2.01 describes these programs. Only the official pay item name and description should be used in the contract documents, special provisions, or summary of quantities.

3. Rounding. The quantity of any item should check exactly with the figure on the computation sheets. Indicate any rounding of the raw estimated figures on the computation sheets. Unless stated otherwise, rounding of the calculations should not be done until the value is incorporated into the Quantity Summary Tables.

4. Significant Digits. When calculating quantities, consider the implied correspondence between the accuracy of the data and the given number of digits.

5. Cost Estimate. Only use the total values from the Quantity Summary Tables to develop the cost estimate. Show all items described in the plans that will be included in the cost estimate. The designer will be responsible for inserting these values into either CES or Estimator.

17-1.02 Computation Records

Quantity-computation sheets may be generated by computer or by hand. Combine all computation sheets and bind them with a cover sheet. The preparer will sign or initial and date each sheet. The checker will also be required to sign or initial and date each sheet.

Check all values obtained through computations or use of standardized tables. For those pay items where agreements may be reached to make payment on the basis of plan quantities, an independent check should be performed and noted. The resolution of any differences between original and check computations should be identified. Where computations are performed by computer, an independent check is not required. However, check the input and review the computation output sheet for mistakes. Also, sign and date the computer output similarly to hand computation sheets.

Retain the quantity computations within the project file.

The contractor may request copies of the quantity calculations subsequent to the letting. Requests prior to the letting from contractors should be directed through the Legal Services Division.

17-1.03 Units of Measurement

Quantities for all contract pay items should be estimated using the measurement units shown in the INDOT *Standard Specifications* or the special provisions. The values determined from the computations should be rounded as described below and shown in the quantities-summary tables and elsewhere in the plans as required.

Rounding of values should be as follows.

1. Small Quantity. For a quantity of 10 or less, round to the nearer whole unit (i.e., 3.2 to 3, 5.5 to 6, or 9.8 to 10).

2. Large Quantity. For a quantity greater than 10, round up to the next whole unit (i.e., 27.8 to 28, or 146.2 to 147).

3. Linearly-Measured Work. Round each linear-measure quantity up to the next whole foot.

4. Earthwork. For an individual cross-section area, round to the nearer 0.1 ft^2. For an individual end-area volume, round to the nearer 1 yd^3. For a total pay quantity, round up to the next multiple of 5 yd^3.

5. Structural Concrete. Round each structural-concrete quantity to the nearest 0.1 yd^3. This includes each individual pour or structure portion and the total quantity for each concrete class shown in bills of materials and the Bridge Summary sheet.

The values shown in the Estimate of Quantities and Cost Estimate developed by the designer should reflect this rounding procedure. The Engineer's Estimate and Schedule of Pay Items developed by the Contract Administration Division's Estimating Office will also reflect this procedure.

17-1.04 Non-Defined Work

17-1.04(01) Lump-Sum Pay Unit

Only use a lump-sum pay unit where the scope of work for the item is clearly defined, and the amount of work has a minimal chance of changing during construction. The INDOT *Standard Specifications* defines which quantities may be estimated as lump sum. Where practical, list the quantities for the separate work that will be included within the lump-sum item. The list should note that the separate quantities are for estimating purposes only. Where there is a significant chance of quantity changes, the work must be by the unit and not lump sum.

17-1.04(02) Item Included in Other Work

No work should be shown as incidental to another pay item or the contract. If any work will be included as part of another item, it must be addressed by the specifications or with a special provision. The designer should only include an item of work in another pay item where the scope of work for both is clearly defined and the probability of the quantity of either item changing is minimal. Minimize the amount of work to be included in other pay items. It is impossible for bidders, or the Department, to prepare an estimate for a project which contains incidental items for which quantities or the scope of work is indeterminable.

17-1.05 Proprietary Material

To ensure competitive bidding, the designer should restrict the use of proprietary materials on a project. A proprietary material is defined through specifications that are so specific that only one product will satisfy the requirements, or that the name of the product is actually specified. However, if a situation occurs where the use of a proprietary material will enhance safety, control costs, or will otherwise improve the project design, the use of a proprietary material may be justifiable. Where this is applicable, the designer should consider the following.

1. Justification. The designer must prepare public-interest finding for the use of a proprietary material not later than the Stage 3 submittal. This should include a description of the circumstance being addressed by the proprietary material, alternative solutions considered, and the reasoning why the proprietary material was chosen. Figure 17-1A, the form that should be used to request approval for the proprietary material, has been revised to be identified as the Proprietary-Material-Use Public-Interest Finding. It now also provides instructions regarding the required specific information. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

2. Existing Facility. A proprietary material may be justified where it is essential for synchronization with an existing highway facility, for which there is no equally suitable alternative.

3. Experimental. A proprietary material may be justified for research purposes or for a distinctive type of roadway. A justification for an experimental or research item must include a work plan detailing the evaluation to be conducted. Each project on the State highway system must follow the procedures described in the *INDOT Guidelines for Initiating and Reporting Experimental Features Studies*.

4. Approval. Submit the justification to the Production Management Division director for approval. This may occur anytime between Design Approval and Final Plans submittal. Use of a proprietary material on a non-exempt NHS project will require FHWA approval. This will occur when the PS&E is submitted for the letting.

5. Approved Proprietary Material. A list of approved proprietary materials which have been found to be in the public interest for use may be found on the Department's website, at www.in.gov/indot/div/M&T/appmat/appmat.htm. Figure 17-1B lists approved proprietary materials which do not appear on the website's list. No justification is required if such a material is specified for use.

17-2.0 EARTHWORK QUANTITIES

17-2.01 Computerized Computations

Earthwork computations can be determined using a computer and special design software packages. Earthwork quantities for a small project, approach, S-line, side road, ditch, or additional-grading feature may require manual calculations (see Section 17-2.02). For computer calculation of mainline earthwork quantities, the information required is as follows:

1. cross section showing existing and proposed ground surfaces;
2. shrinkage and swell factors; and
3. identification of sections not to be included (e.g., bridge section).

The computer can generate a computation of end areas and volumes for each cross section. Show the actual computed end areas and volumes on the plans cross sections.

17-2.02 Manual Computations

For a small project, or to calculate special features on a larger project (e.g., approach, ditch), it may be necessary to calculate the earthwork quantities manually. The following procedures apply.

1. Computation Sheet. See Figure 17-2A, Computation Sheet, for that used by the Department. This form can be used for documenting cross-sectional areas and volumes between cross sections. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

2. End Areas. The end areas used to compute the quantities are defined by the ground lines and typical-section template. See Figure 17-2B, End Area Template. After the cross sections have been plotted, determine the areas of cut and fill for each cross section using a planimeter. Include the waste of unsuitable soils, undercut, rock excavation, trench excavation, or special excavation or embankment on the section. Record the cut and fill areas for each cross section on the computation sheet.

3. Sum of End Areas. The Sum of End Areas columns are the sum of adjacent cross-section areas for the Cut and Fill columns. The line in the figure is offset between the two end areas. This line indicates that two areas are to be added together.

4. Length. Record the distance between stations in this column.

$$V = \left(\frac{A_1 + A_2}{2} \right)(D)$$ (Equation 17-2.1)

5. Volume Computation. Volumes for excavation (cut) and embankment (fill) are determined using the average-end-area formula,

Where: V = volume, yd^3

$A_1 + A_2$ = sum of cut or fill end areas of adjacent sections from the Sum of End Areas, yd^2

D = distance between sections, ft

These values are recorded in the appropriate Volume of Cut and Volume of Fill columns on the computation sheet.

17-2.03 Shrinkage and Swell Factors

Fill quantities calculated manually or by a computer must be adjusted by the appropriate shrinkage factor to account for the compaction of material, loss from hauling, subsidence of the existing ground caused by the overburden, erosion, and clearing operation. The factors used in the calculations will depend on the soil type, quantity to be moved, and engineering judgment. Sand and gravel have smaller shrinkage factors than clay or silt. For rock excavation, it may be necessary to apply an expansion or swell factor. Figure 17-2C, Shrinkage and Swell Factors, provides factors that may be used for preliminary design purposes. A more definitive value may be available from other sources (e.g., the Geotechnical Report).

Only use one shrinkage factor for the entire project or for each individual balance within the project. The district office may provide guidance in choosing the applicable factor(s) to be used in the calculations. The designer may need to adjust the shrinkage factor to account for smaller quantities.

17-2.04 Balancing

For a large project, it is desirable to approximately balance the earthwork (cut and adjusted fill) for the project. An unbalanced project will require the contractor to haul extra material (borrow) or remove the excess (excavation) from the project site, which will typically increase construction costs. Balancing within the project limits can be accomplished by revising the profile grade line, revising cut and fill slopes, revising ditch profiles, etc. To determine if balancing is appropriate, the designer should consider the following.

1. Rural New Construction or Reconstruction. It is desirable to make a reasonable effort to balance the earthwork quantities.

2. Rural 3R Project. The need for balancing will be determined for each project as required.

3. Other Project. For an urban-area, interchange, or partial 3R project it is impractical to provide a balanced grading design. Therefore, it will not be necessary to balance the earthwork.

For a long project, the designer should provide several intermediate balance points. The length of each balance section should not exceed 2000 ft unless an interchange, rest area, or area of deep cut or fill are included. A bridge is not included within the balance limits.

17-2.05 Earthwork Tabulation

To allow the contractor to determine the amount of excavation, borrow, etc., required the designer should include an earthwork balance table in the plans. For a long roadway project, provide a separate table for each balance section. Quantities for benching should be included in the earthwork balance. This table should be included on a Road Plan and Profile sheet, typically in the profile half of the sheet. Figure 17-2D, Earthwork Balance Table (Road Project), illustrates the typical format that should be used. For a bridge project, one earthwork tabulation table will be required for the entire project. Show this table on the Layout sheet. Figure 17-2E, Earthwork Tabulation (Bridge Project) illustrates the typical format that should be used.

17-2.06 Linear Grading

The use of the linear grading pay item is generally limited to a project with a minimal amount of earthwork. This will only include the applications as follows.

1. Preventative Maintenance, Functional, or Structural Pavement Treatment. Linear grading consists of earth wedging at the outside edge of each shoulder where the pavement is to receive one of these treatments. If this type of earthwork is significant enough to require benching, linear grading should not be considered.

2. Guardrail. Linear grading consists of earth wedging behind guardrail to obtain the required earth backup for the posts. If this type of earthwork is significant enough to require benching, linear grading should not be considered.

3. Median. Linear grading consists of earth filling a median required for paving shoulders and placement of a concrete median barrier where travel lanes are not being added.

All other earthwork should be paid for as common excavation and borrow.

Where linear grading is being considered, the measurement for payment will be based on the length of roadway per linear foot measured along the centerline actually constructed to the lines and grades shown in the typical cross section. Measurement will be made once per centerline per area. Typical cross sections should be separated.

The pay-quantity limits should be measured along the roadway centerline, with deductions for bridges, etc. For example, a divided-roadway project length is 25,000 ft, and includes two bridges with a combined length of 600 ft. Linear grading is to be done in the median and beyond the outside shoulders. The linear-grading pay length is 24,400 ft. The plans should indicate which work is to be included in the linear-grading pay item, both by typical section and in estimated quantities per area of linear grading, i.e., cubic yards of common excavation.

The pay unit for linear grading is linear-foot.

17-2.07 B Borrow

Where B borrow is specified, it should be considered as a separate pay item. All locations where B borrow is to be placed should be shown on the plans. When estimating the quantity of B borrow, the designer should consider the following.

1. Mechanically Stabilized Earth Retaining Wall. B borrow is placed outside of the limits of structure backfill (e.g., beyond the reinforcing straps). Section 17-4.05 provides additional information for determining backfill material quantities for a retaining wall.

2. Unsuitable Materials. B borrow is used to replace unsuitable materials (e.g., peat) within the roadway structure. Section 18-2.06 provides guidance for determining the locations for the placement of B borrow with peat excavation.

3. Culvert Replacement. Where a culvert is to be removed for an existing roadway, replace the culvert excavation material with B borrow.

17-2.08 Structure Backfill

17-2.08(01) Structure-Backfill Types

Structure backfill has been subdivided into types. Each type should be specified as described below.

1. Type 1. This type should be specified for a location as follows:

    a. longitudinal or transverse structure placed under, or within 5 ft of, the back of paved shoulder or back of sidewalk of a new facility, or

    b. such a structure for an existing facility where all existing pavement is to be replaced.

2. Type 2. This type should be specified for a location as follows:

    a. longitudinal or transverse structure placed under, or within 5 ft of, the back of paved shoulder or back of sidewalk where undisturbed existing pavement is to remain; or

    b. precast-concrete three-sided or four-sided structure with height of cover of 2 ft or greater.

3. Type 3. This type should be specified for use behind a mechanically-stabilized-earth retaining wall.

4. Type 4. This type should be specified for a location as follows:

    a. trench where a utility line is present; or

    b. behind a reinforced-concrete slab-bridge end bent.

5. Type 5. This type should be specified for a location as follows:

    a. precast-concrete three-sided or four-sided structure with height of cover of less than 2 ft;

    b. filling voids in an underground facility;

    c. filling in an abandoned pipe or structure; or

    d. other application that does not require excavation.

17-2.08(02) Information to be Shown on Plans

Structure backfill is a separate pay item. The pay-item name should include the type. The pay unit is square yard. In estimating the quantity of structure backfill, the following should be considered.

1. Drainage Structure. Section 17-3.0 discusses the procedure for estimating structure-backfill quantities for a drainage structure.

2. Abutment. The quantity of structure backfill should be determined and shown similarly to that for a concrete retaining wall, i.e., 1:1 backslope to a point 1.5 ft outside the neat lines of the abutment footing. See Section 17-5.05(01).

3. Retaining Wall. The quantity of structure backfill should be determined and shown on the cross sections at each retaining-wall location. Section 17-5.05(02) provides additional information regarding retaining-wall structure backfill.

17-2.09 Flowable Backfill

Flowable backfill is a separate pay item. It is required for backfilling behind the end bents of a reinforced-concrete slab bridge, or behind the wingwalls of a precast-concrete three- or four-sided structure. It is also required for backfilling a new cross-culvert placed under an existing roadway.

Flowable backfill for use other than as structure backfill should be specified as either removable flowable or non-removable flowable backfill. R should be entered in Structure Data sheet's Flowable Backfill column if the material is removable. N should be entered in the column if the material is non-removable.

17-3.0 DETERMINING PIPE-BACKFILL QUANTITIES

The determination of pipe-backfill quantities is based on the pipe shape, pipe-interior designation, backfill method, and backfill material.

For additional guidance on determining pipe-backfill quantities, see the INDOT *Standard Specifications* or the INDOT *Standard Drawings*, or contact the Production Management Division's Design Resources Team.

17-3.01 Background Information

17-3.01(01) Pipe Shape

The pipe shape is either circular or deformed.

17-3.01(02) Pipe-Interior Designation

The interior of a pipe is either smooth or corrugated. For most pipe structures and pipe types, the contractor will have a choice of pipe materials, of either interior designation. For the purpose of determining backfill quantities, a corrugated interior should be assumed.

17-3.01(03) Backfill Method

The standard backfill methods are described below, and also shown on the INDOT *Standard Drawings*.

1. Method 1. This method should be used for a structure to be placed under a new- or replacement-roadway mainline or public road approach, for a structure to be placed under a median embankment, or for a new structure to be placed under an existing roadway mainline or public road approach.

2. Method 2. This method should be used for a structure to be placed under a drive in new or replacement work, or under an existing drive.

3. Method 3. This method should be used for a structure to be placed under a new- or replacement-roadway's median trench.

17-3.01(04) Backfill Material

Unless instructed otherwise, structure backfill is required for each culvert or storm-drain structure, except a field-entrance culvert which is to be backfilled with suitable excavated material.

The contractor may substitute coarse aggregate as an option for structure backfill for backfilling a concrete culvert, pipe, structural plate pipe, pipe-arch, or arch. However, the backfill material should always be identified as structure backfill. If coarse aggregate is used, the ends and top of

the trench are to be capped with geotextile as shown on the INDOT *Standard Drawings*. The geotextile is not a separate pay item.

A specific backfill type should be specified only if, for example, a pipe is to be placed in the vicinity of utilities. Then, flowable backfill should be specified. If structure backfill or flowable backfill are both acceptable alternates, the material should be identified and quantified as structure backfill.

See the INDOT *Standard Drawings* to determine the appropriate backfill materials for the structure based on the backfill method required.

17-3.02 Hand-Calculation of Backfill Quantities

Figure 17-3A identifies the values described below which are required for determining backfill quantities.

17-3.02(01) Circular Pipe, Earth Foundation

C_t = corrugations thickness = 0.5 in.

$$B_c = H_c = \frac{Inside\,Dia. + 2C_t}{12}$$

T_c = trench cover depth over pipe

V_c = 1 ft for $B_c \leq 1.5$ ft, or 1.5 ft for $B_c > 1.5$ ft

For backfill method 1 or 2, $L_B = 2(5) + Pvmt.\ Width + 2\left[2\left(T_c + H_c\right)\right]$,
where $T_c = V_c$. The pavement width is that of the travel lanes plus shoulders.

For backfill method 3, or method 1 in a median embankmemt,
$L_B = Median\ Width - 2\left[2\left(T_c + H_c\right)\right] - 2(5)$. The median width excludes the shoulder widths.

$$A_c = \frac{\pi\left(B_c\right)^2}{4}$$

$W = 0.3B_c$ or 0.75 ft, whichever is greater

$W_b = 2W + B_c$

$$K = 2W + B_c + \frac{2H_c}{12}$$

For backfill method 3, $K_3 = 2W + B_c + \frac{2(H_c + V_c)}{12}$

$$W_t = K + \frac{2T_c}{12}$$

All methods, backfill quantity, B_{BC}, per linear foot from trench bottom to pipe crown:

$$B_{BC} = \frac{[0.5H_c(W_b + K)] - A_c}{27}$$

Method 1 or 2 backfill quantity, B_{CT}, per linear foot from pipe crown to top of trench:

$$B_{CT} = \frac{T_c(K + W_t)}{54}$$

Method 3 backfill quantity, B_{CV}, per linear foot from pipe crown to top of V_c dimension:

$$B_{CV} = \frac{V_c(K + K_3)}{54}$$

Method 3 backfill quantity, B_{VT}, per linear foot from top of V_c dimension to top of trench:

$$B_{VT} = \frac{(T_c - V_c)(K_3 + W_t)}{54}$$

Method 1 backfill per linear foot = $B_{BC} + B_{CT}$.
Method 1 total backfill quantity = $L_B(B_{BC} + B_{CT})$.

For backfill method 2, B_{BC} and B_{CT} each represent different materials, so the quantities should not be added. The total quantity for method 2's B_{BC} material is $(L_B)(B_{BC})$. The total quantity for method 2's B_{CT} material is $(L_B)(B_{CT})$.

For backfill method 3, B_{BC} and B_{CV} are the same material, so the total method 3 quantity of this material is $L_B(B_{BC} + B_{CV})$. B_{VT} represents a different material, so it should not be added to $B_{BC} + B_{CV}$. The total quantity for method 3's B_{VT} material is $(L_B)(B_{VT})$.

17-3.02(02) Circular Pipe, Rock Foundation

The total backfill quantity is that required for an earth foundation plus the foundation backfill required below the pipe. The additional volume is determined as follows:

A = 8 in. or 2/3 ft. The entry in the formula below for W_F must be made in feet.

$$W_F = 2W + B_c - \frac{2A}{12}$$

Backfill quantity, B_F, per linear foot of foundation area:

$$B_F = A\left(\frac{W_b + W_F}{2}\right)$$

Total foundation-backfill quantity = $(L_B)(B_F)$

17-3.02(03) Deformed Pipe, Earth Foundation

C_t = corrugations thickness = 0.5 in.

$$B_c = \frac{Span + 2C_t}{12}$$

$$H_c = \frac{Rise + 2C_t}{12}$$

For backfill method 1 or 2, $L_B = 2(5) + Pvmt.\ Width + 2\left[2\left(T_c + H_c\right)\right]$,
where $T_c = V_c$. The pavement width is that of the travel lanes plus shoulders.

For backfill method 3, or method 1 in a median embankment,
$L_B = Median\ Width - 2\left[2\left(T_c + H_c\right)\right] - 2(5)$. The median width excludes the shoulder widths.

$$A_c = \frac{\left(Pipe\ Opening\right)\left(C_t\right)\left(P\right)}{12}$$

$W = 0.3B_c$ or 0.75 ft, whichever is greater

$W_b = 2W + B_c$

$$K = 2W + B_c + \frac{2H_c}{12}$$

All methods, backfill quantity, B_{BC}, per linear foot from trench bottom to pipe crown:

$$B_{BC} = \frac{\left[0.5H_c\left(W_b + K\right)\right] - A_c}{27}$$

Method 1 or 2 backfill quantity, B_{CT}, per linear foot from pipe crown to top of trench:

$$B_{CT} = \frac{T_c\left(K + W_t\right)}{54}$$

Method 3 backfill quantity, B_{CV}, per linear foot from pipe crown to top of V_c dimension:

$$B_{CV} = \frac{V_c\left(K + K_3\right)}{54}$$

Method 3 backfill quantity, B_{VT}, per linear foot from top of V_c dimension to top of trench:

$$B_{VT} = \frac{\left(T_c - V_c\right)\left(K_3 + W_t\right)}{54}$$

Method 1 total backfill per linear foot = $B_{BC} + B_{CT}$.
Method 1 total backfill quantity = $L_B(B_{BC} + B_{CT})$.

For backfill method 2, B_{BC} and B_{CT} each represent different materials, so the quantities should not be added. The total quantity for method 2's B_{BC} material is $(L_B)(B_{BC})$. The total quantity for method 2's B_{CT} material is $(L_B)(B_{CT})$.

For backfill method 3, B_{BC} and B_{CV} are the same material, so the total method 3 quantity of this material is $L_B(B_{BC} + B_{CV})$. B_{VT} represents a different material, so it should not be added to $B_{BC} + B_{CV}$. The total quantity for method 3's B_{VT} material is $(L_B)(B_{VT})$.

17-3.02(04) Deformed Pipe, Rock Foundation

The total backfill quantity is that required for an earth foundation plus the foundation backfill required below the pipe. The additional volume is determined in the same manner as for a circular pipe.

17-3.03 Computer Program for Determining Backfill Quantities

The computer program, Backfill Calculation Software, is now available on the Department's website at www.in.gov/dot/div/contracts/standards/07Bkfl-qt.xls. Use of the program precludes the need for hand-calculations for cross-structures as shown in the INDOT *Standard Drawings*.

For a circular pipe, the input data include pipe diameter, pavement or median width as required, and T_c.

For a deformed pipe, the input data include pipe size, pavement or median width as required, T_c, span, rise, and perimeter P. Span, rise, and P can be determined from the reference sheets included with the program.

The following backfill-quantities calculation examples are included with the program.

1. Method 1, Circular Corrugated Pipe, Rock Foundation
2. Method 1, Deformed Smooth-Interior Pipe, Earth Foundation
3. Method 1, Circular Smooth-Interior Pipe, Earth Foundation
4. Method 2, Circular Corrugated Pipe, Earth Foundation
5. Method 2, Circular Corrugated Pipe, Structural-Plate Metal, Rock Foundation
6. Method 2, Deformed Corrugated Pipe, Earth Foundation
7. Method 3, Circular Corrugated Pipe, Earth Foundation
8. Method 3, Deformed Corrug. Pipe, Structural-Plate Aluminum Alloy, Earth Foundation
9. Method 3, Deformed Corrugated Pipe, Structural-Plate Steel, Rock Foundation

17-3.04 Video Inspection

Video inspection will be required for each pipe that is inaccessible for visual inspection, or for which visual inspection is impossible. This includes each location considered to be in a confined space. Commercial- and private-drive pipes will not be video inspected. This is a pay item, and should be applied as necessary to each non-underdrain pipe pay item, without regard to INDOT *Standard Specifications* reference number.

17-3.05 Information to be Shown on Plans

The backfill method, material, and quantity; geotextile quantity if applicable; and video-inspection quantity if applicable, should be shown in the Structure Data table for each pipe structure.

17-4.0 ROADWAY QUANTITIES

17-4.01 Pavement Materials

Chapter Fifty-two discusses INDOT pavement design criteria. It also provides information for quantity determinations of subgrades, asphalt materials, concrete materials, underdrains and geotextile wraps. Figure 17-4A, Roadway Factors, provides factors that can be used to determine asphalt pavement and other roadway quantities.

The following method should be used to determine quantities for shoulder corrugations. For an Interstate route, it is sufficient to multiply the number of shoulders requiring corrugations, usually four, by the gross project length in yards. For another type of facility, it is acceptable to multiply the number of shoulders that require corrugations by the gross project length in yards by 0.8 to account for the gaps in the intermittent corrugation pattern. It is not necessary to subtract the length of gaps at bridge approach slabs and bridge decks, driveways, median crossovers, or public road approaches when calculating the quantity. It is also not necessary to subtract the length of non-corrugated shoulder less than 7 ft wide adjacent to a roadside barrier.

17-4.02 Subgrade Treatment

The subgrade is defined as the top surface of a roadbed upon which the pavement structure and shoulders are constructed. The subgrade area should be computed for all areas of new pavement or shoulders, including cuts and fills. The width of the treatment is between points which are 2 ft, or as determined, outside the edges of paved shoulders or back faces of curbs, as shown in Chapter Fifty-two, or as instructed by the Production Management's Office of Geotechnical Services. The lateral limits and type of subgrade treatment should be shown on the Typical Cross Sections on the plans.

17-4.02(01) Subgrade-Treatment Types [Rev. Jan. 2011]

For each of the subgrade treatment types described below, the contractor is to choose from the applicable options for each type. Where subgrade treatment other than that described here is recommended by the Office of Geotechnical Services, a special provision should be prepared.

The subgrade treatment methods are as follows:

1. Type I**.** The contractor's options are as follows:
   a. 14 in. chemical soil modification;
   b. 12 in. of the subgrade excavated and replaced with coarse aggregate No. 53; or
   c. 24 in. of soil compacted to density and moisture requirements.

2. Type IA. The contractor's options are as follows:
   a. 14 in. chemical soil modification; or
   b. 12 in. of the subgrade excavated and replaced with coarse aggregate No. 53.

3. Type IB. This treatment consists of 14 in. chemical soil modification.

4. Type IC. This treatment consists of 12 in. of subgrade excavated and replaced with coarse aggregate No. 53.

5. Type II. The contractor's options are as follows:
   a. 8 in. chemical soil modification;
   b. 6 in. of the subgrade excavated and replaced with coarse aggregate No. 53; or
   c. 12 in. of soil compacted to density and moisture requirements.

6. Type IIA. The contractor's options are as follows:
   a. 8 in. chemical soil modification; or
   b. 6 in. of the subgrade excavated and replaced with coarse aggregate No. 53.

7. Type III. The contractor's options are as follows:
   a. 6 in. of soil compacted to density and moisture requirements; or
   b. 6 in. of the subgrade excavated and replaced with coarse aggregate No. 53.

8. Type IIIA. This treatment consists of 6 in. of the subgrade excavated and replaced with coarse aggregate No. 53.

9. Type IV. This treatment consists of 9 in. of the subgrade excavated and replaced with coarse aggregate No. 53 on geogrid.

17-4.02(02) Subgrade-Treatment Type Determination

1. Project With Subgrade-Treatment Type Determined per Former Practice. The designer should transmit a memorandum to the Office of Geotechnical Services. Such memorandum should request that the Office of Geotechnical Services review the

pavement design to determine the subgrade-treatment type or types required as described herein. Once the Office of Geotechnical Services transmits its determination to the designer, the designer must revise the plans, pay items, and pay quantities accordingly.

A project that did not require subgrade treatment per former practice will likely do so now.

2. Project With Subgrade-Treatment Type Yet to be Determined. The preliminary field check plans should include projected AADT figures and subgrade-treatment areas tabulated for each survey line as shown in Figure 17-4B. During the field check, the Office of Geotechnical Services should be informed of possible shallow utilities, temporary pavement, need for a temporary runaround, or night construction so that it can make suitable recommendations for subgrade type. Such considerations should be documented in the field check minutes.

   The type or types of subgrade treatments described in Section 17-4.02(01) to be used will be specified in the Geotechnical Report. If the Geotechnical Report does not specify the subgrade-treatment type, the designer should send a memorandum requesting the subgrade treatment to the Office of Geotechnical Services.

   The field check may have already been conducted, but the Geotechnical Report may not yet have been received by the designer. For this situation, the designer should submit to the Office of Geotechnical Services the tabulation and information regarding shallow utilities, temporary pavement, need for a temporary runaround, or night construction so that it can make suitable recommendations for subgrade type.

17-4.02(03) Determining Pay Items and Quantities

A divided highway may have parallel but separate subgrade-treatment areas, likely of the same type, depending upon the width of the median. An isolated area such as that on an S-line, median crossover, or possibly a portion of the mainline, may be of a different treatment type than that of the mainline. Quantities should be determined for each required subgrade-treatment pay item.

17-4.03 Placing Pipe Under Existing Pavement

Pay quantities for backfill and pavement replacement work at an installation or replacement of a pipe, culvert, structure, or utility line placed either transversely or longitudinally under an existing paved-roadway alignment will be determined as described below.

17-4.03(01) Determining the Longitudinal Pay Limits of the Pavement Replacement

The following equations, along with the INDOT *Standard Drawings*, should be used to determine the longitudinal pay limits, *L*, in linear feet, of the pavement replacement.

1. Structure of 30 in. Diameter/Span or Smaller.

$$L = 5.5 + \frac{d}{6} + \frac{B_c}{12} \qquad \text{[Equation 17-3.1]}$$

where d = vertical distance from flow line to profile grade, feet
B_c = inside diameter or span, inches

2. Structure of Diameter/Span of Greater Than 30 in.

$$L = 4 + \frac{d}{6} + 0.13B_c \qquad \text{[Equation 17-3.2]}$$

17-4.03(02) Determining Pavement Quantities

The pavement material to be placed should match the existing pavement section as closely as possible. If the existing section is shallower than the minimum section shown on the INDOT *Standard Drawings*, such minimum section should be specified. The designer will determine the existing pavement section from the most recent approved pavement design or existing typical cross sections details. If the existing asphalt pavement section cannot be determined, the minimum HMA section shown on the INDOT *Standard Drawings* with 440 lb/yd^2 HMA Base should be specified. If the existing concrete pavement section cannot be determined, a minimum PCCP section of 9 in. depth should be specified. The same new pavement section should be used for both travelway and shoulders.

1. Asphalt Pavement. Hot mix asphalt (HMA) pavement quantities should be determined for Surface, Intermediate, or Base courses. The thickness of each course should approximate that in place with consideration given to current practice in determining course thicknesses. If a thicker section than the minimum is required, the additional thickness should consist of HMA Base 25.0 mm. The courses and lay rates should be shown on the plans.

The pay unit is ton. The type should be determined as described in Section 52-9.02(03). Quantities should be determined for each course and summed to obtain a total quantity of HMA for structure installation to be shown on the plans on the Structure Data sheet in the Pavement Replacement, HMA columns.

2. Concrete Pavement. The required portland cement concrete pavement (PCCP) quantity is the travelway and shoulder widths times *L* as determined above. The pay unit is square yard. The same pay item should be specified without regard to the required pavement depth. The required depth should be shown on the plans. The new subbase should match the existing thickness and type, whether the existing subbase is open graded or dense graded. The PCCP quantity should be shown on the plans on the Structure Data sheet in the Pavement Replacement, PCCP column.

3. Composite Asphalt over Concrete Base. HMA of the thickness in place should be placed on PCCP of the minimum or greater thickness if required. The HMA material should consist of HMA for Structure Installation as required. The new subbase should match the existing thickness and type, whether the existing subbase is open graded or dense graded. The quantities should be determined and shown on the plans as described in Items 1 and 2 above.

17-4.03(03) Determining Backfill Quantities

Quantities for backfill should be determined based on the section shown in the INDOT *Standard Drawings*, and as described in Section 17-3.01(03). The backfill quantities should be shown on the Structure Data sheet in the appropriate Backfill column. If no Structure Data sheet is included with the plans, the backfill quantities should still be shown on the plans.

17-4.03(04) Determining Underdrain Quantities

Underdrains, if present, should be perpetuated. The only pay quantity will be for the linear measure of underdrains based on the existing configuration. The pay unit is linear foot. Quantities should not be determined for underdrain pipe, aggregate for underdrains, geotextile for underdrains, HMA for underdrains, outlet protector if required, video inspection for underdrains, and all other incidentals for underdrains, as this work is included in the cost of the pay item.

17-4.04 Subbase and Underdrains for Cement Concrete Pavement

17-4.04(01) Subbase

The subbase under cement concrete pavement consists of two aggregates Coarse Aggregate Size No. 8 on top of Compacted Aggregate Base, Type O, No. 53. The INDOT *Standard Specifications* provides the criteria for thickness of these aggregates. The bottom layer of this composite subbase should be designated on the plans as a separation layer. Include this separation layer in a cement-concrete mainline, S-line, or approach pavement except a drive. For estimating and payment purposes, combine the quantities for both aggregate types and designate them together as Subbase for Cement Concrete Pavement. For additional guidance, see Chapter Fifty-two and the INDOT *Standard Specifications*.

17-4.04(02) Underdrains

Underdrains are required under new pavement. Locate the underdrain in the pavement structure as shown in Chapter Fifty-two and provide a detail in the construction plans. For additional guidance, see Chapter Fifty-two and the INDOT *Standard Specifications*. Where underdrains are used, include the following pay items.

1. Underdrain. The underdrain will consist of the pay items as follows:

    a. Pipe, Type 4, Circular, *(size)* in.;

    b. Geotextile for Underdrains; and

    c. Aggregate for Underdrains. Only the aggregate placed below the subgrade is included as aggregate for underdrains.

2. Underdrain Outlets. Underdrain outlets will consist of the pay items as follows:

    a. Pipe Underdrain Outlet, *(size)* in.;
    b. Outlet Protector, *(type)*; and
    c. Delineator Post.

17-4.05 Non-Standard Concrete Median Barrier

A non-standard concrete median barrier may be required on a horizontal curve, superelevation transition, or other locations where the barrier height varies from the standard dimensions, or where the median barrier is attached to a concrete footing or wall cap. Identify these locations

on the plans and include the pay items Concrete, Class A and Reinforcing Steel, on the plans. Also, include a special provision in the contract.

A short length of irregular concrete median barrier section used in conjunction with the standard shape, a barrier at an approach to a bridge pier, sign foundation, or other similar support should be considered concrete median barrier and quantified as concrete barrier.

17-4.06 Concrete Curb Ramps

The pay limit for each curb ramp type is shown on the INDOT *Standard Drawings*. The approximate pay quantity for each type of curb ramp is described in Figure 17-4D, Quantities for Curb Ramps. Quantities for curb or curb and gutter within the curb-ramp limits should be incorporated into the project's appropriate curb or curb-and-gutter quantities. Quantities for sidewalk required outside the curb-ramp pay limit, including those for additional landing area or improved access area, should be incorporated into the project concrete sidewalk quantities. If flared sides are sod instead of concrete, such sodding should be incorporated into the project sodding quantities.

17-4.07 Sodded, Paved, or Riprap Ditch

A longitudinal-ditch slope of flatter than 1% will be seeded. A slope of 1% or steeper but flatter than 3% will require sodding. A slope of 3% or steeper will require a paved side ditch or riprap lining. However, in an area of poor soil, a slope of flatter than 3% may be paved or lined with riprap. A riprap ditch is typically used in a rural area and should be avoided in an urban area. The final ditch-protection type will be determined at the field check in consultation with the district office. The following discusses how to estimate the quantities for each ditch type.

17-4.07(01) Sodded Ditch

A standard sodded ditch is that which is parallel to the pavement profile grade line. A special sodded ditch is that which varies in elevation with respect to the pavement profile grade line. Depending on the side slopes, either ditch type may be used within the clear zone. Do not use a ditch with side slopes of 3:1 or steeper within the clear zone.

A ditch should be sodded to a point 1 ft above the flow line. Figure 17-4E, Sodded Ditch Quantities, provides the factors that can be used to determine the sodding quantities for a 4-ft wide sodded ditch based on various side slopes.

17-4.07(02) Paved Side Ditch

The INDOT *Standard Drawings* and Figure 17-4F, Paved Side Ditch, illustrate the types of paved side ditch used by the Department. To determine the type of paved side ditch, use the criteria provided in Section 30-3.03(02).

When computing quantities, the designer should consider the following.

1. Limits. Where a paved side ditch meets a sodded or unsodded ditch flowing in the same direction, extend the limits of the paved side ditch 25-ft beyond the theoretical point of termination. A longer distance may be required under special circumstances.

2. Measurement. Paved side ditch is measured from station to station in meters. For a grade of 20% or flatter, increase the measured distance from the plans by 5% to compensate for grade. For a grade steeper than 20%, increase the measured distance by 10%.

3. Transition. A paved-side-ditch transition is required at an intersection with an earth ditch or pipe culvert. Convert the transition to an equivalent length of the type of paved side ditch specified. A transition of 10 ft or shorter is also required between two different types of paved side ditches. The transition is provided for in the pay length of the larger type of paved side ditch type specified.

4. Cutoff Wall. A cutoff wall is required at the beginning and end of each paved side ditch. Each cutoff wall is considered to be equivalent to 8 lft of the paved-side-ditch type specified at a location. Therefore, add an additional 8 lft to the measured paved-side-ditch quantity for each cutoff wall required.

5. Lug. A lug is provided to prevent sliding on a steep slope. Each lug is considered equivalent to 8 lft of the paved-side-ditch type specified at a location. Therefore, add an additional 8 lft to the measured paved-side-ditch quantity for each lug required. Lugs should be provided at the locations as follows:

    a. 10 ft downslope from a grade change;

    b. 10 ft downslope from the intersection of two different types of paved side ditches;

    c. at the downslope end of a transition between two different types of paved side ditches; or

d. at the intervals shown in Figure 17-4G, Lug Intervals.

6. Sodding. Provide sodding next to a paved side ditch as shown in Figure 17-4F, Paved Side Ditches. To determine the sodding quantity, use a factor of 2.6 yd^2 per linear foot of paved side ditch. This factor is applicable for all paved-side-ditch types.

17-4.07(03) Riprap-Lined Ditch

When designing a riprap-lined ditch, consider the following:

1. Revetment riprap may be used for a slope of 3% or steeper, but 10% or flatter. Class I or class II riprap should be used for a slope steeper than 10%.

2. At a bridge cone, use the riprap type specified for the bridge cone.

3. Where a riprap ditch meets a sodded or unsodded ditch flowing the same direction, extend the limits of the riprap 25 ft beyond the theoretical point of termination.

4. Place geotextile under the riprap.

5. Show the ditch details on the plans.

6. Use uniform riprap for a ditch which is within the clear zone.

17-4.08 Mailbox Assembly and Mailbox Approach

A project on a rural non-Interstate-route will require mailbox assemblies. Section 51-11.0 provides guidance on the design and location of a mailbox approach. If mailbox locations are not shown on the topographic survey, the designer should not assume that mailboxes are not present on the route. In the absence of survey information, the designer should check for mailboxes at the field check review. The use of the videolog will also aid in determining the location and number of mailboxes.

Figure 17-4H, Mailbox Summary Table, illustrates the mailbox quantities that should be used. If the designer is certain that mailboxes are not located within the project limits, there is no need to include the work in the plans.

17-4.09 Monuments

17-4.09(01) General

A monument is set to define a certain civil boundary such as a section line, or to permanently establish a vital survey point. Monuments used by the Department are shown in the INDOT *Standard Drawings* and are defined as follows.

1. Monument Type A. Use this type with vitrified brick or asphalt surface on concrete base.

2. Monument Type B. Use this type with an asphalt pavement.

3. Monument Type C. Use this type where a monument is required outside the pavement area.

4. Monument Type D. Use this type with a concrete pavement.

5. Benchmark Post. Use this type to establish a Department benchmark.

6. Section Corner Monument. Use this type to monument a section corner.

It is the responsibility of the designer to select the type of monument that best suits the location where a monument is required.

17-4.09(02) Civil Boundary

The following will apply.

1. Location. Provide a monument at each section corner or quarter-section corner that appears within the right of way for a new facility, or for a facility to be reconstructed except as described in Item 2 below. Where a section line crosses a limited-access facility, provide a monument at the intersection of the right-of-way line and the section line. For fenced, limited-access right of way, place the monument outside the fence at each point where the section line crosses the limited-access right-of-way line.

2. Responsibilities. The district office will request the county surveyor to establish each section corner or section line not already defined by a monument at the time of construction. If the county surveyor fail to establish each such point as requested, the district office will eliminate each monument provided for this purpose from the contract.

3. Plans. Designate each monument by type and show it on the plans with an arrow to its approximate location.

17-4.09(03) Survey-Line Control Point

A survey-line control point and its respective monument are used as the basis for the description of all right of way that is acquired. With respect to right-of-way description, it is as significant as a section corner. A survey-line control-point monument must be set by a registered land surveyor. A partial 3R project or a project not requiring additional right of way is exempt from this requirement. The following will apply.

1. Monumenting PI, PC, or PT. The following will apply.

    a. Where a PI appears within the right of way, provide a monument at the PI.

    b. Provide a monument for each PC or PT.

    c. Designate each monument by type and show it on the plans with an arrow to its approximate location.

2. Monumenting Beginning and End Point of Project. Place a monument on the survey centerline at each of these points.

3. Monumenting POT or POC. The following will apply.

    a. It is not necessary to monument each POT or POC. These intermediate points are to be monumented as necessary so that the maximum interval between adjacent monuments does not exceed 1000 ft.

    b. The designer must inspect the plans and select intermediate points to be monumented so that an instrument operator can see a tripod with a target set on an adjacent monument in at least one direction. For this purpose, use a line-of-sight of 4 ft above adjacent monuments.

    c. Locate each monument such that the line-of-sight between adjacent monuments will appear within the right of way.

d. Where practical, a monument required to define a POC or POT should coincide with a POC or POT established during the original survey for greater accuracy in locating the monument.

e. Designate each POC or POT monument by type and station and show it on the plans with an arrow to its approximate location.

17-4.09(04) INDOT Benchmark

A benchmark should be provided at least every 1.5 mi. It should be located as follows.

1. Structure. Include a benchmark on each bridge, slab-top culvert, or box culvert. Where twin structures or dual structures are constructed at the same location, a benchmark is required only on one structure.

2. Non-Structure. Where the spacing of structures is in excess of 1.5 mi, show benchmark posts on the plans and space them such that the maximum spacing between benchmarks is 1.5 mi.

3. Plans. Designate each benchmark post required under Item 2 by station on the plans with the note as follows:

   Benchmark Post Required
   Station _____ + _____

17-4.09(05) Correcting Plans

The district construction engineer will notify the Production Management Division's Survey Team if monuments are to be eliminated from the contract or the location of a monument is changed. The as-built plans are to reflect any changes made to the monument locations shown in the construction plans.

17-4.09(06) Right-of-Way Marker

See Section 85-7.0 for information.

17-4.09(07) National Geodetic Survey Benchmark

Each National Geodetic Survey (NGS) benchmark disturbed by highway construction must be re-established. It is the responsibility of the Contractor to secure the replacement disk for such a benchmark. In addition, the construction plans should include the note as follows:

N.G.S. Benchmark Post No. _____,
Station _____, (Rt.) (Lt.) shall be re-established by the Contractor.

Information for field procedures on resetting a NGS benchmark may be obtained by making the contacts as follows:

For Illinois benchmark:

Illinois Geodetic Advisor
IDOT Administration Building, Room 005
2300 South Dirksen Parkway
Springfield, IL 62764
(217) 524-4890

For Indiana benchmark:

Coordinator for Indiana
Area of Surveying Engineering
School of Civil Engineering
Purdue University
1284 Civil Engineering Building
West Lafayette, IN 47907-1284
(765) 494-2165

17-4.09(08) NGS Horizontal-Control Point (formerly Triangulation Point)

The designer is responsible for notifying the NGS if a NGS horizontal-control point must be re-established due to proposed highway construction. This notification will be by letter from the Production Management Division director and should be made at the time the plans are sent to the district office.

It is not necessary to include a monument in the plans for use in re-establishing a NGS horizontal-control point. However, the appropriate monument should be requested from the NGS to replace the existing monument being re-established. The NGS address is as follows:

National Geodetic Survey
NOAA RC
325 Broadway
Boulder, CO 80303

17-4.09(09) United States Geological Survey Benchmark

Each United States Geological Survey (USGS) benchmark disturbed by highway construction must also be re-established. Information on resetting such may be obtained by contacting the following:

U.S. Geological Survey
Mid-Continent Mapping Center, MS 309
1400 Independence Road
Rolla, MO 65401
Telephone: (573) 308-3808
Fax: (573) 308-3652

17-4.10 Seeding and Sodding

17-4.10(01) Seeding for Grading and Paving Project

The following will apply.

1. Rural Area of 1 ac or Larger. An area within the right of way that is not sodded or paved should be seeded as follows.

   a. Seeding. Use Seed Mixture R as specified in the INDOT *Standard Specifications*. Estimate the quantity assuming an application rate of 170 lb/ac.

   b. Mulching. Use the pay item Mulching Material and estimate it at a rate of 2 T/ac.

   c. Fertilizer. For estimating purposes, assume an application rate of 800 lb/ac.

2. Urban Area of 1 ac or Larger. An area within the right of way that is not sodded or paved should be seeded as follows.

   a. Seeding. Use Seed Mixture U as specified in the INDOT *Standard Specifications*. Estimate the quantity assuming an application rate of 150 lb/ac.

   b. Mulching. Use the pay item Mulching Material and estimate it at a rate of 2 T/ac.

   c. Fertilizer. For estimating purposes, assume an application rate of 800 lb/ac.

3. Rural Area of Smaller Than 1 ac. For an area within the right of way which is not sodded or paved, use the pay item Mulched Seeding R. Estimate the area and pay quantity in square yards.

4. Urban Area of Smaller Than 1 ac. For an area within the right of way which is not sodded or paved, use the pay item Mulched Seeding U. Estimate the area and pay quantity in square yards.

17-4.10(02) Seeding for Grading Project

The following will apply.

1. Shoulder Point to Shoulder Point. The area between the outside shoulder points should be seeded as follows.

   a. Seeding. Use Seed Mixture P as specified in the INDOT *Standard Specifications*. Estimate the quantity assuming an application rate of 80 lb/ac.

   b. Fertilizer. For estimating purposes, assume an application rate of 400 lb/ac.

2. Shoulder Point to Right-of-Way Line. The area between the outside shoulder point and the right-of-way line should be seeded according to the requirements for a grading and paving project as discussed in Section 17-3.10(01).

17-4.10(03) Temporary Seeding [Rev. Jan. 2011]

Temporary seeding is used to establish seeding where temporary cover is required for soil disturbed during construction operations (e.g., temporary runaround). and where late-season soil stabilization and temporary ground cover is required. The following will apply.

1. Seeding. Use seed mixture T, conventional mix, as specified in the INDOT *Standard Specifications*. Estimate the quantity assuming an application rate of 150 lb/ac.

2. Mulching. Use the pay item Mulching Material and estimate it at a rate of 2 t/ac.

The designer should be alert to recognize each work area where soil will be disturbed by construction operations, and is likely to remain in an uncovered state, especially on a multi-phase project, for an extended period of time. Temporary-seeding locations should be shown on the plans, and temporary-seeding-related pay items and quantities should be included to eliminate the need for the negotiation of a contract change order.

17-4.10(04) Seeding for Environmental Mitigation

Where environmental mitigation is required by the environmental document, the Design Summary, or as determined from a field check, specify one of the following seed mixtures.

1. Seed Mixture Grass. The following will apply.

    a. Type 1. Specify this mixture where a special grass is required in addition to the regular seed mixture. The pay item is Seed Mixture Grass Type 1. For estimating purposes, assume an application rate of 195 lb/ac.

    b. Type 2. This mixture is to be furnished at the contractor's expense instead of the regular seed mixture in an urban area that has been disturbed beyond the construction limits.

2. Seed Mixture Legume. The following will apply.

    a. Type 1. Specify this mixture where a special legume mixture is required in addition to the regular seed mixture. The pay item is Seed Mixture Legume Type 1. For estimating purposes, assume an application rate of 190 lb/ac.

    b. Type 2. This mixture is to be furnished at the contractor's expense instead of the regular seed mixture in a rural area that has been disturbed beyond the construction limits.

    c. Signs. Include "Do Not Spray" signs where this mixture is specified.

17-4.10(05) Wildflower Seed Mixture

Where a wildflower seed mixture is specified, prepare the necessary special provisions so that at least three alternatives of equal cost, type, and growing condition are available for the contractor to select. These alternates may be designated by alternate vendors' formulations, by the designer's own non-proprietary formulations, or any combination thereof that results in three equal alternatives. Ensure that alternate component varieties for non-proprietary formulations allow the contractor to make substitutions for component varieties that may be in short supply. If the designer has any questions regarding application rates, method of measurement, or pay item descriptions, he or she should contact the Production Management Division's landscape architect.

17-4.10(06) Sodding

In determining the need for sodding, the designer should consider the following.

1. Sod. Sod should be included as described as follows:

   a. in an earth ditch with longitudinal slope of 1% or steeper but flatter than 3%;

   b. along a paved side ditch (see INDOT *Standard Drawings*);

   c. at a bridge-cone area near a bridge structure as shown in Figure 17-5 I, Riprap and Sodding Limits with Barrier Transitions on Bridge, or Figure17-5J, Riprap and Sodding Limits with Barrier Transitions on RCBA;

   d. in a median ditch of a divided highway; see Figure 17-4 I, Sodding Locations; and

   e. at side-slope break points; see Figure 17-3 I.

2. Nursery Sod. Nursery sod will be required for all exposed surfaces within the right of way of a developed area (i.e., commercial, industrial, residential). A maintained lawn expected to be disturbed by construction a rural area will also require nursery sod.

3. Estimates. Estimate the area of sod and nursery sod in square yards.

4. Water. To estimate the amount of additional water required for sod and nursery sod, assume a rate of 3.6 gal./yd^2. The pay unit is kilogallon, symbol kGAL.

17-4.10(07) Mobilization and Demobilization for Seeding

If pay items for seeding are required, at least one each of the pay item Mobilization and Demobilization for Seeding is required. If the project includes a temporary runaround, add at least one additional unit to the estimate. Additional units may be added as required for the likely progression of work (e.g., for the various construction phases).

17-4.11 No-Passing-Zone Pavement Markings

If a no-passing zone extends beyond the project limits, striping quantities should include required solid-yellow lines and adjacent broken-yellow lines to the ends of such no-passing zone.

17-4.12 Spare Parts Package for Guardrail End Treatment or Impact Attenuator

If a guardrail end treatment or impact attenuator is required, the designer should contact the appropriate district Office of Roadway Services regarding the number of each type and stage of spare parts packages desired. The Office will provide the number of each required, along with the delivery location. Only one delivery address will be permitted. The appropriate recurring special provisions should be modified to incorporate this information and included in the contract documents. The appropriate pay items and quantities should be incorporated into the estimate of quantities and cost estimate.

17-4.13 Temporary Traffic Barrier (TTB)

The total pay quantity of each type of TTB should be computed only once, regardless of how may traffic-maintenance phases it is to be used in, or how many times it must be moved.

The length of the longitudinal portion of TTB should be taken from the beginning point of where it is required to the ending point of where it is required. Gaps required to accommodate public road approaches or drives should be subtracted out. The length of each such gap should be taken as the approach or drive width plus its radii. The lengths of each flared portion should be measured along the flare.

A construction-zone energy-absorbing terminal, if required for use with TTB type 1 or type 3, is a separate pay item to be quantified only once, regardless of how many traffic-maintenance phases it is to be used in, or how many times it must be moved. The length of each construction-zone energy-absorbing terminal, if required for use with TTB type 2 or 4, should be taken as 37.58 ft where used along an outside shoulder, or 12.5 ft where used along a median shoulder. Such lengths should be included in the linear quantities of TTB.

Delineation, and anchoring or other means required to control deflection, are included in the TTB quantities, so they should not be considered when determining the pay quantities.

17-4.14 High-Tension Cable-Barrier System (CBS)

1. Plans. The longitudinal and transverse CBS locations should be shown on the plans. A geotechnical investigation of the soil conditions will be required for the approximate locations of the safety terminal and the representative locations of the intermediate line-post foundations at the respective sites throughout the entire length of the proposed

barrier installation. The geotechnical-investigation results should be incorporated into the contract documents.

2. Quantities. The length of each end terminal should be included in the quantities for CBS. A safety terminal should be included for each end of each CBS run. One spare-parts set should be included. The plans should show all necessary linear-grading work to be done in the median. The quantities should be included in a pay item for linear grading. A traffic-control plan should be included, along with a pay item for maintaining traffic.

17-5.0 BRIDGE QUANTITIES

17-5.01 Structural-Concrete Quantities

17-5.01(01) Cast-In-Place Concrete

Measure concrete quantities, in cubic yards, based on the theoretical volume for the class and use specified. Do not deduct for the volume of piles, joint material, or reinforcing steel within the concrete.

17-5.01(02) Concrete Structural Members

Prestressed I beams and bulb-tee beams will be measured by the linear foot. There is no measurement per each or lump sum. Prestressed box beams will be measured by the square yard.

17-5.01(03) Surface Seal

The manner of showing the limits of surface seal on the plans, and the pay quantity of surface seal, should be determined based on attached Figure 17-5A(0). The quantity in square feet (square meters) should be shown where appropriate on the Bridge Summary of Quantities.

For a bridge with concrete structural members, the tops of all such members, and the outside faces of the fascia members should also be surface sealed. This quantity is included in the concrete-structural-member quantities. It should not be calculated, nor included in the surface-seal quantity shown on the Bridge Summary of Quantities.

17-5.02 Excavation Quantities

Structure excavation can consist of several types of excavation. In addition to the INDOT *Standard Specifications*, Figure 17-5A, Structure Excavations, and the following discuss the various structure-excavation types and how to determine the applicable quantities.

1. Class X Excavation. Specify the pay item Excavation, X, where solid rock, loose stones, boulders of more than 0.5 yd^3 in volume, concrete footings from old structures not shown on the plans, timber grillages, piles, or other similar materials are encountered within the limits of foundation excavation. The volume of class X excavation is determined as follows:

$$\text{Class X Excavation} = \frac{(L)(W)(D)}{27}$$

Where: L = length of footing, ft
W = width of footing, ft
D = depth of class X excavation, ft (See note * in Figure 17-5A)

D extends from the bottom of the footing to the top of the rock elevation.

2. Wet Excavation. Specify the pay item Excavation, Wet, where foundation excavation is encountered below a horizontal plane designated on the plans as the upper limit of wet excavation. The limits for wet excavation quantities are defined as the theoretical volume bounded by the bottom of the footing, the upper limit of wet excavation and vertical planes which are 1.5 ft outside the neat lines of the footing and parallel thereto. The elevation of the upper limit of wet excavation is the low-water elevation plus 1 ft. The volume of any class X excavation encountered within these limits must be subtracted from the wet excavation quantities. The volume of wet excavation is determined as follows:

$$\text{Wet Excavation} = \frac{(L+3)(W+3)D}{27}$$

Where: L = length of footing, ft
W = width of footing, ft
D = depth of wet excavation, ft (See note * in Figure 17-5A)

Additional quantities may be required outside these limits for the following conditions.

a. The plans show a cofferdam with dimensions that exceed 1.5 ft outside the footing and the cofferdam is not a pay item. The theoretical volume for wet

excavation will be based on the dimensions of the cofferdam as shown in the plans.

b. A foundation seal is required. The wet-excavation limits will be extended to the bottom elevation of the foundation seal.

If a portion of the present structure lies wholly or partially within the limits of wet excavation, do not alter the pay quantities for wet excavation.

3. Dry Excavation. The volume of dry excavation is the amount of excavation required from the top of wet excavation to the top of proposed ground line (see note ** in Figure 17-5A). Only include the pay item Excavation, Dry, if the quantity exceeds 250 yd^3. Where dry excavation is not included as a pay item, the quantity is included the concrete quantity. The volume of dry excavation is determined as follows:

$$\text{Dry Excavation} = \frac{(L+3)(W+3)D}{27}$$

Where: L = length of footing, ft
W = width of footing, ft
D = depth of dry excavation, ft (See note ** in Figure 17-5A)

4. Waterway Excavation or Common Excavation. This excavation is the amount of excavation required from the existing ground line to the proposed ground line (see note * in Figure 17-5A). If this excavation is in the main-channel area, the pay item is Excavation, Waterway. Otherwise it is Excavation, Common. If it is as common excavation, add this quantity to the previously computed quantity for the road work. If extensive channel work is required, compute the waterway excavation separately.

5. Foundation Excavation (Unclassified). If there are no other types of structure excavation, the excavation pay item required at each end bent is Excavation, Foundation, Unclassified. The volume of foundation excavation (unclassified) is determined as follows:

$$\text{Foundation Excavation (Unclassified)} = \frac{(L+3)(W+3)D}{27}$$

Where: L = length of footing or end bent cap, ft
W = width of footing or end bent cap, ft

D = depth of excavation from the natural ground line to bottom of the foundation, ft

17-5.03 Piling [Rev. Jan. 2011]

17-5.03(01) Test Piles [Added Jan. 2011]

The geotechnical report will specify the test method for determining the nominal driving resistance of a driven pile as dynamic formula, dynamic-pile load, or static load. If the number of hours required before restriking can occur is not provided in the geotechnical report, 0 should be entered in the appropriate recurring special provision's appropriate blank.

The appropriate test-piling-related pay items are as follows.

1. Dynamic-Formula Method, INDOT *Standard Specifications* Section 701.05(a).

    a. Test Pile, Indicator, Production. One such pile per support is required.

    b. Test Pile, Indicator, Restrike. A quantity of one each is required for each test pile.

    If the geotechnical report does not specify a number of hours before restrike can occur, the pay items for indicator test pile and indicator test pile restrike are not required.
    In addition to the criteria shown in the INDOT *Standard Specifications*, the designer should consider the following.

2. Dynamic Pile-Load Test, INDOT *Standard Specifications* Section 701.05(b).

    a. Test Pile, Dynamic, Production. The required number and locations of such piles per support or structure will be shown in the geotechnical report.
    b. Test Pile, Dynamic, Restrike. A quantity of one each is required for each test pile.
    c. Dynamic Pile Load Test. A quantity of one each is required for each test pile.

3. Static-Load Test, INDOT *Standard Specifications* Section 701.05(c).

    a. Test Pile, Static Load, pile size, Non-Production. The required number of such piles per support or structure will be shown in the geotechnical report.
    b. Static Pile Load Test. A quantity of one each is required for the test pile.

    If this test method is specified, the static-load test-pile location area should be shown on the plans. The geotechnical report will also specify the dynamic-pile-load test for the

same piles. The pay items for test pile, dynamic restrike, and dynamic pile load test will also be required.

If the geotechnical report specifies epoxy-coated or reinforced-concrete-encased piling, the portion of the production test pile that is to be so treated should be quantified as an epoxy-coated or reinforced-concrete-encased pile. The remainder of the pile length should be quantified as a test pile, as described above.

Quantities should not be included for restock piling. This is for construction-oversight personnel use at the conclusion of pile-driving operations.

17-5.03(02) Permanent Piles [Added Jan. 2011]

1. Exposed or Buried Piles. Piles which consist of an exposed portion and a buried portion should be measured as two pay items. The buried portion of a steel-pipe pile is Pile, Steel Pipe, *(pipe-well thickness)* in, *(diameter)* in. The exposed portion is Pile, Steel Pipe, Epoxy Coated, *(pipe-well thickness)* in, *(diameter)* in.

2. Pay Items. The pay items defined in the INDOT *Standard Specifications* should be used. The pay item names will include information on the pile diameter or size, the type of encasement, reinforcing-steel requirements, and the wall thickness of the steel shell.

3. Measurement. The minimum pile tip elevation shown on the General Plan sheet for a stream crossing is established to provide adequate penetration to protect against scour and does not necessarily indicate the penetration needed to obtain the required bearing. The estimated elevation needed to obtain the required bearing is shown only in the Geotechnical Report. The billed length of piling should be computed based on the lower of the minimum tip elevation shown on the General Plan sheet or the estimated bearing elevation shown in the Geotechnical Report.

4. Incidental Items. Do not include separate pay items for pile encasement, reinforcing steel, or concrete filling. These are included in the pay items for the piles.

5. Oversized Predrilled Pile Holes. For an integral end bent structure, include a special provision to define the additional payment breakdown required for oversized predrilled holes and uncrushed gravel backfill. The piles themselves should be measured as described in the INDOT *Standard Specifications*. Include the special provision where the blow count (N) exceeds 35 blows per foot within the 10-ft interval below the bottom of the cap.

17-5.04 Steel Sheet Piling

Steel sheet piling required for railroad protection should be shown on the plans. Sheet piling with a higher section modulus than that specified may be required by the railroad company or by the contractor's bearing design. Sheet piling is cut to 10 ft below the final ground elevation, and left in place after construction is complete. The sheeting is not required for permanent support, but disturbance caused by its removal may be damaging. Steel sheet piling to be left in place is measured by the square foot.

The specified section modulus should be included in the pay item name.

17-5.05 Backfill for a Structure

17-5.05(01) Backfill at Bridge Support

1. End Support.

    a. Beam or Girder Type Superstructure. Backfill behind an end bent should consist of coarse aggregate wrapped in a geotextile as shown in the INDOT *Standard Drawings*. An end bent drain pipe should also be included. A structure over water should have the outlet located on the downstream side wherever possible.

    b. Reinforced Concrete Slab Bridge. Flowable backfill should be used to backfill behind an end bent as shown in the INDOT *Standard Drawings*. End bent drain pipes will not be required.

2. Interior Support.

    a. Railroad or Roadway Grade Separation Structure. The area to a point 1.5 ft outside the neat lines of each footing should be backfilled with structure backfill as shown on the INDOT *Standard Drawings.* The neat-line limits and estimated quantities should be shown on the Layout sheet for each support location.

    b. Bridge Over Waterway. The area to a point 1.5 ft outside the neat lines of each footing should be backfilled with common fill or borrow material.

17-5.05(02) Backfill for Retaining Wall

Chapter Sixty-eight provides the design criteria and warrants for the placement of a retaining wall.

Figure 17-5B, Cast-in-Place Concrete Retaining Wall Earthwork Quantities Limits; Figure 17-5C, MSE Retaining Wall Earthwork Quantities Limits; and Figure 17-5D, MSE Retaining Wall Earthwork Quantities Limits Showing Foundation Treatment, each illustrate the typical pay limits for excavation and backfill material quantities for a retaining wall. The contractor may select an alternate wall design. However, the earthwork quantities should be calculated based on the outermost neat-line construction limits for the wall type shown on the plans.

All excavation quantities required for placement of retaining walls should be incorporated into the project's earthwork quantities tabulation and balancing. The required pay items for a cast-in-place concrete wall are common excavation and structure backfill. The required pay items for an MSE wall are common excavation, structure backfill, and B borrow.

17-5.06 Roadway Items

Where bridge construction is to be included within road-project limits, the bridge designer should provide the road designer with a Layout sheet and a General Plan sheet indicating the proposed roadway construction near the bridge. In addition, the bridge designer will be responsible for providing the road designer with the quantities for the pay items listed in Figure 17-5E, Bridge Pay Items in Road Plans, so that they can be included with the roadway quantities.

17-5.07 Pavement Markings

A bridge project should include pay items and quantities for traffic-lane stripes, edge lines, and signs. A detail or a table illustrating permanent pavement-marking limits and quantities should be shown in the plans; see INDOT *Typical Plan Sheets*. The designer should consider the following.

1. Edge and Center Lines. Determine the quantity for solid-white edge lines and for broken-yellow center lines directly from the plans.

2. No-Passing Zones. The quantity for solid-yellow lines to denote a no-passing zone is an undistributed item. New solid-yellow lines for a no-passing zone should be provided for the entire no-passing zone, even if the no-passing zone extends beyond the limits of the bridge project. Approximate lengths may be determined during the field check. However, actual limits will be determined by the district Office of Traffic.

17-5.08 Regulatory or Warning Traffic Signs

The designer, in conjunction with district-office personnel during the field check review, should determine whether new traffic signs will be required or if the present ones can be reset.

The method of determining quantities for new regulatory or warning traffic signs is as follows.

1. Posts. Sign posts are measured by the linear ft and specified by type.

2. Signs. Sheet signs are measured by the area, in square feet, according to the sheeting type and thickness.

Figure 17-5F, Sign Post and Sheet Sign Summary (Bridge Project), illustrates the signing tables that should be placed on the Bridge Summary sheet or on the Approach Details sheet. For a project with a small number of signs, the totals may be omitted.

Sign codes, description, size, location, post length, and type are listed in the tables according to the guidelines in the *Manual on Uniform Traffic Control Devices*, the INDOT *Standard Drawings* and Chapter Seventy-five. The type and quantity of posts should be determined as shown on the INDOT *Standard Drawings*.

17-5.09 Reinforced Concrete Bridge Approach (RCBA)

17-5.09(01) Summary of Bridge Quantities

Quantities for the following pay items should be included in the Summary of Bridge Quantities table on the Bridge Summary sheet.

1. PCCP of the required thickness in the RCBA and extensions is measured by the square yard. See the INDOT *Standard Drawings* for the required RCBA thickness.

2. Epoxy coated reinforcing steel in the RCBA and extensions is measured by the pound.

3. Dense-graded subbase placed under the RCBA and extensions is measured by the unit ton.

17-5.09(02) RCBA Details

The designer may not be able to use the details and bill of materials shown in the INDOT *Standard Drawings.* The designer should therefore consider providing complete RCBA details on the bridge plans. Complete details should be provided on the plans where the conditions are present as follows:

1. a bridge that will be constructed in two or more phases;

2. a bridge where the RCBA width must be sufficient to provide for more than two travel lanes, auxiliary lanes, or a median;

3. where variable or nonstandard RCBA length, thickness, or details are used; and

4. where concrete sidewalks, median barrier, center curb, lip gutter, etc. must be accommodated.

17-5.10 Riprap and Sodding Limits at Bridge Cone

Figure 17-5 I, Riprap and Sodding Limits with Barrier Transitions on Bridge, and Figure17-5J, Riprap and Sodding Limits with Barrier Transitions on RCBA, illustrate the placement of riprap and sodding at a bridge cone to control erosion. Figure 17-5 I illustrates the placement where the barrier transitions are on the bridge and Figure 17-5J where they are on the RCBA. Riprapping the surfaces of the bridge cones and fill slopes adjacent to the RCBA (Figure 17-5J) is recommended for a new bridge at a stream crossing. Where mowing equipment experiences difficulty traversing riprap drainage turnouts for a grade separation structure (e.g., at an interchange), the bridge cone surfaces may be sodded instead.

For a bridge-rehabilitation project, the designer should review proposed erosion control techniques (e.g., erosion control mat, riprap drainage turnout, sodded flume, curb inlet/piping) with the Production Management Division's Bridge Rehabilitation and Ratings Team and the district office.

17-5.11 Structural-Steel Painting

Steel-bridge painting and partial-bridge painting are designated by type. The type refers to the location of the steel to be painted. The types are as follows.

17-5.11(01) Type 1

The steel to be painted at this location is entirely beneath the bridge deck. A beam or girder bridge is a representative example.

17-5.11(02) Type 2

The majority of the steel to be painted at this location is beneath the bridge deck. However, some steel extends above, but not over the bridge deck. A pony-truss bridge is a representative example.

17-5.11(03) Type 3

The majority of the steel to be painted at this location is above and over the bridge deck. There is also some steel to be painted beneath the bridge deck. A through-truss bridge is a representative example.

A particular structure should have only one Type designation. For example, a through truss with beam-approach spans has a Type 3 designation.

17-5.11(04) Structural-Steel Cleaning

Bridge cleaning and partial-bridge cleaning are designated by the same types as for painting, but are also designated by QP type. The QP designation refers to the contractor's certification level. If the structure was built in 1995 or later, the QP-1 designation should be used. If all or a portion of the structure was built in 1994 or earlier, the QP-2 designation should be used. The Department's *Bridge Inventory Log Book*'s Year Built should be used to determine the QP type.

17-5.11(05) Quantities Determination

The pay quantity is computed as the surface area of the bridge deck, or the out-to-out coping width multiplied by the out-to-out bridge-floor length for each type. The same quantity applies if all or a portion of the steel is to be painted. The portions of the steel to be painted should be identified on the plans.

If only the bearings, end diaphragms, beam ends, etc., are to be cleaned and painted, the work should be identified as painting a portion of the structural steel. Additional clarification should be provided via a unique special provision, or details should be shown on the plans.

A pay item for maintaining traffic should be included. Corresponding pay items for other traffic-maintenance appurtenances, such as construction signs, temporary traffic barrier, attenuator truck, etc., should also be included.

The designer should discuss the need for the inclusion of other site-specific work such as clearing, tree trimming, guardrail removal and replacement, working platform, or other unique items that may be required, with the district Office of Construction's project engineer or supervisor who typically handles painting contracts.

If possible, the number of bridge sites in one contract should be limited to not more than three. This will result in more contracts, but it should result in more-competitive bidding. It will also provide a better opportunity of completing the contract within the temperature and humidity restrictions and within the construction season. Summarization 17-5K shows the information that should be provided in the Contract Information book, along with a sample english-units entry. An editable version of this document is available on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

17-6.0 MATHEMATICAL FORMULAS

Figure 17-6A provides mathematical formulas to be used for various quantity determinations.

Proprietary-Material Transmittal Memorandum

_____, 20____

TO: _____
_____

THRU: _____
_____

FROM: _____
_____

ROUTE: _____

DES. NO.: _____

PROPRIETARY MATERIAL: _____

The attached documentation is for your consideration in approving use of the proprietary material shown above. Pursuant to 23 CFR 635.411, the material satisfies the requirement checked below.

☐ Certification that no suitable equal exists
☐ Certification that product is essential for synchronization
☐ Approval for experimental purposes, Work Plan included
☐ Public-Interest Finding (PIF); suitable alternatives exist but they are not the most cost-effective or in the public's best interest
☐ Programmatic Approval for PIF / certification, Work Plan included

Additional comments: _____

Figure 17-1A

THERE ARE NO APPROVED PROPRIETARY MATERIALS AT THIS TIME.

APPROVED PROPRIETARY MATERIALS

Figure 17-1B

CERTIFICATION FOR PROPRIETARY-MATERIAL USE,
NO SUITABLE EQUAL EXISTS

ROUTE: _____ DES. NO: _____
PROJECT NO.: _____ COUNTY: _____
PROJECT DESCRIPTION: _____
FHWA OVERSIGHT: ☐ YES ☐ NO
PROPRIETARY MATERIAL: _____

1. Description of Need: [Provide a discussion as to why the product was selected, including limitations and conditions for its use. Delete all instructions once fields are completed.]

2. Product History: [Indicate if the product has been used successfully in Indiana or elsewhere.]

3. Product Availability: [Indicate if there are other similar products that can be used, and which other similar products were considered. Indicate that there are not at least two other similar products for Certification. A minimum of 3 vendors' products are necessary to negate the need for a proprietary-material approval. Provide discussion or comparison matrix.]

4. Product Cost: [Provide the difference in the cost of the proposed item to other non-proprietary items. Indicate the additional cost or cost savings for the use of the proposed item. Include an estimate of additional cost incurred as a result of this proprietary-product requirement.]

☐ This certification is for an experimental or research item. The Work Plan is attached.

Prepared By: _____. Date: _____

APPROVED: _____ Date: _____
☐ INDOT Director of Highway Design
☐ INDOT Director of Bridges
Engineering Services and Design Support

CONCURRED: _____ Date: _____
Federal Highway Administration

Figure 17-1C

CERTIFICATION FOR PROPRIETARY-MATERIAL USE,
ESSENTIAL FOR SYNCHRONIZATION

ROUTE: _____ DES NO: _____
PROJECT NO: _____ COUNTY: _____
PROJECT DESCRIPTION: _____
FHWA OVERSIGHT: ☐ YES ☐ NO
PROPRIETARY MATERIAL: _____

1. Description of Need: [Provide a discussion as to why the product was selected, including limitations and conditions for its use. Delete all instructions once fields are completed.]

2. Product History: [Indicate if the product has been used successfully in Indiana or elsewhere.]

3. Product Availability: [Indicate if there are other similar products that can be used, and which other similar products were considered. Indicate that there are not at least two other similar products for Certification. A minimum of 3 vendors' products are necessary to negate the need for a proprietary-material approval. Provide discussion or comparison matrix.]

4. Product Cost: [Provide the difference in the cost of the proposed item to other non-proprietary items. Indicate the additional cost or cost savings for the use of the proposed item. Include an estimate of additional cost incurred as a result of this proprietary-product requirement.]

5. Project Compatibility: [Indicate if this is the only product that is compatible due to function, logistics, or aesthetics. Discuss and document compatibility requirements evaluated. Provide comparisons to other products and their relationship to the product requirements.]

6. Maintenance: [Discuss maintenance issues such as training or storage. Provide discussion as to why other products cannot be used due to maintenance concerns.]

Prepared By: _____. Date: _____

APPROVED: _____ Date: _____
☐ INDOT Director of Highway Design
☐ INDOT Director of Bridges
Engineering Services and Design Support

CONCURRED: _____ Date: _____
Federal Highway Administration

Figure 17-1D

PUBLIC-INTEREST FINDING FOR PROPRIETARY-MATERIAL USE

ROUTE: _____ DES NO: _____
PROJECT NO: _____ COUNTY: _____
PROJECT DESCRIPTION: _____
FHWA OVERSIGHT: ☐ YES ☐ NO
PROPRIETARY MATERIAL: _____

1. Description of Need: [Provide a discussion as to why the product was selected, including limitations and conditions for its use. Delete all instructions once fields are completed.]

2. Product History: [Indicate if the product has been used successfully in Indiana or elsewhere.]

3. Product Availability: [Indicate if there are other similar products that can be used, and which other similar products were considered. Indicate that there are not at least two other similar products for Certification. A minimum of 3 vendors' products are necessary to negate the need for a proprietary-material approval. Provide discussion or comparison matrix.]

4. Product Cost: [Provide the difference in the cost of the proposed item to other non-proprietary items. Indicate the additional cost or cost savings for the use of the proposed item. Include an estimate of additional cost incurred as a result of this proprietary-product requirement.]

5. Project Compatibility: [Indicate if this is the only product that is compatible due to function, logistics, or aesthetics. Discuss and document compatibility requirements evaluated. Provide comparisons to other products and their relationship to the product requirements.]

6. Maintenance: [Discuss maintenance issues such as training or storage. Provide discussion as to why other products cannot be used due to maintenance concerns.]

7. Engineering Analysis: [Compare the project requirements to similar project types and discuss the reasonableness of the requirements. Discuss unique project factors.]

8. Expanded Economic Analysis: [Include life-cycle cost analysis.]

9. Contractual or Performance Implications: [Discuss whether use of this item will impose restrictions on the use of other items specified in the contract or in future contracts.]

10. Attach Supplemental Documentation: [Outline assumptions, product research, and quantifiable benefits.]

11. Length of Time that Approval is Effective: _____

Prepared By: _____. Date: _____

APPROVED: _____ Date: _____
☐ INDOT Director of Highway Design
☐ INDOT Director of Bridges
Engineering Services and Design Support

APPROVED: _____ Date: _____
Federal Highway Administration

PUBLIC-INTEREST FINDING FOR PROPRIETARY-MATERIAL USE

Figure 17-1E (2 of 2)

PROGRAMMATIC CERTIFICATION FOR PROPRIETARY-MATERIAL USE, NO SUITABLE EQUAL EXISTS

ROUTE: _____ DES NO: _____
PROJECT NO:. _____ COUNTY: _____
PROJECT DESCRIPTION: _____
FHWA OVERSIGHT: ☐YES ☐ NO
PROPRIETARY MATERIAL: _____

1. Description of Need: [Provide a discussion as to why the product was selected, including limitations and conditions for its use. Delete all instructions once fields are completed.]

2. Product History: [Indicate if the product has been used successfully in Indiana or elsewhere.]

3. Product Availability: [Indicate if there are other similar products that can be used, and which other similar products were considered. Indicate that there are not at least two other similar products for Certification. A minimum of 3 vendors' products are necessary to negate the need for a proprietary-material approval. Provide discussion or comparison matrix.]

4. Product Cost: [Provide the difference in the cost of the proposed item to other non-proprietary items. Indicate the additional cost or cost savings for the use of the proposed item. Include an estimate of additional cost incurred as a result of this proprietary-product requirement.]

5. Length of Time that Approval is Effective: _____

The Work Plan is attached.

Prepared By: _____. Date: _____

APPROVED: _____ Date: _____
INDOT Deputy Commissioner
Engineering Services and Design Support

APPROVED: _____ Date: _____
Federal Highway Administration

Figure 17-1F

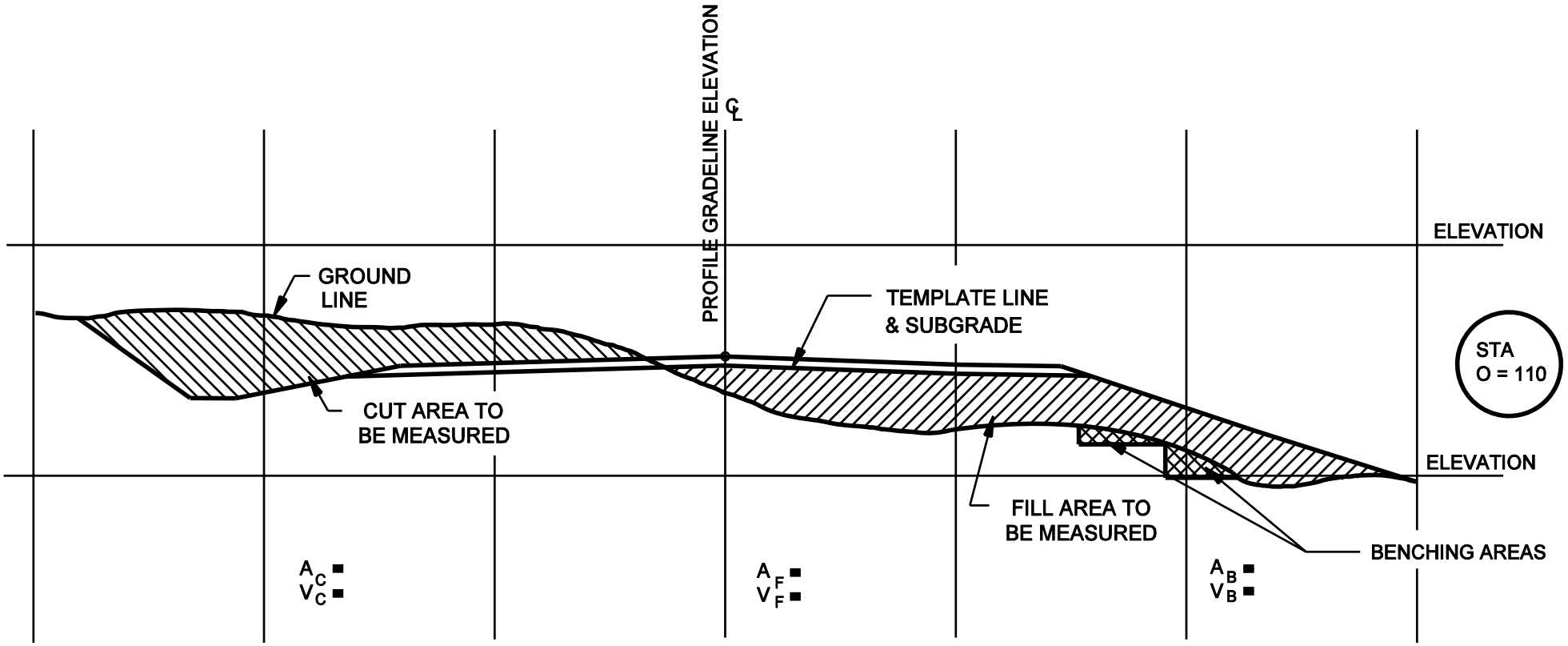
EARTHWORK COMPUTATION

ROUTE ________ DES. NO. ____________ PAGE NO. ___ OF___

BY ____________ DATE ____________ SUBJECT ____________________________

CHKD BY ________ DATE ____________ ____________________________

STATION	AREA CUT (ft^2)	AREA FILL (ft^2)	CUT, SUM END AREAS (ft^2)	FILL, SUM END AREAS (ft^2)	LENGTH (ft)	VOL. CUT (cys)	VOL. FILL (cys)



END AREA TEMPLATE

Figure 17-2B

Recommended shrinkage factor to be used for divided-roadway project:

0 < cys < 1000 / 100 lft	= 25%
1000 ≤ cys < 2000 / 100 lft	= 20%
≥ 2000 cys / 100 lft	= 15%

Recommended shrinkage factor to be used for two-lane-roadway project:

0 < cys < 500 / 100 lft	= 25%
500 ≤ cys < 1000 / 100 lft	= 20%
≥ 1000 cys / 100 lft	= 15%

The recommended shrinkage factor to be used for a shoulder-widening project is 30% to 35%.

The recommended swell factor to be used for a rock fill is 30% to 35%.

SHRINKAGE AND SWELL FACTORS

Figure 17-2C

Earthwork Balance

Fill +____①②	_____ cys
Common Excavation②③④⑤	_____ cys
Unclassified Excavation②③④⑤	_____ cys
Rock Excavation②③④⑤	_____ cys
Borrow or Waste	_____ cys
Peat Excavation	_____ cys
Benching②③⑤	_____ cys

Notes:

① *For shrinkage and swell factors to be used, see Figure 17-2C.*

② *When the project is on new alignment, increase both the excavation and fill quantities to include any benching required. See Figure 18-2J for typical benching procedures.*

③ *Where benching is required for construction of a new embankment over an existing embankment, no direct payment is made for benching.*

④ *Excavation for subgrade treatment is not included in the excavation quantities.*

⑤ *If applicable, include a note that the _____ excavation quantity includes _____ cys of unsuitable material and/or _____ cys of benching.*

EARTHWORK BALANCE TABLE
(Road Project)

Figure 17-2D

Earthwork Tabulation

Fill +20%	_____ cys
Common Excavation ①	_____ cys
Usable Waterway Excavation (_____ %) ②	_____ cys
Surplus Foundation Excavation ③	_____ cys
Borrow or Waste	_____ cys
Total Waterway Excavation④	_____ cys
Benching (Estimated) ⑤	_____ cys

① *Excavation for subgrade treatment is not included in the above excavation quantities.*

② *Show the actual usable portion on the plans (_____ %). Estimate the percentage during the field check. If no other information is available, use 70%.*

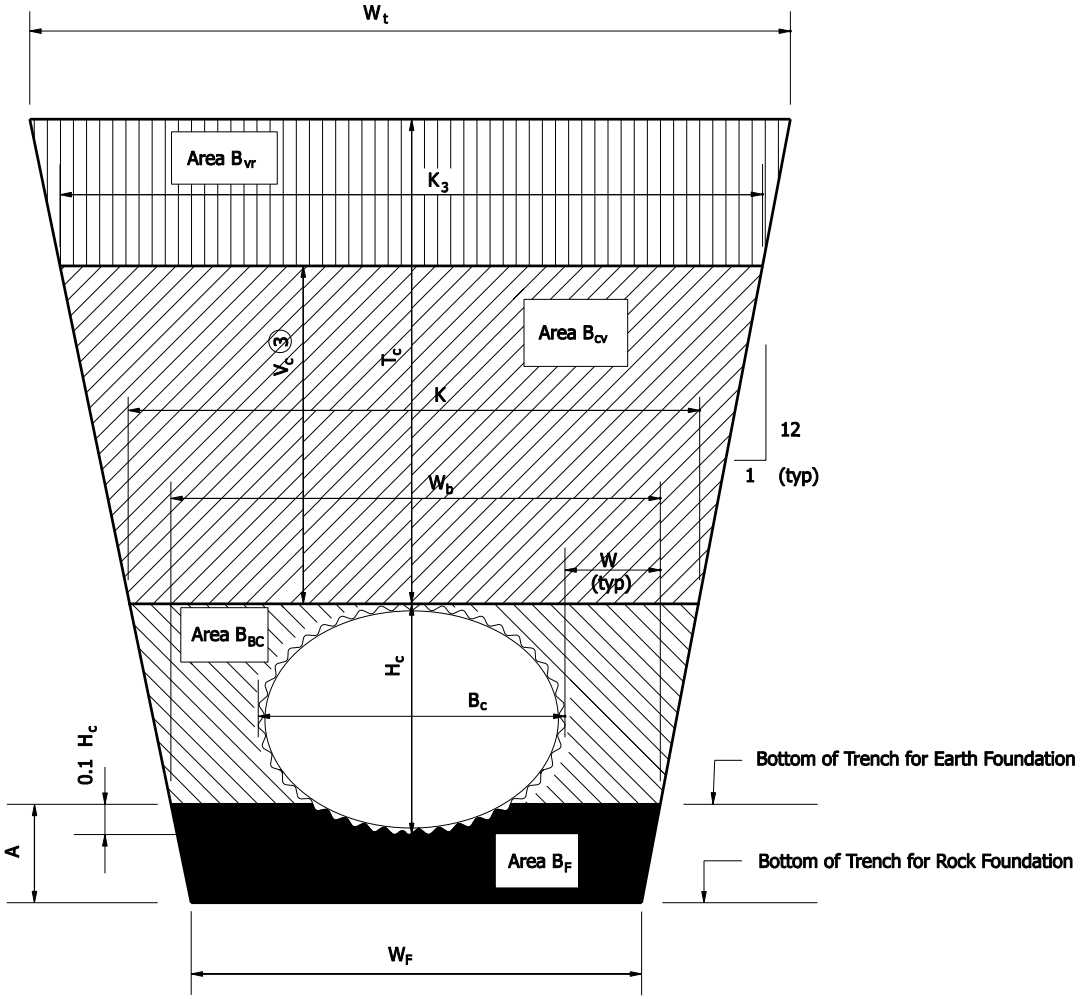
③ *Includes earth volume displaced by substructure concrete or structure backfill at foundation excavations. If this volume < 100 cys, do not include it in the earthwork tabulation.*

④ *Include all material excavated to shape the channel under the structure, reduced by the estimated concrete volume of existing piers or abutments above the channel-clearing line. Abutment backfill above the clearing line should be included in waterway excavation.*

⑤ *Benching is to be shown on the cross sections. Benches are to be 8 ft to 10 ft wide where practical. Volume should be estimated and shown in the earthwork tabulation. The benching quantity is not included in the common-excavation quantity.*

EARTHWORK TABULATION,
BRIDGE PROJECT

Figure 17-2E



Notes:

1. Area A_C is the pipe area to the outside edge of the corrugations.

2. For a circular pipe, $B_C = H_C$.

③ For backfill method 1 or 2, $V_C = T_C$.

BACKFILL AREA PER LINEAR FOOT OF PIPE, EARTH FOUNDATION

Method 1 Structure or flowable backfill as required, $B_{BC} + B_{CV} + B_{VT}$

Method 2 Structure or flowable backfill as required, B_{BC}
Compacted earth backfill, $B_{CV} + B_{VT}$

Method 3 Structure or flowable backfill as required, $B_{BC} + B_{CV}$
Compacted earth backfill, B_{VT}

BACKFILL AREA PER LINEAR FOOT OF PIPE, ROCK FOUNDATION

Method 1 Structure Backfill, B_F
Structure or flowable backfill as required, $B_{BC} + B_{CV} + B_{VT}$

Method 2 Structure backfill, B_F
Structure ofr flowable backfill as required, B_{BC}
Compacted earth backfill, $B_{CV} + B_{VT}$

Method 3 Structure backfill, B_F
Structure or flowable backfill as required, $B_{BC} + B_{CV}$
Compacted earth backfill, B_{VT}

VALUES REQUIRED FOR DETERMINING BACKFILL QUANTITIES

Figure 17-3A

Asphalt Mixtures	
Pavement Thickness	Factor
1 in.	110 lb/yd^2 = 0.055 T/yd^2
1.25 in.	140 lb/yd^2 = 0.070 T/yd^2
1.5 in.	165 lb/yd^2 = 0.083 T/yd^2
1.65 in.	180 lb/yd^2 = 0.090 T/yd^2
2 in.	220 lb/yd^2 = 0.110 T/yd^2
2.25 in.	250 lb/yd^2 = 0.125 T/yd^2
2.5 in.	275 lb/yd^2 = 0.138 T/yd^2
2.75 in.	300 lb/yd^2 = 0.150 T/yd^2
3 in.	330 lb/yd^2 = 0.165 T/yd^2
3.25 in.	360 lb/yd^2 = 0.180 T/yd^2
3.5 in.	385 lb/yd^2 = 0.193 T/yd^2
4.5 in.	495 lb/yd^2 = 0.248 T/yd^2
8 in.	880 lb/yd^2 = 0.440 T/yd^2
Asphalt for Prime Coat	0.63 gal./yd^2 = 0.0028 T/yd^2
Asphalt for Tack Coat	0.06 gal./yd^2 = 0.00025 T/yd^2

Riprap	
Riprap	1.5 T/yd^3

Water for Sodding	
Water	4 gal./yd^2 = 0.004 kgal/yd^2

Pavement Markings	
Permanent Broken Centerline	0.25 lft/ft

Compacted Aggregate	
Aggregate Thickness	Factor
3 in.	0.167 T/yd^2
4 in.	0.222 T/yd^2
5 in.	0.278 T/yd^2
6 in.	0.333 T/yd^2
7 in.	0.389 T/yd^2
8 in.	0.444 T/yd^2
9 in.	0.500 T/yd^2
12 in.	0.667 T/yd^2

B Borrow for Draintile	
Pipe Dia.	Factor
6 in.	0.257 yd^3/lft
8 in.	0.269 yd^3/lft
10 in.	0.278 yd^3/lft
12 in.	0.304 yd^3/lft
18 in.	0.502 yd^3/lft

Aggregate for Underdrains	
Pipe Dia.	Factor
6 in.	0.090 yd^3/lft
8 in.	0.110 yd^3/lft
10 in.	0.136 yd^3/lft

Shoulder Drains	
Flat Terrain	24.8 T/mi
Rolling Terrain	30.2 T/mi
Hilly Terrain	35.5 T/mi

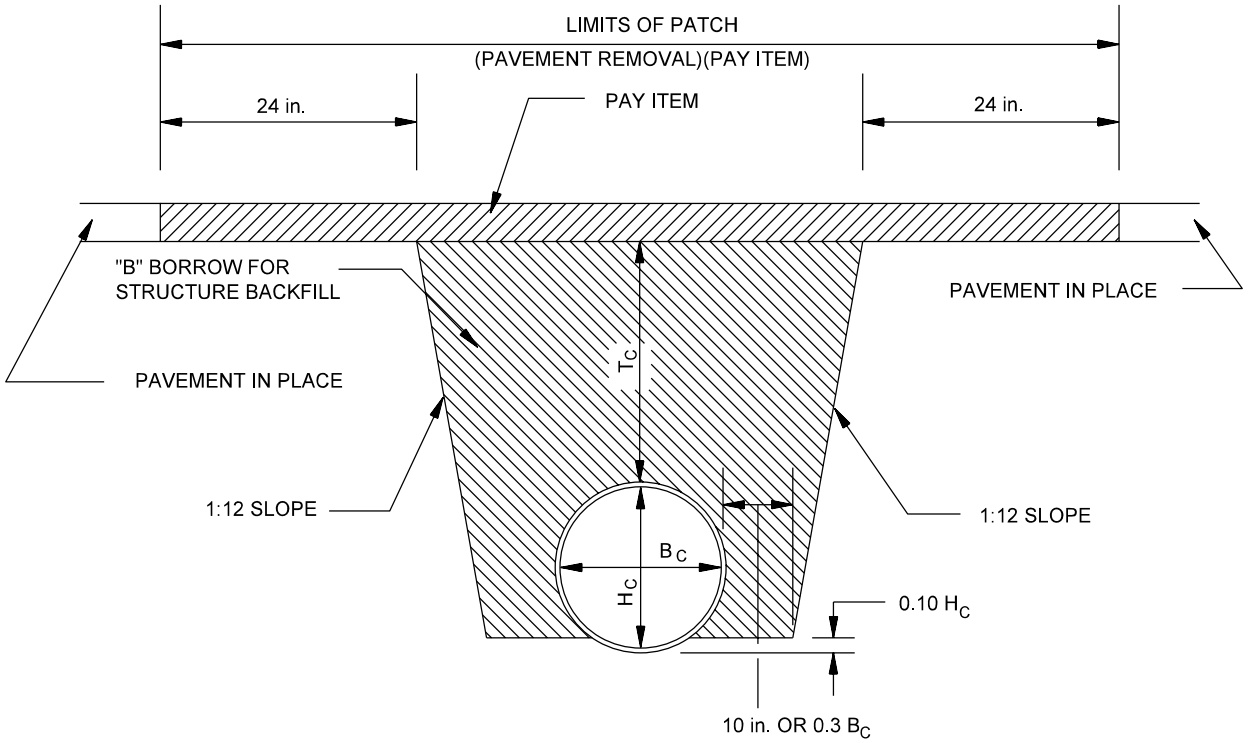
ROADWAY QUANTITIES FACTORS

Figure 17-4A

Line	Design-Year AADT	Treatment Area, SYS
“A”	20,000	10,000
“S-1-A”	300	500
“S-2-A”	400	950

EXAMPLE TABULATION OF SUBGRADE TREATMENT INFORMATION TO ACCOMPANY MEMORANDUM TO MATERIALS AND TESTS DIVISION

Figure 17-4B



Note:

B_C = Overall diameter or span
H_C = Overall diameter or span
T_C = Trench cover depth

PLACING PIPE UNDER EXISTING ROADWAY

Figure 17-4C

Curb Ramp Type	6-in. Curb		8-in. Curb	
	Assumptions for Calculation Purposes (Top Landing Not Incl. in Area), All Dimens. ft	Area (SYS)	Assumptions for Calculation Purposes (Top Landing Not Incl. in Area), All Dimens. ft	Area (SYS)
A	Sdwk. width 10	7.0	Sdwk. width 12	11.1
B	Sdwk. width 13; R = 10 Sdwk. width 18; R = 25	16.4 21.4	Sdwk. width 15; R = 10 Sdwk. width 20; R = 25	19.4 30.6
C	Utility-strip width 6	2.7	Utility-strip width 8	3.5
D	Utility-strip width 6	2.7	Utility-strip width 8	3.5
E	Utility-strip W = 10 (one side only); Sdwk. W = 4, R = 10 Sdwk. W = 7, R = 25	10.7 6.0	Not possible to construct on utility-strip width of 10	n/a
F	Sdwk. width 4; R = 15 Sdwk. width 4; R = 25	14.3 21.6	Sdwk. width 4; R = 15 Sdwk. width 4; R = 25	16.1 23.3
G	Sdwk. 5, Util. 6; R = 25	4.9	Sdwk. 5, Util. 6; R = 25	6.0
H	Sdwk. Width 6; R = 25	6.3	Sdwk. Width 6; R = 25	7.7
K	Sdwk. width 5	8.9	Sdwk. width 5	11.1
L	Grass median width 16	9.3	Grass median width 16	9.3

QUANTITIES FOR CURB RAMPS

Figure 17-4D

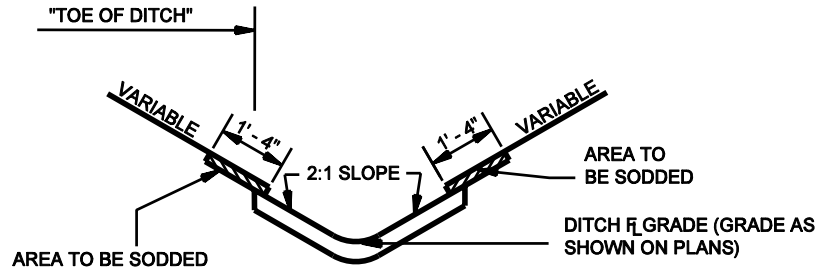
Foreslope	Backslope	Sodding Factor (syd/lft)
6:1	4:1	1.56
4:1	4:1	1.33
4:1	3:1	1.22
3:1	3:1	1.11
3:1	2:1	1.00

Notes:

1. *Sodding factor assumes a 4-ft wide ditch bottom.*
2. *Sodding factor assumes sodding is placed to a height of 1 ft above the flow line.*
3. *For sodding next to a paved side ditch, use a sodding factor of 0.3 syd/lft.*

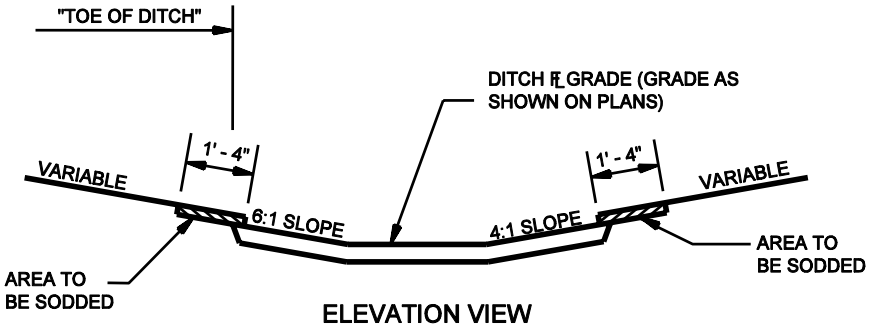
SODDED-DITCH QUANTITIES

Figure 17-4E



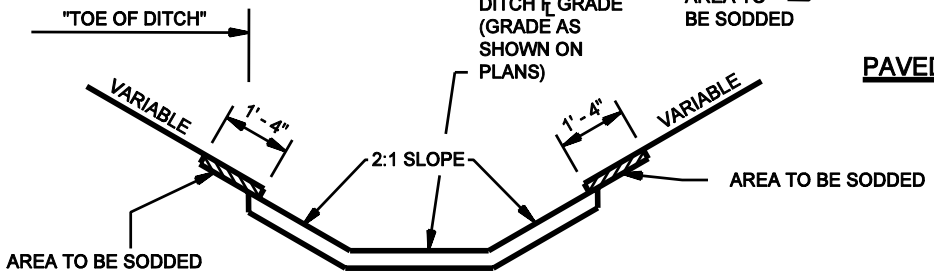
ELEVATION VIEW

PAVED SIDE DITCH TYPES A THROUGH D



ELEVATION VIEW

PAVED SIDE DITCH TYPES J THROUGH M



ELEVATION VIEW

PAVED SIDE DITCH TYPES E THROUGH H

Note: Do not use n2:1 side slopes within the clear zone.

PAVED SIDE DITCHES

Figure 17-4F

Grade Range	Interval
3% ≤ Grade < 5%	200 ft
5% ≤ Grade < 8%	150 ft
8% ≤ Grade < 10%	100 ft
10% or greater	50 ft

LUG INTERVALS

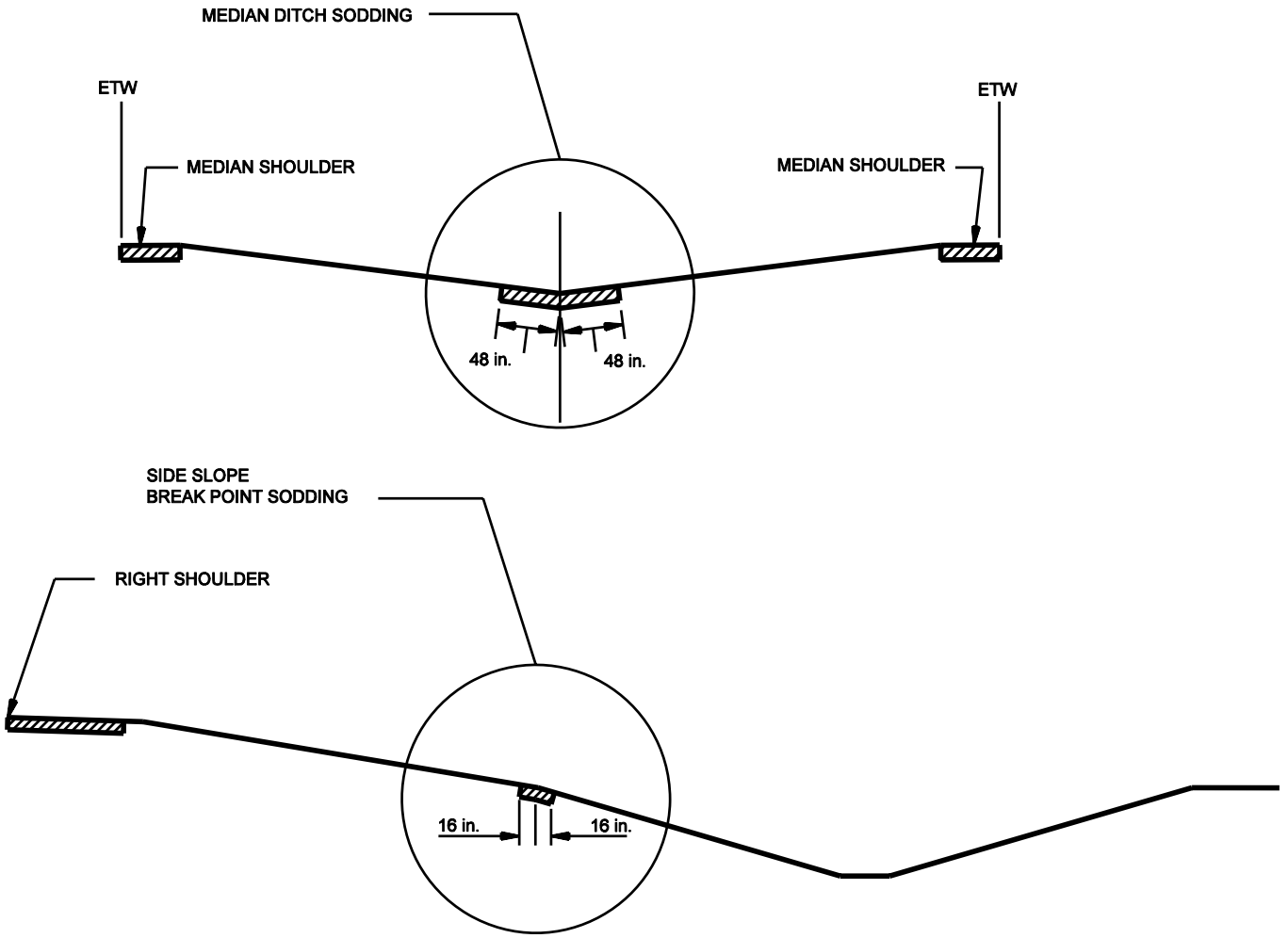
Figure 17-4G

MAILBOX APPROACHES *					
LOCATION		DESCRIPTION	WIDTH (ft)	MAILBOX ASSEMBLIES REQUIRED	
LT or RT	℄ BOX STATION			SINGLE	DOUBLE
LT	106+41	Paved Shoulder, Mailbox Beyond Drive	10	--	1
RT	106+54	Paved Shoulder, Mailbox Before Drive	10	1	--
LT	124+32	Paved Shoulder, Mailbox Beyond Drive	8	2	1

* See the *INDOT* Standard Drawings.

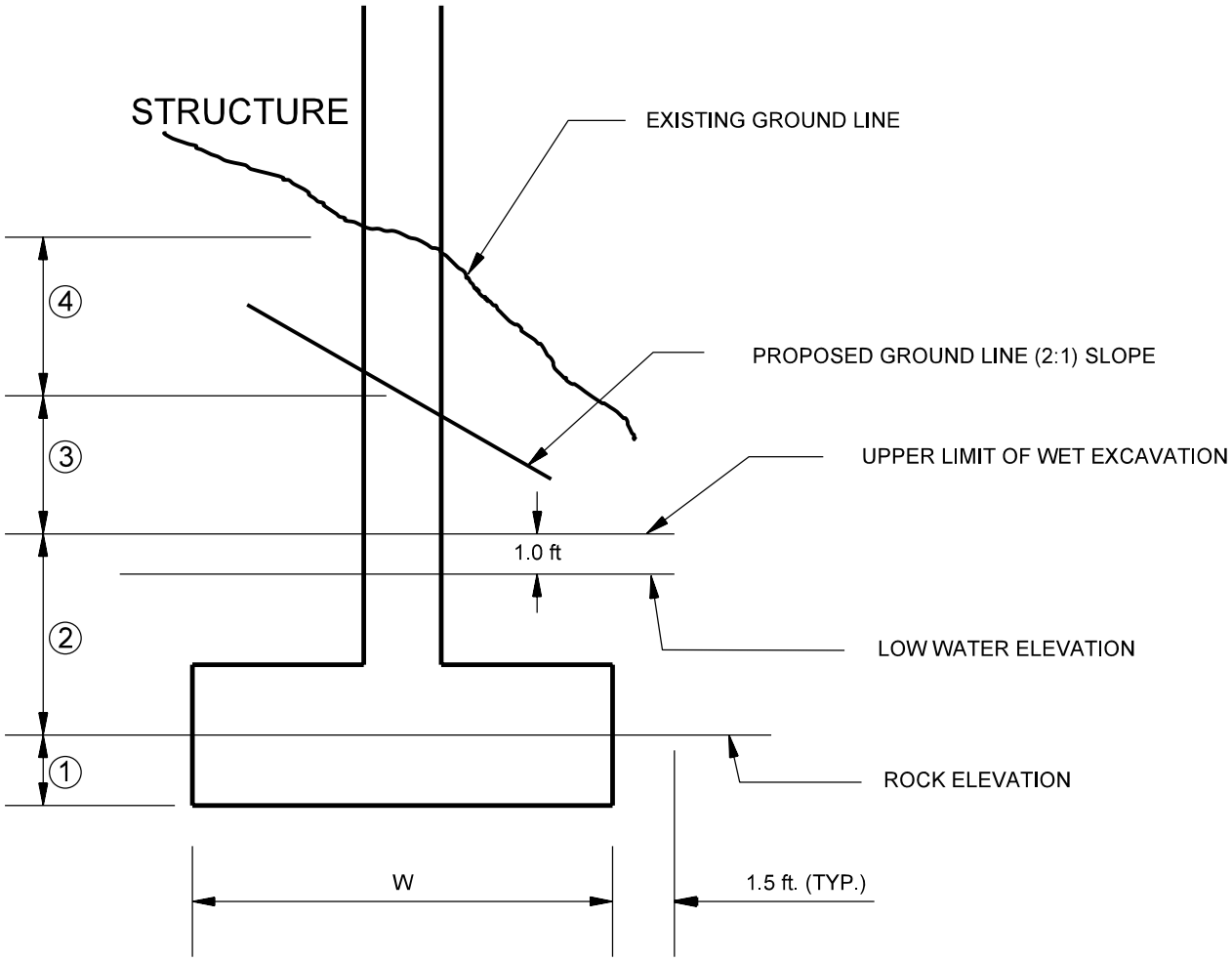
SAMPLE MAILBOX SUMMARY TABLE

Figure 17-4H



SODDING LOCATIONS

Figure 17-4I

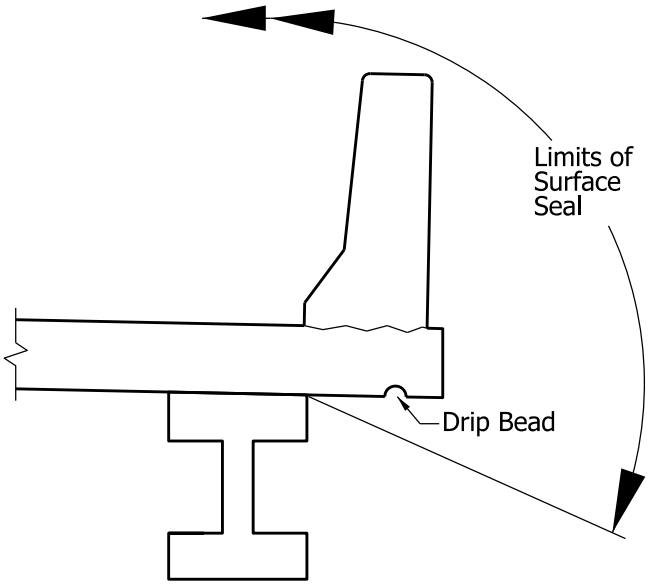


① Class "X" Excavation
② Wet Excavaton
③ Dry Excavation
④ Waterway Excavation or Common Excavaton

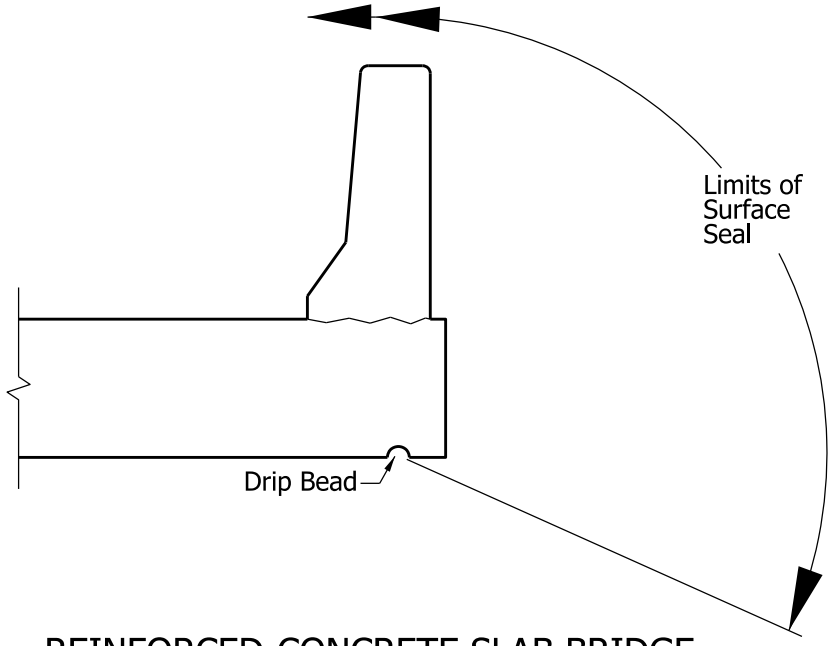
Note: See Section 17-4.02 and INDOT Standard Specifications for additional guidance

STRUCTURE EXCAVATION

Figure 17-5A



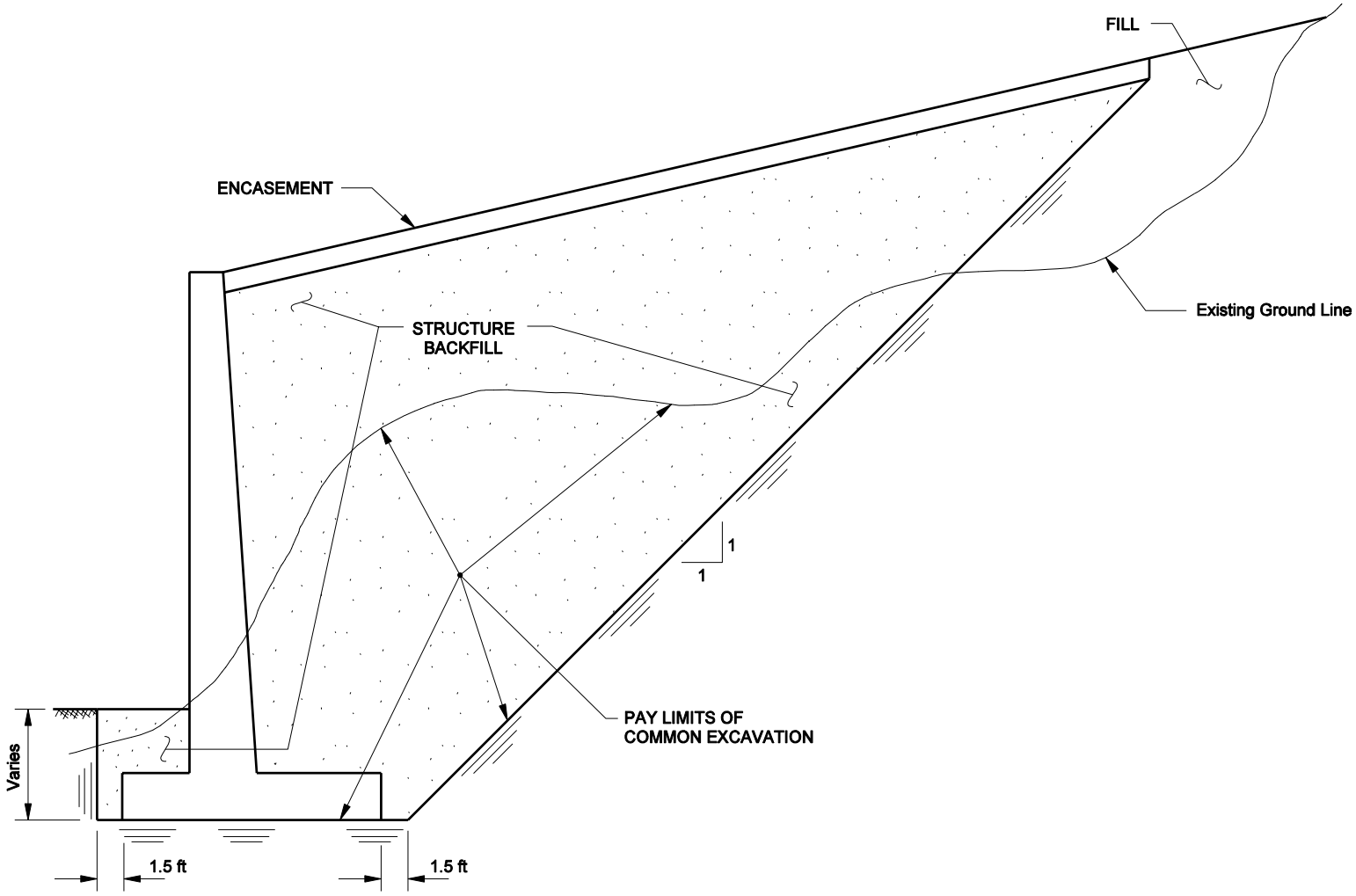
BRIDGE WITH STRUCTURAL MEMBERS



REINFORCED-CONCRETE SLAB BRIDGE

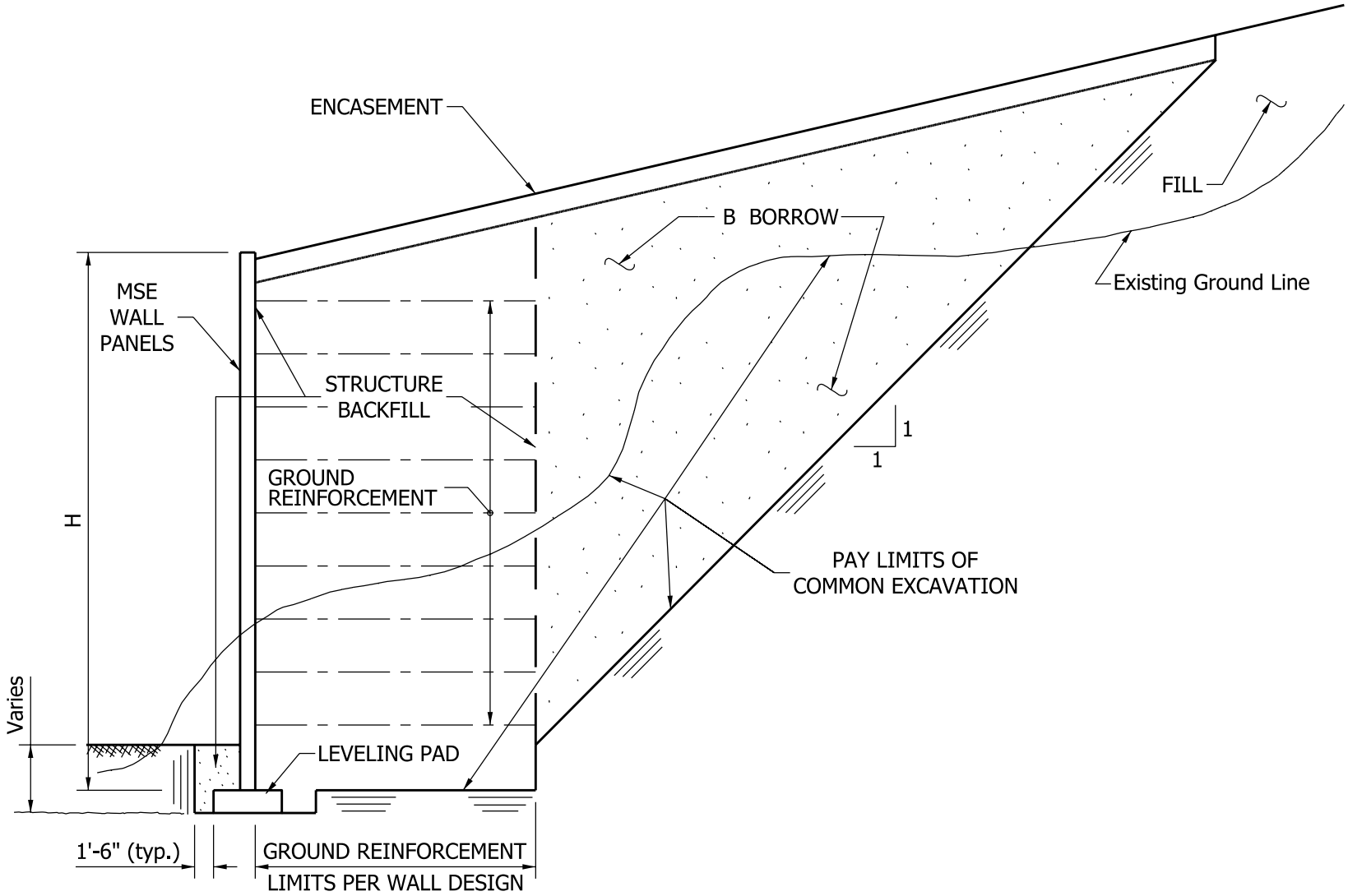
LIMITS OF SURFACE SEAL TO BE SHOWN ON PLANS

Figure 17-5A (0)



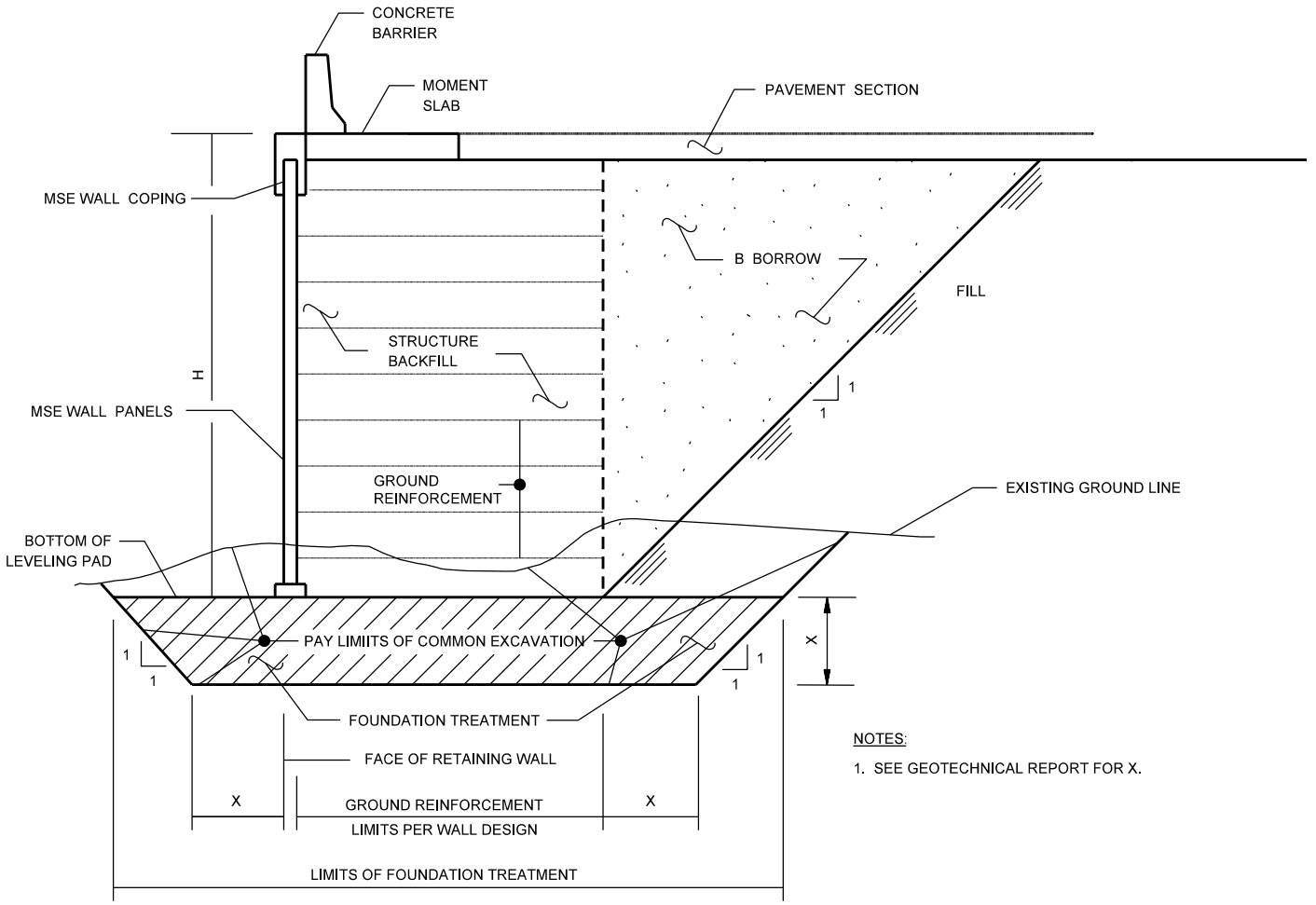
CAST-IN-PLACE CONCRETE RETAINING WALL EARTHWORK QUANTITIES LIMITS

Figure 17-5B



MSE RETAINING WALL EARTHWORK QUANTITIES LIMITS

Figure 17-5C



MSE RETAINING WALL EARTHWORK QUANTITIES LIMITS
(Showing Foundation Treatment)
Figure 17-5D

Spec. Ref.	Item	Unit	Quantity
203	Excavation, Waterway	cyd	
211	B Borrow	cyd	
211	Structure Backfill	cyd	
211	Flowable Backfill	cyd	
302	Dense Graded Subbase	cyd	
503	Terminal Joint	lft	
601	Bridge Railing Transition, TGB	each	
601	Bridge Railing Transition, WGB	each	
609	Reinforced Concrete Bridge Approach, _____ in.	syd	
703	Reinforcing Steel	lb	
704	Grates, Basins, and Fittings, Cast Iron	lb	
715	Pipe, Type 4, Circular, 6 in.	lft	
715	Pipe, Type 5, Circular, 12 in.	lft	
203	Surplus Foundation Excavation [not a pay item]	cyd	

BRIDGE PAY ITEMS IN ROAD PLANS

Figure 17-5E

SIGN POST SUMMARY					
SIGN CODE	LOCATION		NO. OF POSTS	POST TYPE	TOTAL LENGTH (lft)
	STATION AND LINE	LT. or RT.			
			TOTAL	A	
			TOTAL	B	
			TOTAL	1	
			TOTAL	2	

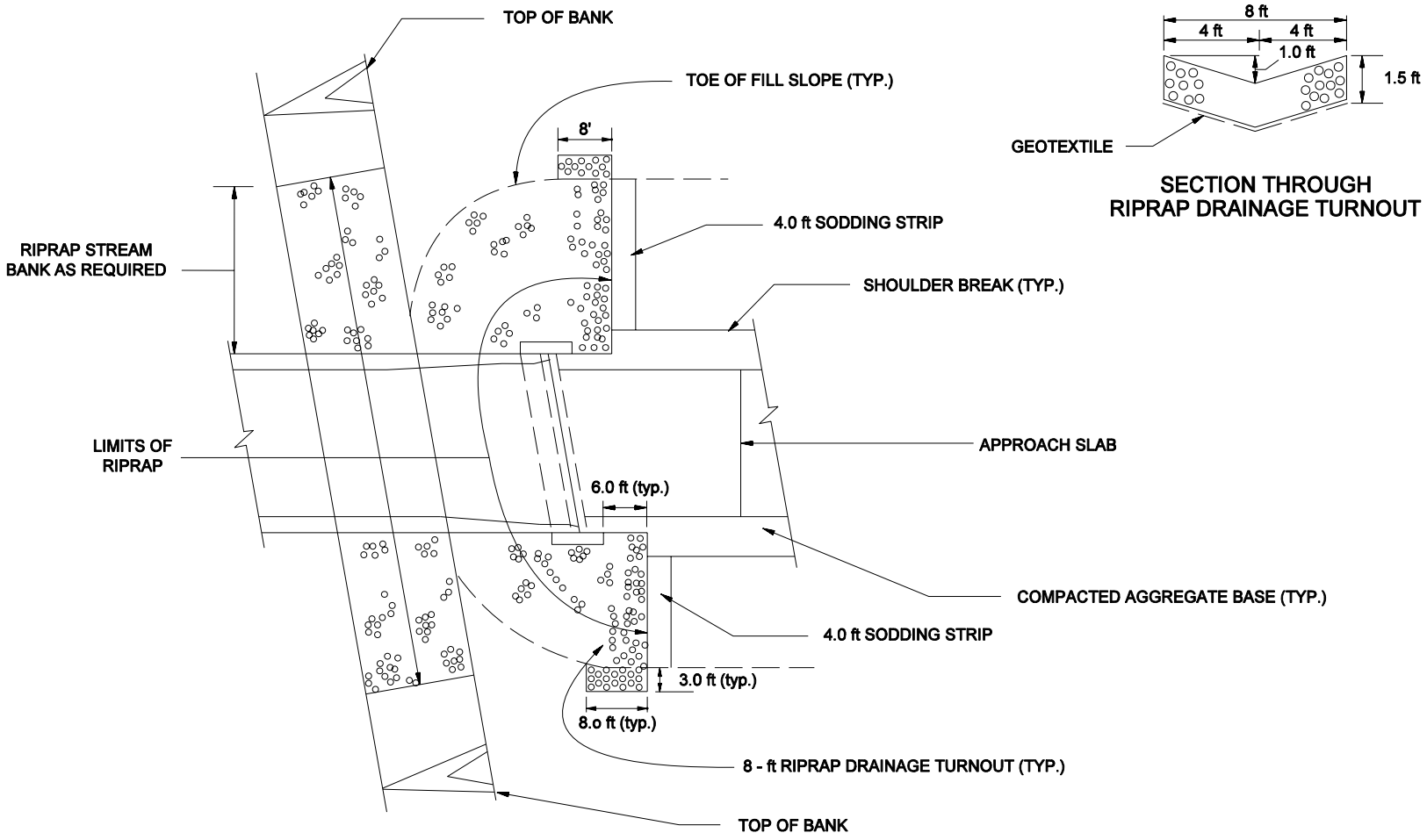
Note: Sign location and post lengths are approximate. Exact location and length to be determined in the field in accordance with the Manual on Uniform Traffic Control Devices.

SHEET SIGN SUMMARY					
SIGN CODE	SIGN DESCRIPTION	NO. OF SIGNS	SHEETING TYPE*	THICKNESS (in.)	TOTAL AREA (sft)
		TOTAL	I	0.080	
		TOTAL	II	0.080	
		TOTAL	I	0.100	
		TOTAL	II	0.100	
		TOTAL	I	0.125	
		TOTAL	II	0.125	

**Type I – "Enclosed lens" reflective sheeting*
Type II – "Encapsulated lens" reflective sheeting

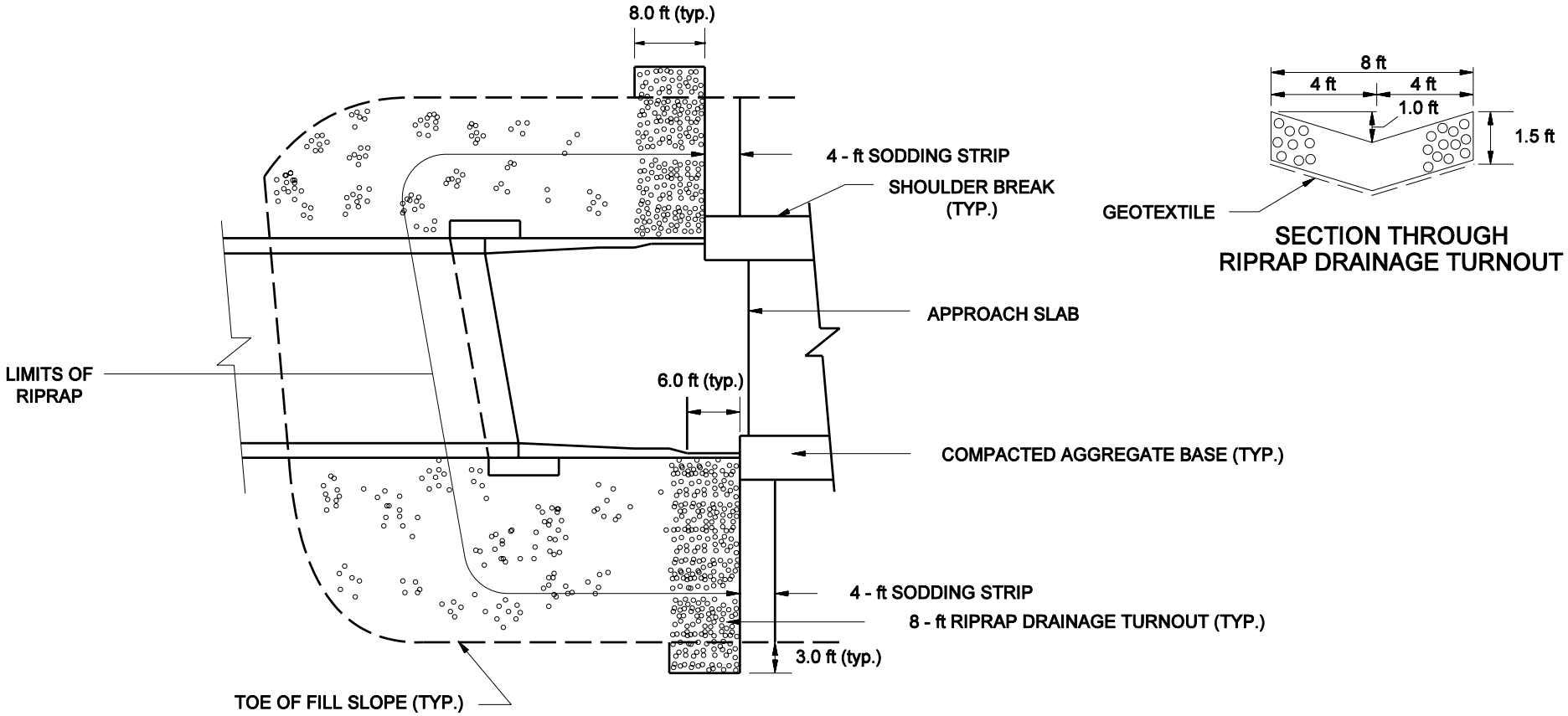
SIGN POST AND SHEET SIGN SUMMARIES
(Bridge Project)

Figure 17-5F



RIPRAP AND SODDING LIMITS WITH BARRIER TRANSITIONS ON BRIDGE

Figure 17-5I



RIPRAP AND SODDING LIMITS WITH BARRIER TRANSITIONS ON APPROACH SLAB

Figure 17-5J

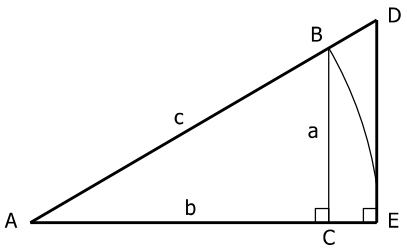
Bridge-Painting Locations and Information								
Contract Structure Number	Route Number	Structure Number	NBI Number	Ref. Post	County	Feature Crossed	Location	No. of Spans

									Drainage	
Contract Structure Number	Lengths of Strl.-Steel Spans ft-in. *	Existing Primer Type	Year Last Painted	Year Built	Tons of Strl. Steel **	Surf. Area Strl. Steel, ft^2 **	New-Paint Color (name)	New-Color No. (5-digit no.)	Clean & Paint Castings, each	Roadway Drain Casting Extensions, each

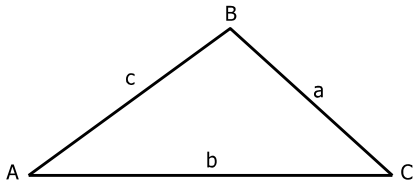
* Length shown is approximate. ** The quantities shown are approximate only.
The Contractor shall determine the quantities upon which to base its bid.

BRIDGE-PAINTING LOCATIONS AND INFORMATION

Figure 17-5K



RIGHT TRIANGLE



OBLIQUE TRIANGLE

RIGHT TRIANGLES

$\sin A = \frac{a}{c} = \cos B$ $\quad \csc A = \frac{c}{a} = \sec B$ $\quad a = c \sin A = c \cos B = b \tan A = b \cot B = \sqrt{c^2 - b^2}$

$\cos A = \frac{b}{c} = \sin B$ $\quad \sec A = \frac{c}{b} = \csc B$ $\quad b = c \cos A = c \sin B = a \cot A = a \tan B = \sqrt{c^2 - a^2}$

$\tan A = \frac{a}{b} = \cot B$ $\quad \cot A = \frac{b}{a} = \tan B$ $\quad c = \frac{a}{\sin A} = \frac{a}{\cos B} = \frac{b}{\sin B} = \frac{b}{\cos B}$

OBLIQUE TRIANGLES

Given	Sought	Formula
A, B, a	b, c	$b = \frac{a}{\sin A} * \sin B$ $\quad c = \frac{a}{\sin A} * \sin (A + B)$
A, a, b	B, c	$\sin B = \frac{\sin A}{a} * b$ $\quad c = \frac{a}{\sin A} * \sin C$
C, a, b	$\frac{1}{2}(A + B)$	$\frac{1}{2}(A + B) = 90° - \frac{1}{2} C$
	$\frac{1}{2}(A - B)$	$\tan \frac{1}{2}(A - B) = \frac{a - b}{a + b} * \tan \frac{1}{2}(A + B)$
a, b, c	A	Given $s = 1/2 (a + b + c)$, then: $\sin \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{bc}}$ $\cos \frac{1}{2} A = \sqrt{\frac{s(s - a)}{bc}}$ $\tan \frac{1}{2} A = \sqrt{\frac{(s - b)(s - c)}{s(s - a)}}$ $\sin A = 2\frac{\sqrt{s(s - a)(s - b)(s - c)}}{bc}$
	Area	$\text{Area} = \sqrt{s(s - a)(s - b)(s - c)}$
C, a, b	Area	$\text{Area} = \frac{1}{2} ab \sin C$

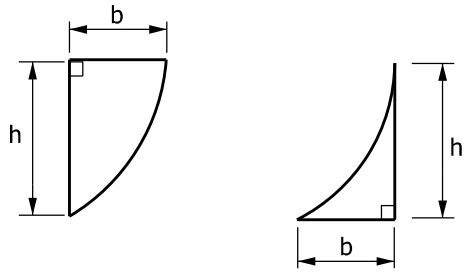
MATHEMATICAL FORMULAS

Figure 17-6A
(page 1 of 3)

Nomenclature

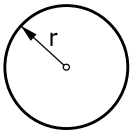
A = total surface area
d = distance
h = height
p = perimeter
r = radius
s = side (edge) length, arc length
V = volume
θ = vertex angle, in radians
ϕ = central angle, in radians

Parabola



$A = \frac{2bh}{3}$ $\quad A = \frac{1}{3}bh$

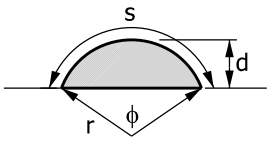
Circle



$p = 2\pi r$

$A = \pi r^2 = \frac{p^2}{4\pi}$

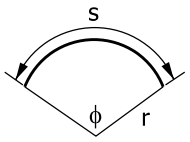
Circle Segment



$A = \frac{1}{2}r^2(\phi - \sin\phi)$ $\quad (\phi$ in rad)

$\phi = \frac{s}{r} = 2\left(\arccos\frac{r-d}{r}\right)$

Circle Sector (1)

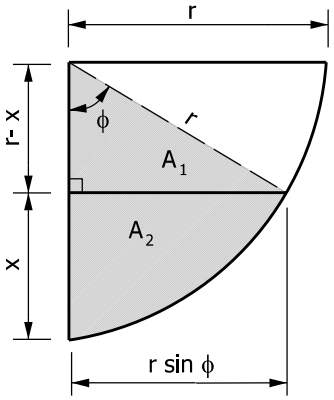


$A = \frac{1}{2}\phi r^2 = \frac{1}{2}sr$ $\quad (\phi$ in rad)

$\phi = \frac{s}{r}$

Circle Sector (2)

$\cos\phi = \frac{r-x}{r}$



Area of Triangle

$A_1 = \frac{1}{2}(r - x)(r \sin\phi)$ $\quad (\phi$ in deg)

Area of Circle Sector

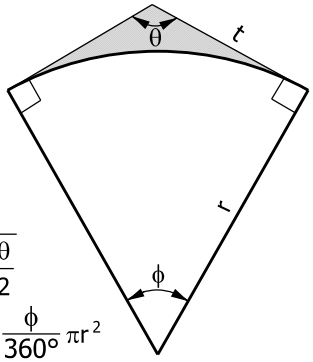
$A_2 = \frac{\phi}{360°}\pi r^2$

External Area

External Area = Total Area - Area of Circle Sector

$t = \frac{r}{\tan\frac{\theta}{2}}$

$\phi = 180° - \theta$ $\quad (\phi, \theta$ in deg)



Total Area = $rt = \frac{r^2}{\tan\frac{\theta}{2}}$

Area of Circle Sector = $\frac{\phi}{360°}\pi r^2$

External Area = $r^2\left[\frac{1}{\tan\frac{\theta}{2}} - \pi\frac{\phi}{360°}\right]$

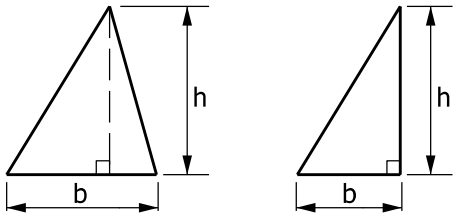
MATHEMATICAL FORMULAS

Figure 17-6A
(page 2 of 3)

Number of Sides	Name of Polygon
3	triangle
4	rectangle
5	pentagon
6	hexagon
7	heptagon
8	octagon
9	nonagon
10	decagon

Triangle

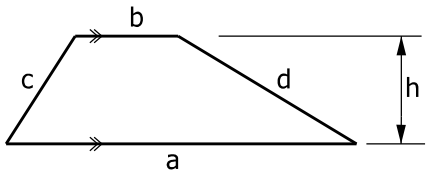
$A = \frac{1}{2} bh$



Trapezoid

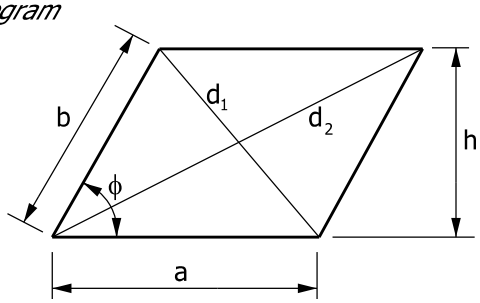
$p = a + b + c + d$

$A = \frac{1}{2} h (a + b)$



If c = d, the trapezoid is isosceles.

Parallelogram



$p = 2(a + b)$

$d_1 = \sqrt{a^2 + b^2 - 2ab(\cos \phi)}$

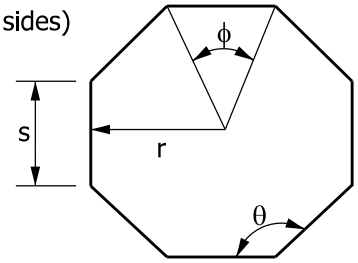
$d_2 = \sqrt{a^2 + b^2 + 2ab(\cos \phi)}$

$d_1^2 + d_2^2 = 2(a^2 + b^2)$

$A = ah = ab(\sin \phi)$

If a = b, the parallelogram is a rhombus

Regular Polygon
(n equal sides)



$\phi = \frac{2\pi}{n}$ (ϕ in rad)

$\theta = \frac{\pi (n - 2)}{n}$ (θ in rad)

$p = ns$

$s = 2r\left[\tan\left(\frac{\phi}{2}\right)\right]$

$A = \frac{1}{2} nsr$

MATHEMATICAL FORMULAS

Figure 17-6A
(page 3 of 3)

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER NINETEEN

STANDARD CONTRACT DOCUMENTS AND UNIQUE SPECIAL PROVISIONS

Chapter Fourteen provides the Department's procedures for the preparation of construction plans. This Chapter describes the Department's standard contract documents, including the *Standard Specifications*, Supplemental Specifications, *Standard Drawings*, Recurring Special Provisions, Recurring Plan Details, and Schedule of Pay Items. This Chapter also provides guidelines for preparing Unique Special Provisions if the standard documents do not address the needs of the project.

19-1.0 GENERAL

19-1.01 Standards Committee

The mission of the Department's Standards Committee is to develop, review, and recommend for approval all substantive additions and revisions to the Department's standard documents used for design and construction of projects. These documents include this *Manual*, the INDOT *Standard Specifications* and the INDOT *Standard Drawings*.

The Standards Committee meets regularly to review and act on proposed changes to the standard documents. The Committee consists of representatives from the Department entities as follows:

1. Director, Construction Management Division – Committee Chairperson
2. Contract Administration Division
3. Construction Management Division, Office of Materials Management
4. Construction Management Division, Office of the State Construction Engineer
5. Construction Management Division, Office of Construction Technical Support
6. One representative from a district construction office
7. One representative from a district production office
8. Highway Operations Division, Office of Traffic Engineering
9. Planning Division, Office of Pavement Engineering
10. Production Management Division, Office of Roadway Services
11. Production Management Division, Office of Structural Services
12. Construction Management Division, Specifications Engineer – Secretary (non-voting)

A Federal Highway Administration representative is present to provide comments on proposals for use on the National Highway System. The FHWA representative is a non-voting member.

A proposal for consideration by the Standards Committee may be submitted through the Secretary for possible inclusion on the Committee's agenda.

19-1.02 Contract Documents

All bid and contract documents should complement and agree with each other to provide a clear, concise package that can be readily understood by bidders, contractors, and field personnel. A conflict between contract documents can result in change orders and claims which can delay construction and increase project cost.

In developing and assembling the contract documents for a project, the designer should ensure that all the documents are compatible. If the designer believes one of the standard documents may cause a conflict, the Project Manager should be notified.

19-1.03 Hierarchy of Contract Documents

The *Standard Specifications*, Supplemental Specifications, *Standard Drawings*, Special Provisions, Recurring Plan Details, construction plans, and supplementary documents are essential parts of the contract. A requirement occurring in one is as binding as though occurring in all. They are intended to compliment each other and are used to describe and provide complete instructions for the work to be accomplished.

The designer should perform quality control checks to reduce or eliminate discrepancies between the contract documents. However, discrepancies between documents will occur. The *Standard Specifications* define the following contractual hierarchy of relationships between the documents in order of precedence, as follows:

1. Instructions to Bidders and description of pay items listed in the Schedule of Pay Items;
2. Special Provisions;
3. Plans, including *Standard Drawings* and Recurring Plan Details;
4. Supplemental Specifications;
5. *Standard Specifications*.

If there is a discrepancy in dimensions, calculated dimensions govern over dimensions scaled from the plans.

The order of precedence is from the least-standardized document to the most-standardized document. Each group of documents is discussed in detail below, listed from most standardized to least standardized, since each successive document type may represent a modification of the previous documents.

19-1.03(01) Standard Specifications

The *Standard Specifications* consist of the standard contract language adopted by the Department for a construction project. They are incorporated into each contract by reference. They provide the Department's criteria for the following:

1. the contractor's duties;
2. control of material quality;
3. the contractor's and Department's contractual relationship; and
4. measurement and payment for pay items.

The *Standard Specifications* are published by the Construction Management Division and are available either from the Department's website or on CD. The Department also prints a limited number of copies for use by Department field personnel only. New editions are not published on a regular schedule. They are instead issued as warranted due to the number of changes authorized by the Standards Committee. If a new edition is issued, it will be published in March and become effective beginning with contracts let on or after September 1 of that year. The designer is responsible for ensuring that contract documents are developed using the edition of the *Standard Specifications* applicable to the project based on the contract letting date.

19-1.03(02) Supplemental Specifications

Supplemental Specifications are revisions to the *Standard Specifications* which have been adopted by the Department since the last publication of the *Standard Specifications*. The intent is that they will be incorporated into the *Standard Specifications*' next revision. Complete sets of Supplemental Specifications are added to the contract documents for each project and are intended for general use.

Beginning with the *Standard Specifications* 2008 edition, Supplemental Specifications are not being used. Instead, required revisions to the *Standard Specifications* necessary before the next edition is published are incorporated into contracts through Recurring Special Provisions.

19-1.03(03) Plans

Plans include the approved construction plans, profiles, typical cross sections, working drawings, the Standard Drawings, and applicable Recurring Plan Details, or exact reproductions thereof, which show the location, character, dimensions, and details of the work to be done on a project.

1. Recurring Plan Details. Recurring Plan Details are either standard details that have been adopted since the last update of the *Standards Drawings* or are details that are included in a contract to complement a Recurring Special Provision.

   As new or revised *Standard Drawings* are adopted by the Department, they will be included in contracts as Recurring Plan Details. The Department will determine for which letting the Recurring Plan Details will become effective. The Recurring Plan Details will then be included in the next update of the *Standard Drawing*s set and will be deleted as Recurring Plan Details.

   Recurring Plan Details that are included in a contract to complement a Recurring Special Provision may never become part of the *Standard Drawings*. Such Recurring Plan Details are discussed further in Section 19-1.03(04), item 1.

2. *Standard Drawings*. The *Standard Drawings* provide standardized construction details for various elements that are consistent from project to project (e.g., guardrail, fencing, drainage details, bridge elements, signs). They provide information on how to lay out or construct the various design elements. The complete set of *Standard Drawings* is included by reference as part of the plans in each construction contract. The *Standard Drawings* are typically updated once each year with the new set becoming effective for contracts let on or after September 1 of each year.

   Standard Drawings are available on the Department's website. Plan details required for a project which are not included in the *Standard Drawings* must be developed by the designer for inclusion in the plans.

19-1.03(04) Special Provisions

Special provisions are specifications in addition to the *Standard Specifications* that describe conditions and requirements for special situations on a specific project. Special provisions are added to the contract documents for a specific project and are not binding for a contract other than the one for which they are included.

A special provision serves one of two functions in the contract documents as follows:

1. directly modifies the existing *Standard Specifications* by adding, deleting, or revising language in an existing section, or by adding a new section; or

2. adds a stand-alone specification to the contract that does not directly modify the *Standard Specifications*.

The two distinct types of special provisions are Recurring Special Provisions, which are further subdivided into Standard Recurring Special Provisions and Contract-Specific Recurring Special Provisions; and Unique Special Provisions.

1. Recurring Special Provision. A Recurring Special Provision is a specification created by the Department to describe work not included in the *Standard Specifications*. It is typically used in multiple contracts over a period of time. A Recurring Special Provision is typically created as a revision to the *Standard Specifications* as the result of action by the Standards Committee. Passage of a *Standard Specifications* revision by the Committee will often result in the need to issue the revision as a Recurring Special Provision prior to the next edition of the *Standard Specifications*, at which time the Recurring Special Provision may be adopted into the *Standard Specifications*.

   A Recurring Special Provision may require the inclusion of a Recurring Plan Detail in the contract to complement the special provision. The Department maintains a menu of all current Recurring Special Provisions and Recurring Plan Details that is updated as new provisions are adopted and existing provisions are revised or deleted. The Special Provision Menu is available on the Department's website and includes a basis for use for each provision.

   In preparing a project for submittal of plans and contract documents, the designer is responsible for calling out the appropriate Recurring Special Provisions and Recurring Plan Details from the menu. The designer must ensure that the provisions selected are applicable for the specific project before their inclusion in the contract documents. Section 19-2.0 provides further guidance on the use of the Special Provision Menu.

   a. Standard Recurring Special Provision. A Standard Recurring Special Provision can either be a direct modification of the *Standard Specifications* or a completely new specification for work not addressed in the *Standard Specifications*. Standard Recurring Special Provisions are not to be modified by the designer and are included in a contract, in their entirety, as the Department-approved version for the contract letting date. If the language of a Recurring Special Provision must be revised to suit a specific contract need, the designer must submit the revised provision as a Unique Special Provision.

   b. Contract-Specific Recurring Special Provision. A Contract-Specific Recurring Special Provisions, or fill-in-the-blanks special provisions, requires project-specific information to be entered by the designer. Each Contract-Specific Recurring Special Provision has defined fields to be completed by the designer with information specific to that project. No other portion of the provision is to be edited by the designer. As with a Standard Recurring Special Provision, if the language in the non-

editable fields of a Contract-Specific Recurring Special Provision must be revised, the designer must submit the revised provision as a Unique Special Provision.

2. Unique Special Provision. A Unique Special Provision is a specification that pertains only to a specific situation on a project that is not covered by an existing standard document. A Unique Special Provision is intended only for a single use in a specific contract. The Department tracks the use of Unique Special Provisions and considers creation of a new Recurring Special Provision if the same general specification requirements begin to occur in several Unique Special Provisions.

   If a project-specific situation that is not described by an existing standard document, a Unique Special Provision must be written and submitted by the designer. Section 19-3.0(01) discusses guidelines for preparing a Unique Special Provision.

19-1.03(05) Instructions to Bidders and Schedule of Pay Items

Instructions to Bidders are formal instructions issued to bidders as part of or by reference in the bidding documents. These include instructions regarding the procedures for the bidder to follow in preparing and submitting a bid, as well as other special requirements. The instructions are set based on Departmental needs and State and Federal codes. They should be understood by the designer, but the designer is typically not responsible for preparing or revising such instructions. If a contract-specific instruction is required (e.g., mandatory pre-bid meeting), the designer should add this as a Unique Special Provision.

The Contract Information book's Schedule of Pay Items includes the description of each pay item in the contract and the unit of measure for the pay item. Each pay item listed in the Schedule of Pay Items should have a related specification in the contract documents that uses the same pay-item description and the same unit of measure as the pay item shown in the Schedule of Pay Items. It is the designer's responsibility to ensure this compatibility of pay items and specifications.

19-2.0 INSTRUCTIONS FOR USING SPECIAL PROVISIONS AND RECURRING PLAN DETAILS

The Special Provision Menu is maintained by the Department and is available on the Department's website. The Menu lists each current approved Recurring Special Provision and Recurring Plan Detail. A basis for use is included for each provision and plan detail to define the conditions that warrant the inclusion of a Recurring Special Provision or Recurring Plan Detail in a contract.

For each provision on the Menu, the date on which the provision was either adopted or revised, and the first letting date for which the provision is effective, is included. If a provision is listed twice, it

will have two different effective letting dates. This occurs if an older version is being replaced by a newer version, but the new version's effective letting date has not yet passed. Once the new letting effective date has passed, the older version will be removed from the Menu. The designer should ensure that the correct version of a Recurring Special Provision or Recurring Plan Detail is selected based on the scheduled letting date for the contract.

A "How to Use" document that provides further details on use of the Menu is included on the Department's website along with the Special Provision Menu.

19-2.01 Standard Recurring Special Provisions and Recurring Plan Details

Provisions listed in the Menu's Section I – Standard Recurring Special Provisions and Recurring Plan Details, are intended to appear in the contract as shown on the Department's website. If such a provision is required, place an X in the Place In Contract box that corresponds to the desired provision or detail. The designer should not submit a copy, electronic or printed, of a Standard Recurring Special Provision or Recurring Plan Detail that is to be included in the contract. Some provisions or plan details are required in every contract. The check box for Place In Contract will be pre-selected and will not open for editing by the designer.

19-2.02 Contract-Specific Recurring Special Provisions

Provisions listed in the Menu's Section II – Contract-Specific Recurring Special Provisions, will require an attachment to be submitted. For each such provision, place an X in the Place In Contract box that corresponds to the desired provision. The Attach. Req'd. box will be pre-selected and will not open for editing by the designer. The designer must submit an electronic copy of the provision with the blank fields completed.

Instructions for use of the Recurring Special Provisions and Recurring Plan Details Menu are included with the Menu on the Department's website.

19-2.03 Unique Special Provisions

The Unique Special Provisions Summary Sheet is reserved for the designer to list each Unique Special Provision being submitted for the contract. The designer must enter the title of each Unique Special Provision and the Standard Specification section it is most closely related to. The Unique Special Provisions should be listed in Standard Specifications Section numerical order. An electronic copy of each provision must be submitted. The Summary Sheet is available on the Department's website.

19-2.04 Finalization of Menu and Special Provisions

The completed Special Provision Menu must be submitted to the Contract Administration Division. Regardless of the number of Des numbers associated with a contract, only one menu is required. If multiple menus are submitted, they will be returned to the designer to combine them.

Contract-Specific Special Provisions attachments should be placed into one electronic file, in the order in which they are listed in the Menu's Section II. Unique Special Provisions should be placed into another electronic file, in the order in which they are listed on the Unique Special Provisions Summary Sheet.

The Contract Administration Division uses the submitted menu to assemble the Standard Recurring Special Provisions, Recurring Plan Details and Contract-Specific Special Provisions that will be included in the Contract Information Book. The approved versions of the provisions and details, as maintained by the Department, will then be placed in the Contract Information book. Information required for Contract-Specific Recurring Special Provisions will be copied from the attachments submitted by the designer and placed into the Department-approved version of the special provision. Unique Special Provisions, as submitted by the designer and approved by the Department, will also be included in the Contract Information book.

19-3.0 INSTRUCTIONS FOR UNIQUE SPECIAL PROVISION USE

A Unique Special Provision is required if the items of work, methods, materials, sequence of operations, or other restrictions or requirements necessary for completion of the project cannot be described completely by a Recurring Special Provision, a Recurring Plan Detail, the *Standard Drawings*, the Supplemental Specifications, or the *Standard Specifications*. Described completely should be interpreted to mean that the work to be accomplished, the type of materials or equipment required, the construction methods or details to be used, the method of measuring the work, the basis of payment for the work, and all restrictions or requirements specific to the contract are clearly defined.

If a Unique Special Provision is required for a project, the use of a provision that specifies a proprietary product is discouraged. However, the use of a proprietary product may be justified if it will enhance safety, control costs, or otherwise improve the project. In specifying a proprietary product, the designer must provide a written explanation that describes why the proprietary item is necessary and what the benefits of the product are. Section 17-1.05 provides guidance concerning use of and approval of proprietary products.

For a product or material to not be considered proprietary, those of at least three vendors must be available. If only one or two are known, the product or material is considered proprietary. The procedure described in Section 17-1.05 should then be followed.

Example unique special provision phraseology is as follows.

Incorrect: Product A, as manufactured by vendor A or approved equal, shall be used.

Correct: Product A, as manufactured by vendor A; product B, as manufactured by vendor B; or product C, as manufactured by vendor C, shall be used.

A Unique Special Provision should not be written to correct grammatical, typographical, or other errors that can exist in the *Standard Specifications* or Recurring Special Provisions. If one of these is discovered, it should be brought the attention of the Contract Administration Division.

19-3.01 Preparing a Unique Special Provision

A Unique Special Provision can be written to satisfy one of two basic purposes.

A constructive special provision is used to define a portion of the actual construction work, including materials, equipment, methods, measurement, and payment.

A restrictive special provision sets out specific restrictions or requirements that must be followed by the contractor. An example of a restrictive-type Unique Special Provision is illustrated in Figure 19-3A.

The focus of this Section is to provide guidelines for preparing a constructive-type Unique Special Provision.

1. Define Need. Review existing *Standard Specifications, Standard Drawings,* Recurring Special Provisions, and Recurring Plan Details to determine if an existing document adequately addresses the situation. A Unique Special Provision be prepared only if a situation is not adequately addressed in an existing document.

2. Research. Research the topic so that complete and detailed information is available before writing the provision. This may require contacting manufacturers, contractors, or suppliers for the latest information. Local conditions and problems should also be fully investigated.

3. Structure and Format. Prepare a Unique Special Provision in the same structure and format as the *Standard Specifications* (i.e., Description, Materials, Construction Requirements, Method of Measurement, and Basis of Payment). Section 19-3.01(02) provides guidance for the structure, and Section 19-3.01(03) provides guidance for the format that should be used for a Unique Special Provision.

4. Type. Analyze the type of construction to be addressed in the provision to determine the type of specification to prepare. A specification can be written as either a method specification or a performance-based specification. A method specification describes the exact methods, materials, or procedures to be used to construct the work. A performance-based specification describes the quality of the materials to be used and the required end result of the work. A performance-based specification is preferred to encourage innovation and efficiency by the contractor. A method specification should only be used if the method is critical to achieving the desired result.

5. Outline. Develop an outline that addresses the basic requirements of the work to be completed. It should define the essential physical characteristics of the work (e.g., material requirements, dimensional limitations, time, strength, weight, size, shape, configuration, etc.). The contractor's responsibilities should be clearly stated. Organize all relevant factors under each appropriate heading.

6. Write the Unique Special Provision. Once the outline has been developed and all research has been completed, prepare the first draft. The designer should review existing Recurring Special Provisions for guidance on format and language. The following provides grammatical recommendations for preparing a Unique Special Provision:

    a. Voice. Use passive voice and indicative mood: "A rubbed finish shall be applied to the exposed surfaces." instead of "Apply a rubbed finish to exposed surfaces."

    b. Sentences. Use simple language and words. Keep sentences short, to 20 words or less, unless complexity is unavoidable. Avoid the use of too many commas in a sentence.

    c. Paragraphs. Limit paragraphs to three to four sentences if possible.

    d. Terminology. Words should be used consistent with their exact meaning. The same word should be used throughout. Do not use synonyms. Avoid words which have more than one meaning. Section 19-3.01(03) provides the recommended terminology that should be used. Nonessential words and phrases should be omitted.

    e. Pronouns. Avoid the use of pronouns, even if this results in frequent repetition of nouns.

    f. Punctuation. Use the minimum number of punctuation marks consistent with the precise meaning of the language. Do not use a semicolon to separate related though distinct clauses. Instead, use a period to effect distinct sentences. Ensure that there can be no doubt regarding the meaning of a sentence.

g. Capitalization. The only phrases which require full capitalization are the special provision title and subsection headings. The only words which require an initial capital letter without regard to their location in the sentence are Department, Engineer, Contractor, titles of reference publications, traffic sign copy, or other proper nouns if their use is required.

h. Parentheses. Avoid the use of parentheses for other than metric-measure equivalents. Instead, use commas or rewrite the sentence.

i. Numbers. It is unnecessary to write numbers both in words and figures, e.g., "Use four (4) bolts". Each number, including 0 or 1, should be written numerically, unless it must be used to begin a sentence. In writing dimensions, numbers should be used, e.g., ¼ in., 10 ft, 3 gal. Do not write 2 in. x 4 in., but instead, 2 in. by 4 in. Times and dates should be written numerically. Decimals of less than one should be preceded by the zero (e.g., 0.02 ft). Do not begin a sentence with a numeral. Either write the number in words, or rewrite the sentence by placing the numeral within the sentence.

j. Units of Measure. Write out units of measure within a sentence where not accompanied by a quantity. Symbolize units of measure where used in a tabular form or where accompanied by a quantity.

k. Emphasis. All parts of a specification are equally important contractually. Do not use all capitals, underlines, italics, bold type, larger pitch, different font, punctuation, etc., to emphasize words, sentences, pay items, or pay units.

l. Percentages. Where a percent is preceded by a number, the % symbol is used. Where percent is used in a sentence without a number preceding it, the word percent is spelled out.

7. Clarity. To ensure that the provision is clearly written, the designer should review the following.

a. Give directions, not suggestions.

b. Do not assume that the reader understands your intent.

c. Limit the use of phrases such as "as approved by the Engineer," "at the discretion of the Engineer," or "as directed by the Engineer" in place of definite workmanship requirements. Such phrases may lead to confusion or misunderstanding. The contractor may not know what the engineer is thinking.

d. Avoid conflicting or ambiguous requirements. Every specification statement should have only one meaning.

e. Disclose known difficulties or hazards.

f. Use the standard abbreviations listed in *Standard Specifications*.

8. Conciseness. A Unique Special Provision should be as concise as practical. In reviewing a provision, the designer should consider the following.

a. Avoid duplications between the Unique Special Provision and other contract documents, including the *Standard Specifications*.

b. Do not give reasons for a specification requirement.

c. Do not provide additional information which is unnecessary for the preparation of bids and the accomplishment of the work.

d. Once stated, do not repeat an instruction, requirement, direction, or piece of information provided elsewhere in the provision you are writing, or elsewhere in the contract documents.

e. Do not include mandatory provisions that are required in general by the contract.

f. Write the specification in a positive form (e.g., use “shall” instead of “shall not”).

g. Do not include instructions to the Department.

h. Do not include design information that is not necessary for the performance of the work.

9. Completeness. Ensure that the essentials have been included and that each requirement is definitive and complete. The Unique Special Provision should not be vague or open to differing interpretations.

10. Correctness. To ensure that a Unique Special Provision is written correctly, the designer should consider the following.

a. Check all references to the *Standard Specifications* or other contract documents to ensure that the references are correct.

b. Where practical, independently cross-check every factual statement.

c. Do not include conditions that cannot be required or enforced.

d. Ensure that the provision does not punish the contractor or supplier. Penalties or liquidated damages may be included, but the conditions that will result in penalties or liquidated damages must be clearly defined.

e. Ensure that the provision does not unintentionally exclude an acceptable product, construction method, or equipment.

f. Ensure that the provision does not change the basic design of the work.

g. Do not specify impossibilities. The practical limits of workers, equipment, and materials must be known and recognized.

h. Specify standard sizes and patterns where practical.

i. Avoid personal whims and favorite requirements.

j. Ensure that sufficient attention has been provided to assessing the durability or reliability of the material or procedure discussed. The use of recognized standards should be quoted to ensure that the specified performance or characteristics are achieved.

k. Make a careful, critical examination of manufacturer- or trade-association recommendations, and require supporting evidence to be submitted by the contractor.

l. Ensure that the provision gives directions to the contractor that are consistent with standard industry practice and current Department policies and procedures.

m. Ask a colleague to review the provision. What may seem clear to one person may not be clear to someone else.

11. Submittal. Submit the completed draft Unique Special Provision for review and approval. Section 19-3.02 discusses the submittal of a Unique Special Provision for review and approval.

19-3.01(01) Structure of a Unique Special Provision

Prepare a Unique Special Provision using the same structure as the *Standard Specifications*, including subsection layouts. The use of the standardized structure of the *Standard Specifications* provides a common outline for special provisions that helps to ensure that all the necessary information is included in a provision. The designer should review the *Standard Specifications* before writing a Unique Special Provision in order to become familiar with the structure and typical phrasing used throughout.

The standard structure consists of the "Big Five": Description, Materials, Construction Requirements, Method of Measurement, and Basis of Payment.

1. Description. Briefly, but completely describe the scope of work to be performed, with references to specifications, plans, or other recurring special provisions that further define the work. Where necessary or desirable for clarity, describe the relationship of this work to other work or other phases of construction. Do not editorialize.

2. Materials. List the materials to be used in the work and clearly indicate the criteria for acceptance of the materials. Define the specifications and properties of each material and the method of tests for acceptance. Use references to the *Standard Specifications*' materials section as much as possible. References may be made to AASHTO, ASTM, or other recognized specifications if the materials are not addressed in the *Standard Specifications*. Ensure that references to AASHTO, ASTM, or other specifications or test methods from agencies outside of INDOT are accurate and up to date. If a certification is required, ensure that the certification type fits the situation and that information required in the certification is clearly defined.

   A prime consideration in establishing materials requirements is whether the material will be tested by the Department and if the Department has the capability to perform the test. The Office of Materials Management can provide guidance for specifying materials testing and acceptance criteria.

3. Construction Requirements. The construction requirements should be written in the logical order in which field operations are anticipated to proceed. Clearly define the requirements for general conditions, types of construction, and quality of workmanship. Do not leave the contractor in doubt as to what is required.

   Describe the sequence of construction operations (method specification) or the desired end product (performance-based specification) as described in Section 19-3.01, item 4. Where practical, a performance-based specification is preferred. The construction requirements should define tolerances, limits, restrictions, preparations, or other criteria related construction of the work that must be satisfied for an acceptable product. These requirements can include, but are not limited to, dimensions, on-site test criteria, weather conditions, traffic condition, or time limits.

4. Method of Measurement. Describe the components of the completed work that will be measured to determine the pay quantity for the pay item as it will be described in the Schedule of Pay Items. Define the units of measurement and whether the item will be measured in original position, in transporting vehicles, or in the completed work. Designate modifying factors or other requirements needed to establish a definitive, measurable unit. A prime consideration for method of measurement should be the degree of difficulty that field personnel will encounter in making measurements.

5. Basis of Payment. Define the measured units for which payment will be made. Include the pay item name as it will appear in the Schedule of Pay Items and define the scope of work included in payment. Determine and identify which work is to be paid for as an individual pay item, what work is to be included in the cost of that pay item and what work is to be included in the cost of other pay items. The Basis of Payment must clearly identify to the contractor what work is and is not to be included in the unit cost of the pay item. For work that is not included in the pay item in the provision, the designer must then determine and clearly state where the cost of such work is to be placed.

19-3.01(02) Format of Unique Special Provision

The format of a Unique Special Provision will depend on whether it directly modifies the *Standard Specifications* or not.

A provision that directly modifies the *Standard Specifications* must identify the section and line numbers in the applicable edition that is being modified and clearly indicate the modifications being made. The following guidelines should be used in preparing a Unique Special Provision that directly modifies the *Standard Specifications*.

1. Identify the section and line numbers being revised. Place distinct revisions within a section in line numerical order. For example:

```
SECTION 101, LINE 13, INSERT AS FOLLOWS:
SECTION 101, BEGIN LINE 176, DELETE AS FOLLOWS:
SECTION 101, DELETE LINES 525 THROUGH 548.
SECTION 101, AFTER LINE 1083, DELETE AND INSERT AS FOLLOWS:
```

2. Where more than one section is revised in a single Unique Special Provision, place the revised sections in numerical order. For example:

```
SECTION 205, DELETE LINES 52 THROUGH 86.
SECTION 404, AFTER LINE 1448, INSERT AS FOLLOWS:
```

```
SECTION 609, BEGIN LINE 990, DELETE AND INSERT AS FOLLOWS:
```

3. Spaces in the *Standard Specifications* between paragraphs count as lines. Also, horizontal lines shown in tables count as lines.

4. Show revisions to *Standard Specifications* text by using strikethroughs to show deleted text and italics for inserted text. Delete, then insert. Do not insert, and then delete. Do not use a "track changes" feature in word-processing software to indicate revisions.

5. Retain all unrevised existing *Standard Specification* text in the sentence for clarity of the revision. Show entire sentences, even if only one word in the sentence is revised.

6. Include all text shown in each line involved in the revision. This includes sentence fragments not involved in the revision which may appear in the first or last line involved.

7. Where four or more lines of the existing text are entirely deleted without insertions, the deleted copy need not to be shown as overstruck. Indicate the deleted section and lines as follows:

```
SECTION 101, DELETE LINES 267 THROUGH 288.
```

8. In making a revision which inserts new text after an existing paragraph, identify the space after the paragraph as the line to begin after.

Do not develop a provision that revises the *Standard Specifications* solely to correct typographical, spelling, grammatical, or other errors. If such errors are evident, bring them to the attention of the Office of Contracting.

Figure 19-3B, Example Special Provision which Directly Modifies the *Standard Specifications*, illustrates the outline and layout that should be used for such a provision.

A provision that does not directly modify the *Standard Specifications* is formatted differently than that which does. Figure 19-3C, Example Special Provision which Does Not Directly Modify the *Standard Specifications*, illustrates the format to use for a stand-alone Unique Special Provision.

19-3.01(03) Terminology

Phraseology and terminology used in a Unique Special Provision should be consistent with that used in the *Standard Specifications*. In addition, the designer should consider the following.

1. Amount, quantity. Use “amount” when writing about money only. If writing about measures of volume, such as ft^3, gal., etc., use “quantity.”

2. And/Or. Use “and” alone, or “or” alone. Do not use “and/or”.

3. Any, all. The word “any” implies a choice and may cause confusion. In place of “any,” the term “all” should be used. For example, “Correct all defects.”

4. As per. Instead, use “as stated,” “as shown,” “in accordance with,” or another similar phrase.

5. As shown on the plans. Use this phrase instead of “as shown in the plans,” “as detailed on the plans,” “as shown on the detail sheets,” “as shown on the *Standard Drawings*,” or “as shown on sheet __ of the plans.”

6. At the contractor’s expense. Instead of this phrase, use “_____ shall be included in the costs of _____.”

7. Balance, remainder. “Balance” should be used if referring to money. “Remainder” should be used to describe something or material left over.

8. Broken, skip line. Use “broken line” rather than “skip line.”

9. Coarse, course. Use “coarse” to describe a texture. Use “course” for a layer.

10. Conform. Use the word “conform” to refer to dimensions, sizes, or fits that must be strictly adhered to (e.g., “cut bolt threads conforming to ASA Standards, Class 2 fit, coarse thread series”). Where a better product is acceptable, use the phrase “in accordance with...” (e.g., aggregates in accordance with the specification requirements if tested in accordance with AASHTO T 27.)

11. Contractor. Use the word “Contractor” in place of the word “Bidder.” “Bidder” should only be used in a proposal. If referring to the contractor by means of a pronoun, use “it” rather than “he.”

12. Department. Use “Department” in place of “Indiana Department of Transportation.” The abbreviation INDOT should not be used in the contract documents.

13. Engineer. Use of "the Engineer" refers to the Chief Engineer of the Department acting directly or through a duly authorized representative. If used in this context, "Engineer" is always capitalized.

14. Ensure. Do not use “insure” or “assure,” but instead use “ensure.”

15. Guardrail. Spell “guardrail” as one word rather than as two.

16. In accordance with. Use the phrase “in accordance with” in place of “in conformance with.”

17. May. Use “may” for contractor’s operations that are optional.

18. Milling. Do not use “scarifying,” but instead use “milling” or “surface milling.”

19. Or equal. Do not use this phrase without clearly defining what is “equal”.

20. Pay item. Use this phrase instead of “bid item,” “item,” or “line item.”

21. Proposal. The word “proposal” should not be used where the word “contract” is intended. The term “proposal” should only be used to describe requirements during the bidding process.

22. Resisting, resistant. Do not use “corrosion-resisting,” but instead use “corrosion-resistant.”

23. Said. Do not use “said pipe,” “said aggregates” but instead, use “this pipe,” “these aggregates.”

24. Same. Do not use “same” to replace a pronoun like “it” or “them” standing alone, such as “connected to same,” “specified for same,” “same will be given consideration,” “conforming to requirements for same.” The sentence should be rewritten to clearly describe what is meant.

25. Schedule of Pay Items. Use this phrase instead of “Itemized Proposal” or “Proposal” in referring to the list of pay items.

26. Shall. Use “shall” to define what the contractor is required to do. Do not use “may” unless the contractor has an option under the specification.

27. State. The term “State” is preferred over the “State of Indiana” or “Indiana.”

28. Such. Do not end a sentence with the word “such.” “Such” usually means “of this or that kind,” or similar to something stated. Instead, state that which is actually meant, or name the work to be completed or rephrase the sentence.

29. Symbols. Do not use the following symbols in writing a unique special provision.

Symbol	Write Instead

/	per, or "a"
Fº	ºF
+	plus
-	minus
x	by

30. The. Do not eliminate "the" for brevity.

31. Thoroughly, Carefully, Clearly, etc. Avoid using these or other similar adverbs, e.g., thoroughly wet, shall be carefully dried, shall be clearly shown, etc., as they are unenforceable. Preferably, state the value of the intended requirements in percent, dimensions, number of passes, etc.

32. Unit Price. Use "contract unit price" instead of "contract unit price bid."

33. Will. Use only in describing something the Department will do that affects the contractor's performance, e.g., "The Engineer will respond in writing in 14 days" or "_____ will be accepted based on the Department's test results."

19-3.02 Unique Special Provision Review Process

Once a Unique Special Provision is developed an electronic copy is to be transmitted to the project manager for the review process. An explanation of the need for the Unique Special Provision must also be provided, along with a request for unique pay items that can be required. The project manager will transmit the provision to the appropriate offices for review and comment. Depending on the nature of the Unique Special Provision, the following offices should be afforded the opportunity to review a provision prior to inclusion in a contract.

- Central Office
  - Division of Planning
    - Office of Pavement Engineering
    - Office of Roadway Safety and Mobility
  - Division of Production
    - Office of Roadway Services
    - Office of Structural Services
    - Office of Geotechnical Engineering
    - Office of Environmental Services
  - Division of Traffic Control Systems
  - Division of Technology Deployment
  - Division of Contract Administration
    - Office of Estimating

    - Division of Construction Management
        - Office of Technical Support
        - Office of Materials Management
        - Office of the State Construction Engineer
    - Division of Highway Operations
        - Office of Traffic Engineering
        - Office of Pavement Preservation
        - Office of Maintenance Administration
- District Office
    - District Traffic
    - District Construction
    - District Testing
    - District Operations

The Unique Special Provision will be reviewed to ensure that it does not conflict with current Department policy or procedure, that it does not create unwarranted costs or inefficiencies, that it does not duplicate a description of work addressed by the *Standard Specifications* or Recurring Special Provisions, and that the work it describes is materially available, testable, constructible, and non-proprietary unless approved. The provision will also be checked for proper structure, language, and format.

The reviewing parties will return their comments and recommendations to the project manager for action by the designer. The designer should work through the project manager to resolve concerns or questions regarding reviewers' comments and recommendations. Figure 19-3D shows the flow of the Unique Special Provision process.

19-3.03 Submittal of Approved Unique Special Provision

Once a Unique Special Provision has been reviewed and approved for use in a contract, the designer must submit the provision along with the other required contract documents at Stage III submission.

The Department maintains instructions for use and submittal of Unique Special Provisions on its website. These instructions are located along with the instructions for use of the Special Provision Menu.

STOCKPILED BORROW MATERIAL FOR PROJECT

The Department has stockpiled sufficient borrow material for use in the project in the southwest quadrant of the I-465 interchange with I-70 on the eastside of Indianapolis.

All borrow required for the project shall be taken from this stockpile.

EXPLANATION

1. Provision title is centered and is Courier New font, 10-pt. pitch, all capitals.

2. There are no referenced *Standard Specifications* sections and line numbers.

3. Specification text is Courier New font, 10-pt. pitch.

5. There are no deletions or insertions.

EXAMPLE OF A RESTRICTIVE TYPE UNIQUE SPECIAL PROVISION

Figure 19-3A

USE OF CONES IN LIEU OF DRUMS

SECTION 107, BEGIN LINE 416, DELETE AND INSERT AS FOLLOWS:

Pavements and shoulders having an edge drop of more than 3 in. (75 mm) shall be delineated with drums in accordance with 801.09. Delineation shall be at a maximum spacing of 200 ft (60 m). ~~The use of cones in accordance with 801.08 will be permitted during daylight hours in lieu of drums~~.

SECTION 801, BEGIN LINE 259, DELETE AND INSERT AS FOLLOWS:

Cones shall be made of a material to withstand impact without damage to striking vehicles. They shall have a substantial base to restrict overturning. Cones and tubular markers shall be as shown on the plans.

Cones shall be used only during temporary activities where portability is advantageous and they remain in place and do not create a hazard to traffic. The use of cones in lieu of drums will be permitted ~~during daylight hours unless otherwise directed~~ *as shown on the plans. However, cones shall not be used for Interstate-route lane restrictions.*

Tubular markers shall be used for separating two-lane two-way traffic as shown on the plans or as directed.

Cones and tubular markers shall be secured in place either by weighting or adhesives. The use of metal bases will not be permitted.

EXPLANATION

1. Provision title is centered and is Courier New font, 10-pt. pitch, all capitals.

2. Referenced *Standard Specifications* section and line numbers are Courier New font, 10-pt. pitch, all capitals.

3. Specification text is Times New Roman font, 12-pt. pitch.

4. Deletions are shown by overstrike.

5. Insertions are shown in italics.

EXAMPLE SPECIAL PROVISION WHICH DIRECTLY REVISES THE *STANDARD SPECIFICATIONS*

Figure 19-3B

LIGHTWEIGHT AGGREGATE FOR EMBANKMENT

Description

This work shall consist of furnishing and placing lightweight aggregate fill for embankment construction in accordance with 105.03.

Materials

Materials shall be in accordance with the following:

The aggregate source shall submit independent laboratory test results for the quality parameters listed. The test report shall be dated not later than 18 months from the time it is submitted. Independent laboratory test results will not be required if the aggregate is supplied by a certified aggregate producer on the Department's approved Certified Aggregate Producer List.

The lightweight aggregate shall satisfy the requirements as follows:

1. Dry Rodded Unit Weight (Mass), Max... 58 pcf (929 kg/m^3)
2. Gradation, AASHTO M 195..... 1/2 in. to No. 4 (12.7 mm to 4.75 mm)
3. Finer than No. 200, Max..... 8.0% by wet analysis
4. Wear, Max..... 50%
5. Soundness, Max..... 12% loss
6. Friable Particles, Max..... 10.0%
7. Deleterious Particles, Max..... 1.0%

The source of lightweight aggregate is subject to approval of the Engineer. Aggregate that is without suitable documentation of testing by an independent testing laboratory and is not approved or is not supplied by a certified aggregate producer, will not be accepted.

Recycled materials will not be allowed in an environmentally-sensitive area.

Construction Requirements

After placement, this material shall be lightly compacted. Density tests will not be required after placement.

Method of Measurement

Lightweight aggregate for embankment will be measured in accordance with 203.27(d).

Basis of Payment

Lightweight aggregate for embankment will be paid at the contract unit price per ton (megagram).

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Lightweight Aggregate for Embankment.....	TON (Mg)

The costs of material, transportation, placement, and all incidentals shall be included in the cost of the pay item.

EXPLANATION

1. Provision title is centered and is Courier New font, 10-pt. pitch, all capitals.

2. There are no referenced *Standard Specifications* sections and line numbers.

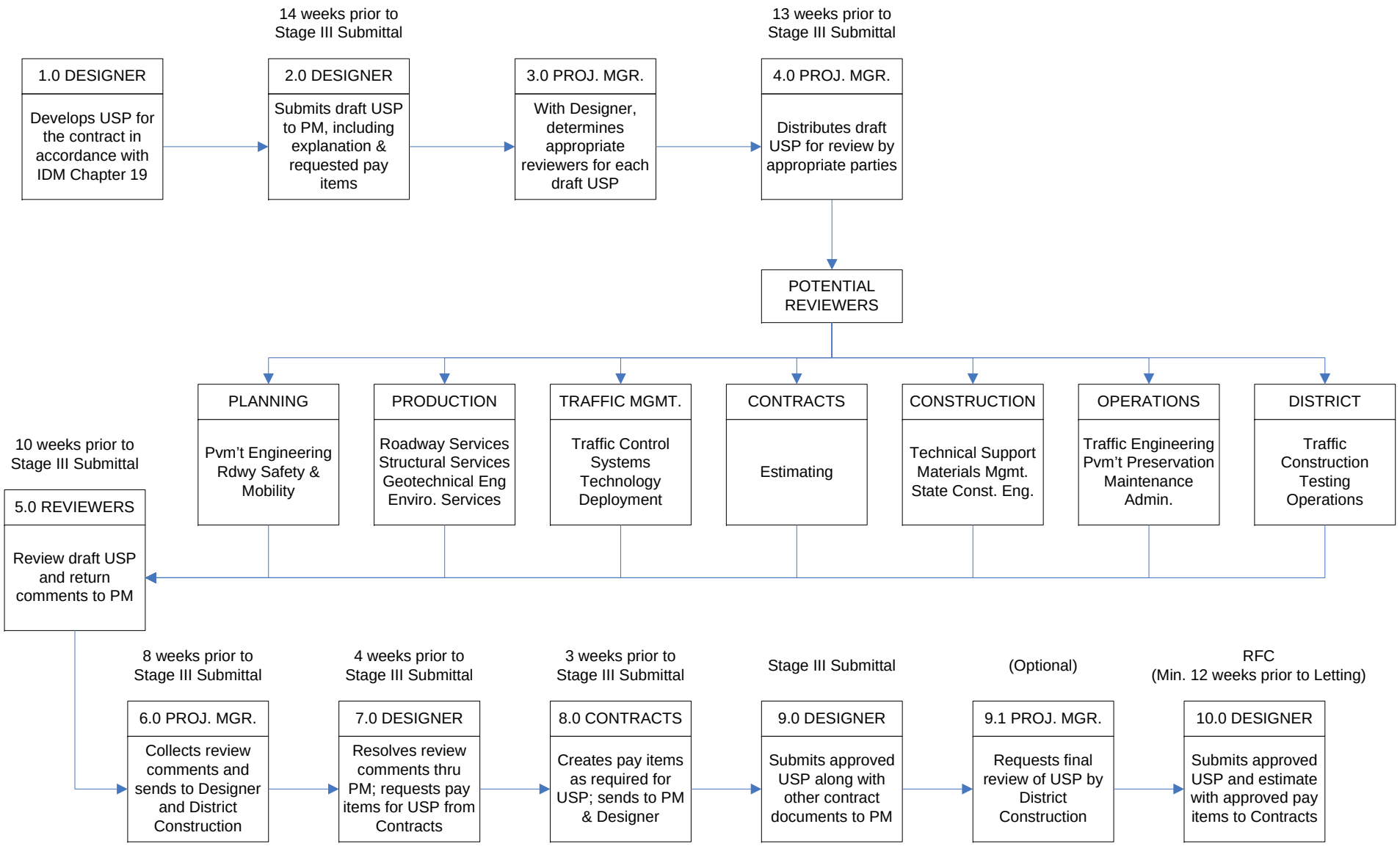
3. Provision subheadings are Courier New font, 10-pt. pitch, boldface.

4. Specification text is Courier New font, 10-pt. pitch.

5. There are no deletions or insertions.

EXAMPLE SPECIAL PROVISION WHICH
DOES NOT DIRECTLY REVISE THE *STANDARD SPECIFICATIONS*

Figure 19-3C



UNIQUE SPECIAL PROVISION PROCESS

Figure 19-3D

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CHAPTER TWENTY

COST ESTIMATING

To adequately define the project scope and to ensure that sufficient construction funds are available, a construction cost estimate is required during the various stages of project development. As the project progresses, the estimate is updated to ensure the project remains cost-effective, that sufficient funds are available for construction, and that the contractor's bid price is reasonable. This Chapter discusses the project cost estimates required and who is responsible for their preparation.

20-1.0 PROJECT ESTIMATES

20-1.01 Project Initiation Estimate

Each district is responsible for nominating projects to be included on the Department's Multi-Year Highway Improvement Program. Two notable exceptions are major-improvement studies and the Interstate System rehabilitation program, which are nominated by the Planning Division. Once a project is nominated, the Urban and Corridor Planning Office is responsible for gathering the necessary project information before it can be included on the Program list. One part of this information-gathering includes a preliminary cost estimate for construction. The preliminary cost estimate is generally provided by the entity which nominated the project. This estimate is determined using broad units of cost (e.g., cost per mile, cost per square yard), by the type of improvement and by reviewing similar, recent projects in the area.

20-1.02 Preliminary Engineering Study Estimate

The Environmental Policy Team, with input from the district, will prepare a more-detailed cost estimate for a project requiring an Engineer's Report. This estimate will be prepared based on the estimating procedures discussed below (e.g., cost per mile, cost per square yard). However, where quantities are available, these should be used. The Environmental Policy Team will be responsible for obtaining appropriate parametric cost estimate data.

A preliminary-study cost estimate is determined according to the following.

1. Roadway Items. For most roadway items, the cost estimate is determined assuming a cost per mile per roadway width. This estimate reflects the cost for earthwork, pavement structures, drainage, or other miscellaneous items. Every effort should be made to include all anticipated work items.

2. Structure Items. For most structural items, the cost estimate is determined assuming a cost per square yard based on similar structure type, work type (e.g., bridge rehabilitation, replacement) and crossing type (e.g., railroad, highway, stream).

3. Traffic-Signal Items. For a signal installation, a cost estimate is determined assuming a cost per intersection. For a signal-interconnect system, a cost estimate is determined assuming a cost per installation. These cost estimates will be provided by the Traffic Signals Team.

4. Traffic-Signs Items. The cost estimate is based on the number of panel signs and cost per sign. The cost estimate will be provided by the Signing and Lighting Team.

5. Lighting Items. Lighting is estimated assuming a cost per mile or per interchange where lighting will be provided. The cost estimates will be provided by the Signing and Lighting Team.

6. Traffic Maintenance. Include an estimate for traffic maintenance for each project. This estimate is determined by parametric means with the aid of previous projects of similar size, type, and complexity. For an expansion or major-preservation project, traffic maintenance costs range from 5 to 15 percent of the roadway or bridge construction items.

7. Right of Way. Right-of-way costs for an expansion or major-preservation project are furnished by the Office of Real Estate, including land cost, damages, and administration costs. Right-of-way cost for another project type is provided by the Administrative Services Team based on previous land-acquisition costs of similar projects.

8. Contingencies. For an expansion or major-preservation project, add a contingency factor for miscellaneous and lump-sum items based on 20 to 30 percent of the roadway or bridge construction items.

9. Preliminary Engineering. For a road project, add a preliminary-engineering cost of 3 to 6 percent based on the total of Items 1 through 8 above, excluding Item 7. For a bridge project, use 5 to 8 percent. The preliminary-engineering cost includes environmental, survey, design, and geotechnical work.

10. Unit Costs. If quantities are available, these quantities in conjunction with the average weighted unit prices from Estimator or CES are used to develop the estimate.

The user should add the cost of major features that are beyond the basic assumptions used to develop the estimate. For example, the cost for a major box culvert should be added to the roadway cost per mile estimate.

20-1.03 Design Estimates

20-1.03(01) Preliminary Field Check

This is the first project stage for which the designer is responsible for preparing the cost estimate. The total from this estimate is included in the preliminary draft from the Design Summary. At this stage, the plans should be sufficiently advanced so that some of the major quantities can be approximated. The estimate should be based on these quantities and the average weighted unit prices. After entering all known quantities into Estimator or CES, the designer should include a 10 to 25 percent contingency factor based on engineering judgment for the miscellaneous items for which the quantities have not yet been determined. If the quantities are not available, the general cost estimating procedures discussed in Section 20-1.02 should be used (e.g., cost per mile per roadway width). The designer should contact the Production Management Division's Utilities and Railroad teams, and the Office of Real Estate to obtain an estimated cost for utilities, railroads, or right of way, unless previously supplied.

For a consultant-designed project, the consultant will be required to use the computer program Estimator to determine the preliminary cost estimate. Section 20-2.01 discusses the Estimator program. As with CES, Estimator will provide an initial cost estimate based on the available quantities. The consultant will be responsible for adjusting the values to reflect the project type, location, environment, and engineering judgment.

A project may have two or more Des numbers. For example, a combination roadway and bridge project will have multiple Des numbers. For this type of project, separate cost estimates are required for each Des number based on the quantities associated with that particular work category. The Office of Contracting will combine individual estimates within a single contract.

20-1.03(02) Design Approval Plans

Most major quantities should be known at this stage. However, if this is not true, the procedures described for determining the cost estimate in Section 20-1.03(01) are also applicable. Include the final total from the cost estimate in the Final Design Summary. The Design Summary is submitted to the Production Management Division director for approval including the total estimated cost. A complete cost estimate is required as an attachment to the Design Summary for an Interstate-route rehabilitation project, or to the Bridge Inspection Report for a bridge-rehabilitation project.

20-1.03(03) Final Check Prints

At this stage, the plans should be complete, and the preliminary cost estimate updated to a final cost estimate. All quantities should be finalized at this stage and entered into Estimator. Section 20-2.03 provides additional guidelines for determining a cost estimate based on quantities.

20-1.03(04) Final Tracings

Before submitting the final tracings, the designer must prepare a final detailed cost estimate based on the final plans and quantities. This may be an update of an earlier cost estimate. This estimate will be used by the Office of Contracting to develop the Engineer's Estimate.

For a local-public-agency project, the Office of Contracting will review the local agency's cost estimate and prepare the Department's cost estimate. This may be, but is not required to be, an independent estimate. If the difference between the local agency's cost estimate and the Office of Contracting's cost estimate is significant, the Local Program Assistance Team will contact the local public agency and negotiate an estimate acceptable to both parties.

If the cost estimate changes after the plans have been transmitted to the Office of Contracting due to changes in the quantities, the procedures described in Section 14-1.02(03) and 14-1.02(04) should be followed.

20-1.03(05) Other Estimates

The following indicates where new or revised cost estimates may be required during the design stage of a project.

1. Project Scope Change. If the scope of the project changes, the designer is responsible for obtaining a new construction cost estimate. If major changes on a Federal-aid project are over $250,000 and if construction will occur in the current or next Federal fiscal year, forward the revised cost estimates to the Urban and Corridor Planning Office so that it can revise the Multi-Year Program. Estimates for scope of work changes are based on approximate quantities and are determined using the procedures discussed in Section 20-1.02.

2. Project Delay. If there has been a significant delay in the project since it was originally designed and estimated, it will be necessary to update the cost estimate.

20-1.04 Engineer's Estimate

The Engineer's Estimate will provide a basis for the Department's evaluation of the bids for highway construction and will allow the Department to determine if the low-bid price is fair and reasonable for the work involved. This estimate and the data used to generate the estimate are confidential and are not for general distribution.

After receiving the cost estimate, the Office of Contracting will ensure that the following reviews or activities occur.

1. Review of Estimate. The Office of Contracting will review the designer's estimate and check it for errors or omissions. If large discrepancies are noted, it will contact the designer to discuss and resolve differences.

2. Review of Contract Completion Time. The Office of Contracting will ensure that the cost estimate is compatible with the contract completion period set by the district construction personnel.

3. Review of Cost Estimate From Office of Real Estate. The Office of Contracting will add cost estimates from the Office of Real Estate to the designer's estimate to determine the final Engineer's Estimate.

4. Prepare Plans, Specifications, and Estimates (PS&E). For a Federal-aid-funded project, the Office of Contracting will include an estimate as part of the PS&E package submitted to FHWA.

5. Review Pre-Bid Meeting Comments. The Office of Contracting will review comments from the Pre-Bid Meeting to determine their effect, if any, on the cost estimate.

6. Opening and Processing Bids. After the public reading of the bids, the Office of Contracting will check the proposals for omissions or errors. If the low bidder satisfies all criteria and if the low bid is within a pre-established award range, the bid is forwarded for approval.

7. Rejection of Bids. If all bid estimates exceed the pre-established award range, the bids and contract are rejected and the re-advertising process begins. The Engineer's Estimate is reviewed with regard to the bids received.

20-2.0 ESTIMATING PROCEDURES

20-2.01 Computer Estimates [Rev. Jan. 2011]

Each construction-cost estimate must be submitted via the CES Cost Estimating System software. CES has a detailed user-guide manual that the designer should review before using the program. The manual can be obtained from the Office of Contracting or by contacting the Architecture and Application Development Divison's TRNS • PORT (BAMS) Administrator.

In order to better-estimate construction costs in the future, and to analyze work done in the past, more information must be entered into CES for an in-house-designed project, or into Figure 20-2A, Consultant Project Input Form, for a consultant-designed project.

All consultant-designed-project-metrics information formerly submitted on the Consultant Project Input Form should not be entered directly into CES. The following project metrics should be submitted.

1. Latitude and Longitude. This information should be taken from the SPMS project schedule. If it is not shown there, the designer or estimator should determine the location of the midpoint of the project in degrees, minutes, and seconds. This data should be entered without units symbols. For example, 89º 59' 34'' is entered as 895934. This information is entered on the General tab, second page. Latitude or longitude information that is already present must be verified.

    a. For a project that includes work on more than one route, the latitude and longitude should be entered for the point closest to the geographic center of all work.

    b. For a district- or subdistrict-wide contract, the latitude and longitude should be entered for the district or subdistrict office.

2. Project Length, Pavement Width and Depth, and Lane Miles (Kilometers). This information should be entered on the the General tab, first page, bottom left, in the block titled Metrics. English units should be used for a metric-units project. Each entry should be rounded to two decimal places, as appropriate.

    a. The project length is the overall length of pavement, entered in miles.

    b. The pavement width is the total width of new mainline pavement, excluding paved shoulders, entered in feet.

    c. The pavement depth is the average depth of new mainline pavement, excluding paved shoulders, entered in inches.

    d. Lane miles is the project length times the number of through travel lanes, excluding shoulders, entered in miles.

The Consultant Project Input Form, Excel file 0527-inf.xls, previously used to submit the information described above in using the Estimator® project-estimation software, will no longer be required.

Cost estimates are based on the quantities and applicable unit prices. CES allows the designer to enter quantities or to develop cost estimates based on general estimating procedures (e.g., cost per square foot of bridge deck, cost per intersection). For Estimator, the user must input actual quantities into the program before it can generate a cost estimate. Once the quantities have been entered, the programs will automatically provide a cost estimate based on historical data from past bids. The Department is responsible for providing the base information used by the programs. This estimate may be used as-is. However, the designer should review the unit costs. Based on the proposed scope for the project, the designer should be aware of factors that may influence unit prices as follows:

1. geographic location (e.g., urban or rural, State location, district);
2. similarity of recent construction projects;
3. inflation (adjustments of past prices to reflect the current year);
4. reliability of recent construction cost data;
5. recent trends in cost of materials, labor, or equipment;
6. anticipated difficulty of construction;
7. project size relative to size of similar projects;
8. proposed project schedule;
9. anticipated construction staging;
10. expected environmental problems (e.g., hazardous wastes, wetlands);
11. use of experimental materials, which requires coordination with the Office of Research and Development; and
12. engineering judgment.

20-2.02 Coded Pay Items

20-2.02(01) General

Each pay item has an official title and code number which is tied to the *Standard Specifications*. These items are listed in the INDOT *Catalog of Unit Price Averages for Roads - Bridges - Traffic*. This document can be obtained from the Office of Contracting. These item numbers are used by the Department for tracking and as a historic data base. For most items, CES or Estimator will provide the official pay item number. However, for some specialty or new items, the construction item may not be within the computer. Therefore, the designer will be required to conduct the following.

1. Checking. The designer should ensure that there is an actual number for the item within the system by entering the item into CES or Estimator. Do not assume that the item is not in the system.

2. Specifications. The designer should review the *Standard Specifications*, Supplemental Specifications, or Recurring Special Provisions to determine if there is a method of payment for the item. If not, a special provision must be developed; see Section 19-2.0.

The designer should be certain that the CES or Estimator software's pay items catalog to be used in developing the estimate of quantities and cost estimate corresponds to that which is effective for the contract letting date. Pay item names, pay units, or code numbers are periodically revised, added, or deleted. It is the designer's responsibility to check the estimating software when these changes occur, and to be certain that they are reflected in the estimate of quantities and cost estimate throughout project development.

20-2.02(02) New Pay Item and Code Number

If an item does not exist within the CES or Estimator program, the designer may request the Office of Contracting to develop a new pay item and code number. The designer should minimize this option as much as practical. The design should instead be modified slightly in order to use an existing pay item. Where necessary, use the following procedure to request a new pay item and code number.

1. Request. Send or fax a memorandum requesting a new pay item to the Office of Contracting. This memorandum should include the information as follows:

    a. the proposed pay item name;
    b. the pay unit, both English and metric;
    c. the applicable *Standard Specifications* section reference;
    d. 3 copies of the special provision for the item, double spaced; and
    e. where applicable, plan details.

2. Comments. The Office of Contracting will review the request and may solicit comments from other Department entities. The written request for comments will include the information as follows:

    a. the *Standard Specifications* section number;
    b. a copy of the special provision;
    c. plan details, where applicable; and
    d. the Office of Contracting's comments on the request.

    Those solicited for comments will be given five work days to return their comments.

3. Response. Upon receipt of all comments, the Office of Contracting will either approve the new pay item for use and assign it a new pay item code number, or it will recommend the use of an existing pay item by developing a supplemental description for an existing specification.

20-2.02(03) Bridge Identification in Pay Item Name

A unique identifier should be assigned to each distinct bridge in the contract if required in a pay item name. For a set of twin structures, each bridge should therefore be assigned a unique identifier.

20-2.02(04) Non-Participating Pay Items [Added Sept. 2011]

Figure 14-1C, Contract Preparation Documents to Contract Administration Division, includes a section for identification of non-participating pay items. These are pay items which FHWA cannot participate in the cost of, in an otherwise federal-aid project. The pay items should be identified as such in the cost estimate.

The most common non-participating pay items include the following.

1. Commemorative plaque on a bridge.

2. Work outside the right-of-way without permit.

3. Adjustment of private facilities not included in the right-of-way acquisition document such as signs; fences, lawn sprinklers, etc.

4. Costs incurred to salvage items for later use by the State are not eligible for federal participation. This includes transportation of materials or storage costs.

5. A betterment that is not currently part of the project. Example: excess sizing of a non-INDOT sewer for future development. The additional cost over replacement-in-kind should be borne by the owner of the facility being adjusted.

6. Purchase of equipment or supplies for retention by INDOT or an LPA that are not permanent project fixtures. Example: purchase of changeable-message signs for retention by INDOT.

20-2.03 Estimating Guidelines

For most items, CES and Estimator will provide the designer with sufficient guidance in determining the appropriate cost for a specific item. However, the designer should consider the following.

1. Unit Cost. The unit cost will be based upon an average price data base maintained by the Department within CES and Estimator, price books, and unit cost bid tabulations. Adjustments to the unit cost may be appropriate based on the factors listed in Section 20-2.01.

2. Lump-Sum Pay Item. Desirably, a lump-sum item should not be used on a project. However, this is not always practical. Where necessary, only use a lump-sum item where the scope of work for the item is clearly defined and the amount of work has a minimal chance of changing during construction. In determining the unit price for a lump-sum item, the designer should consider the following.

    a. Components. Most lump-sum items can be divided into individual parts for estimating purposes. For example, a temporary traffic signal structure can be divided into the pole installation, signal heads, controller, installation, maintenance, removal, etc. Once the elements have been segregated, the designer should use engineering judgment to determine the appropriate cost for each component.

    b. Percentages. Some lump-sum items are determined based on a percentage of the total of the contract items (e.g., mobilization and demobilization, clearing right of way). These are further discussed below.

3. Clearing Right of Way. This is assumed to be 1 to 2 percent of the total contract cost. Factors that should be considered include project location, rural or urban, the type of clearing required (trees or brush), concentration of clearing, and method of disposal.

4. Temporary Bridge and Approaches. This should be segregated into its components as discussed in Item 2.a. For example, the cost of temporary approaches should be determined according to the amount of embankment required, width of pavement, drainage systems, etc. Temporary guardrail and temporary pavement markings are separate pay items.

5. Miscellaneous Items. The following pay items should always be included in the cost estimate.

    a. Field Office. The pay unit is month. The number of months used for the final quantity and schedule of pay items is set by the district Office of Construction based on the estimated construction time.

b. Maintaining Traffic. Maintaining traffic is a lump-sum item and will be determined based on its components. Elements that should be considered include traffic volume, traffic composition, peak times, number of lanes, length of construction, and type of work.

c. Construction Engineering. This will be determined by the computer. Construction engineering is determined using 2% of the total contract cost. This may require revision if significant engineering may be required during construction.

d. Mobilization and Demobilization. This is a lump-sum item and will be determined by the computer. Mobilization and demobilization is determined using 5% of the total contract cost including the amount for construction engineering. Mobilization and demobilization consists of preparatory work and operations necessary for the movement of personnel, equipment, supplies, and incidentals to and from the project site; for the establishment and removal of offices, buildings, and other facilities necessary for work on the project; and for all other work or operations that must be performed or costs incurred when beginning or ending work on the project.

6. Other Cost Estimates. Other entities will prepare their own cost estimates. The designer is responsible for ensuring that such entities receive the correct information so that they can properly prepare their estimates.

7. Other Information. The designer should provide the Office of Contracting with information that may influence the cost of the project (e.g., special commitments, experimental materials, special equipment, expected construction difficulties).

8. Special Material. Contact a supplier directly to obtain a quote for a special material. The quoted price is what a supplier hopes to receive for its product. The final price the contractor will be required to pay will be lower due to competition and negotiations between the contractor and supplier. Such an item as a discount for a large quantity, early payment, or extreme competition may impact the final price. The designer should adjust the quoted price based on these factors, previous estimates, and engineering judgment.

9. Incidentals. Incidental costs cover work that may or may not be addressed by a specific contract pay item. Incidental costs may include the following:

a. work included in other items per the *Standard Specifications* or a special provision;

b. coordination with other contractors;

c. early completion date which demands multiple work shifts;

d. payment of overtime;

e. winter construction;

f. congested work area;

g. high-elevation work;

h. hauling through heavy traffic, frequent railroad crossings, or traffic signals;

i. work not adaptable to the normal equipment used which results in manual labor or renting of special equipment;

j. location of plant sites, including costs of rental and renovation;

k. the season during which the work will be performed;

l. the cost of maintaining traffic including stage construction, flaggers, lights, barricades, or flashing-arrow signs; and

m. outside agencies' rules and regulations (e.g., OSHA, EPA).

10. Structural-Plate Pipe-Arch Unit-Price Data. For a large-culvert location, the hydraulics recommendation letter will include a structural-plate pipe-arch sizing as well as a precast-concrete box-structure or three-sided structure sizing. If this occurs, the designer should evaluate both structures at the structure type and size stage and choose the more economical alternate. If the hydraulics recommendation letter includes the option of a small- to medium-sized structural-plate pipe-arch, a deformed pipe type 1 should be shown on the plans so that the contractor has the option of providing either a corrugated-metal or an elliptical-concrete pipe.

    The Department has very little historical unit-price data for structural-plate pipe-arch structures. Data from recent bid tabulations is available from the Contract Administration Division's Office of Contracting. The designer should contact pipe suppliers for additional price information for a specific size. Some sample price data from specific contracts is shown in Figure 20-2B.

11. Three-Sided-Structure or Oversize-Box-Structure Unit-Price Data. This data may be found at www.in.gov/dot/div/contracts/standards/bridges/3sidedculv.pdf.

12. Concrete-Structural-Members Unit-Price Data. Estimated unit prices for are listed in Figure 20-2C. The designer should adjust unit prices based on the quantities required for the

project. The designer should increase the unit price 20 to 50 percent for small quantities. The designer should further check with a fabricator.

CONSULTANT PROJECT INPUT FORM
ENGLISH-UNITS PROJECT

Des No.	Std. Spec. Year: 2010
Route No. or Road Name:	
Work Type:	
Project Length, 4 decimal places: mi	Latitude: ° ’ ”
Pavement Width, 4 decimal places: ft	
Pavement Depth, : in.	Longitude: ° ’ ”
Lane Miles, 1 decimal place: mi	

If pavement work is not required, the width and depth fields should be left blank.

In saving the completed form, it should be identified as [Submittal] ConProjInFrm [Des No.] for [Bridge, Roadway, Contract] Services. An example reads FT ConProjInFrm 1012345 for Contract Services.

Contract	LETTING DATE	ITEM	DESCRIPTION	Quantity	UNIT PRICE
R-20165	9-16-97	717-26046	Pipe Arch, 0.109 in. T&S, 0.138 in. Bot, 28 sq ft	95 LFT	$140
B-22807	12-17-96	717-26166	Pipe Arch, 0.109 in. T&S, 0.138 in. Bot, 43 sq ft	78 LFT	$210
R-23259	10-22-97	717-26236	Pipe Arch, 0.109 in. T&S, 0.138 in. Bot, 55 sq ft	104 LFT	$275
B-20916	6-04-96	717-26256	Pipe Arch, 0.109 in. T&S, 0.138 in. Bot, 58 sq ft	110 LFT	$150
R-22693	2-11-97	717-26306	Pipe Arch, 0.109 in. T&S, 0.138 in. Bot, 64 sq ft	188 LFT	$250
R-23259	10-22-97	717-26411	Pipe Arch, 0.109 in. T&S, 0.138 in. Bot, 81 sq ft	114 LFT	$300
M-23445	2-10-98	717-04722	Pipe Arch, 0.168 in. T&S, 0.188 in. Bot, 119 sq ft	100 LFT	$396
R-22445	3-19-96	717-26656	Pipe Arch, 0.138 in. T&S, 0.168 in. Bot, 131 sq ft	110 LFT	$325
R-23392	2-10-98	717-26657	Pipe Arch, 0.168 in. T&S, 0.188 in. Bot, 142 sq ft	140 LFT	$264
M-23686	7-14-98	715-05252	Pipe, Type 1, Deformed, 20.5 sq ft	28 LFT	$128
R-23126	12-16-97	715-05027	Pipe, Type 1, Deformed, 20.5 sq ft	128 LFT	$175
R-23126	12-16-97	715-05042	Pipe, Type 1, Deformed, 21.9 sq ft	136 LFT	$100
RS-24801	3-20-01	715-05254	Pipe, Type 1, Deformed, 21.9 sq ft	40 LFT	$196
M-23589	8-11-98	715-05260	Pipe, Type 1, Deformed, 27.4 sq ft	40 LFT	$145
R-24432	2-22-00	715-05265	Pipe, Type 1, Deformed, 32.1 sq ft	315 LFT	$220
R-24729	2-22-00	715-05272	Pipe, Type 1, Deformed, 37.0 sq ft	158 LFT	$207
R-23907	11-16-99	715-05298	Pipe, Type 1, Deformed, Min. Area 74.3 sq ft	98 LFT	$290

SAMPLE CONTRACT UNIT PRICES
PIPE-ARCHES AND DEFORMED PIPE

Figure 20-2B

Description	Cost per Linear Foot
Type I	$66.00
Type II	$88.00
Type III	$102.00
Type IV	$125.00
Bulb Tee, 54 in.	$114.00
Bulb Tee, 66 in.	$120.00
Bulb Tee, 73 in.	$140.00

English Units

CONCRETE STRUCTURAL MEMBERS UNIT COSTS

Figure 20-2C

CHAPTER 109

Right of Way

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CHAPTER EIGHTY-FIVE

RIGHT-OF-WAY PLANS PREPARATION

85-1.0 GENERAL

85-1.01 Purposes

The primary purposes of acquiring highway rights of way are to provide sufficient right of way to efficiently construct the facility, to enable the safe operation of vehicles on the facility after it is constructed, and to permit the satisfactory and efficient operation of maintenance equipment after construction.

In establishing the right of way, consideration should be given to the Office of Real Estate's requirements for preparing legal descriptions of each acquisition or parcel, and in appraising the property and negotiating with the property owner. Further consideration should be given to the staking of the right of way and the Department's or property owners' problems in fencing the right of way.

85-1.02 Definitions

For definitions used in this Chapter, see the *INDOT Right-of-Way Engineering Procedures Manual* published by the Office of Real Estate's Administrative Services Team. The definitions listed below are not included in the above-referenced manual:

1. Access Control Line (ACL). This is the line on which access is physically controlled for Limited Access Right of Way (L.A. R/W). The ACL is usually the same as the L.A. R/W line along which access is controlled in a legal sense. See examples in Section 86-4.0.

2. Local Service Road. This is a road constructed to a property that would not have other access because of the purchase of L.A. R/W or physical constraints.

3. Centerline. This is a base line established in the field survey by geometric computation (paper-relocated line) or by computer generation and is used in the preparation of plans and in construction.

4. Chain-Link Type Fence (CLTF). This is a closely-woven fence as shown on the INDOT *Standard Drawings* which is used to fence the L.A. R/W in an urbanized area or in front of a developed property with a maintained lawn.

5. Control of Access. The rights of owners, occupants, or other persons on land abutting a highway to access, light, air, or view in connection with the highway are fully or partially controlled by a public authority. *Indiana Statutes* refer to this authority as limited access. However, the extent of control or limitation is defined as follows:

   a. Full Control. The control under which the authority to control access is exercised to give preference to through traffic by providing an access connection to a selected public road only and by prohibiting a crossing at grade or a direct drive connection.

   b. Partial Control. The authority to control access is exercised to give preference to through traffic to a degree that, in addition to access a connection with a selected public road, there may be a crossing at grade or a drive connection, as governed by existing conditions and economics in land acquisition and construction.

6. Construction Limit. The construction limit is the farthest limit of construction as measured perpendicular to a base line (e.g., toe of slope, top of ditch backslope). Construction limits should be shown throughout the plans.

7. Farm-Field Type Fence (FFTF). This is an open-woven fence used to fence L.A. R/W in a rural area, but not in front of a nearby rural dwelling or a developed property with a maintained lawn.

8. Final Right-of-Way Plans. The right-of-way plans are considered to be final after the parcel numbers and other pertinent right-of-way data have been added to the right-of-way plans by the Office of Real Estate and have been signed by the Office of Real Estate director.

9. Landlocked Property. A property is considered legally landlocked where it is left without access by the purchase of limited access right-of-way across its existing access or where a physical barrier (e.g., a high fill, stream channel relocation) has been constructed across its existing access or property frontage.

10. Limited Access Right-of-Way (L.A. R/W). See Item 5 above.

11. Monument, Type A, B, C, or D. Standard monument (marker) used to define the survey line, construction centerline, or civil boundary or division.

12. Partial L.A. R/W. See Item 5 above.

13. Preliminary Right-of-Way Plans. Right-of-way plans are considered to be preliminary until such time as they are submitted to the Office of Real Estate for approval.

14. Property Line. A property line outlines or defines property ownership.

15. Right-of-Way Line. A proposed-right-of-way line outlines or defines the land-acquisition requirements for a new highway project or the improvement of an existing highway facility.

85-1.03 Abbreviations

The following abbreviations should be used on right-of-way plans.

R/W	Right of Way
L.A. R/W	Limited-Access Right of Way
A.C.L.	Access Control Line
C.L.T.F.	Chain-Link Type Fence
F.F.T.F.	Farm-Field Type Fence
APP. P.L.	Apparent Property Line
APP. EXIST R/W	Apparent Existing Right of Way
L.S.R.	Local Service Road
B	Beginning of L.A. R/W
E	Ending of L.A. R/W
N.E.P.L.	No Evidence of Property Line

85-1.04 Composition

A complete set of road right-of-way plans will include the sheets as follows:

1. Title sheet;
2. Index sheet;
3. Location Control Route Survey Plat;
4. Plat No. 1 (if Plat No. 3 is not furnished);
5. Typical Cross Sections;
6. Plan and Profile sheets;
7. Detail sheets (if required);
8. Approach Table; and
9. Plat No. 3, if Plat No. 1 is not required.

A complete set of bridge right-of-way plans will include the following:

1. Title and Index sheet;
2. Location Control Route Survey Plat;
3. Plat No. 1;
4. Typical Cross Sections;
5. Detail sheets (if required);
6. Road Plan and Profile sheets;
7. Layout;
8. General Plan; and
9. Bridge Summary.

Right-of-way plans should be on standard 36 in. by 24 in. sheets (A-1 size), except for Plat No. 3, which is discussed in Section 85-2.10.

Include the right-of-way project number and right-of-way code on all right-of-way plan sheets including the plan and profile sheets.

85-1.05 Sheet Numbering

The purpose of the right-of-way plans is to provide a set of maps and other drawings showing the area required for the highway and associated purposes. There is no intention on the part of INDOT to make the right-of-way plans complete with the full construction details of a proposed facility, as this would duplicate the contents of another set of highway plans called the Construction Plans (see Chapter Fourteen). Right-of-way plans may show construction details, because they are developed using the construction plan sheets and parcel numbers added to construction plans. Right-of-way plans will include fewer sheets than the construction plans for the same project and, consequently, are numbered differently.

The right-of-way plans include references to construction plan sheet numbers. Such references which are discordant with the right-of-way plan sheet numbers should be corrected to show right-of-way plan sheet numbers or should be omitted, whichever is appropriate for the conditions.

The aerial mosaic, Plat No. 3, if required, should be numbered as the last sheet of the right-of-way plans. Plat No. 3 may have its own numbering system shown in the title block in the lower-right-hand corner.

Number all right-of-way plan sheets consecutively from the beginning to the end of the set. The title sheet is sheet 1. If, after the sheets have been numbered, it becomes necessary to insert additional sheets, the insertions can be made without re-numbering the original plan sheets by using letters. For example, two new sheets to be inserted between 17 and 18 would be the

numbered 17A and 17B. Re-numbering is necessary, however, where a sheet is eliminated. The total number of sheets should not be shown.

85-1.06 State-Funded FHWA Oversight Exempt Project or Non-NHS Project

The State will not submit plans or other right-of-way data to the Federal Highway Administration for a State-funded FHWA oversight exempt project or a non-NHS project. The delegated responsibility for such approval has been assumed by the State under its approval plan.

85-1.07 Location Survey

A surveyor will not attempt to re-establish a property line from a deed. He or she will, however, review the last deed of record to find references to property-corner monumentation and attempt to collect all physical evidence of property lines that are available. A hedge row or fence row that appears to be a property line will be labeled App. P.L. Where property-line evidence cannot be found but where a property line is expected to exist, the survey will identify this as N.E.P.L. Where a section corner cannot be found, it will be identified as such in the survey documentation.

85-1.08 Property-Owner Contact for Condemned Parcel

Once a parcel is in condemnation, the only contacts that a condemned property's owner may have are with the Legal Services Division or the Attorney General's office.

After the land-acquisition process begins, it is the project manager's responsibility to be aware of which parcels may be undergoing the condemnation process.

If a condemned property's owner, representative, or tenant appears on a final field check, the field-check conductor must explain to him or her that no one in attendance is legally permitted to answer questions or provide information, and that they must instead contact the Attorney General's office.

85-2.0 RIGHT-OF-WAY PLANS SHEETS

85-2.01 Title Sheet for Road Project or Title and Index Sheet for Bridge Project

The right-of-way title sheet should be similar to the title sheet for the construction plans and will include the following:

1. location map to scale;

2. project description (e.g., project type; location; civil township; county, section, township, and range);

3. project reference numbers including designation number, Office of Real Estate code number, and reference point. The Office of Real Estate code number may be left off the Preliminary Right-of-Way Plans, if it is unavailable. It must be shown on the Final Right-of-Way Plans;

4. a signature block for the following:

    a. the Office of Real Estate director; and
    b. the Acquisition Team leader;

5. right-of-way index (bridge project), see Figure 85-2B; and

6. revision table (bridge project).

85-2.02 Index Sheet (Road Project)

The Index sheet will include the following:

1. a completed index. See Figure 85-2A, Sample Right-of-Way Index (Road Plans);
2. a list of utilities;
3. an abbreviation legend;
4. notes that can affect right-of-way purchasing; and
5. a revision table.

85-2.03 Parcel Listing for Land Acquisition

This sheet is no longer required in the plans.

85-2.04 Route Survey Plat

A Location Control Route Survey Plat will be kept with the survey materials for each project that requires additional right of way and will be submitted by the designer with the Right-of-Way Plans. A print of the Location Control Route Survey Plat should be submitted with Preliminary

Right-of-Way Plans. The Mylar of the Location Control Route Survey Plat should be submitted with the Final Right-of-Way Plans.

1. In-House Developed Survey. The Location Control Route Survey Plat for an in-house developed survey will be transmitted to the Office of Real Estate to be recorded, and then transmitted back to the Production Management Division vault to be held until the project is assigned to a designer. Once assigned to a designer, the Location Control Route Survey Plat will be transmitted to the designer along with the survey and held by the designer until submittal of Right-of-Way Plans.

2. Open-End-Contract Survey. The survey, when completed, along with the signed, sealed, and recorded Location Control Route Survey Plat will be held in the Production Management Division vault until the project is assigned to a designer. Once assigned to a designer, the Location Control Route Survey Plat will be transmitted to the designer along with the survey and held by the designer until submittal of Right-of-Way Plans.

3. Design-Consultant-Developed Survey. For a project where the survey is performed by a design consultant, the designer should submit the survey and the signed, sealed, and recorded Location Control Route Survey Plat with Grade Review or Structure Type and Size Plans to be logged in and assigned a survey book number. Once logged in and numbered, the survey and Location Control Route Survey Plat will be returned to the designer. The Location Control Route Survey Plat will then be held by the designer until submittal of Right-of-Way Plans.

85-2.05 Plat No. 1

Plat No. 1 is defined as a plan showing the project centerline and the outline of all properties affected by the proposed construction. In addition to the property lines, Plat No. 1 should show all property owners, the proposed roadway, local service roads, interchanges, S-lines, and landlocked properties. Plat No. 1 should not include the areas of the properties.

It is not necessary to include a Plat No. 1 in the right-of-way plans if a Plat No. 3 is furnished. For a local public agency bridge project, a Plat No. 1 need not be included in the plans. Where Plat No. 3 is not included in the right-of-way plans, Plat No. 1 must be included. Where Plat No. 1 is required, include it in the plans following the Typical Cross Sections.

The scale for Plat No. 1 must be determined for each project. See Section 14-3.05(01) item 3 for scale information.

All property outlines should be shown. For small compact properties or lots, use a code system and tabulate the property owners elsewhere on the plat. For a small property which requires

identification by means of a coding system, do not refer to the property as a parcel. Instead, use the term Index Number, as shown in Figure 85-2B(1), Plat No. 1 Property Owners Tabulation Example.

All mitigation sites should be shown. A separate legal description and area calculations should be prepared for each mitigation site and labeled as Mitigation Site, with the land-acquisition code and parcel number.

Figure 85-2C provides a checklist for the information that should be included on Plat No. 1. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

85-2.06 Typical Cross Sections

Include all necessary typical roadway cross sections. These will include the mainline roadway, crossroads or streets, or local service roads.

85-2.07 Plan and Profile Sheets

85-2.07(01) Topography

Show all topographic information in the field survey book or model files on the Plan and Profile and the Interchange Right-of-Way sheets. Plot all topography information for 300 ft on each side of the centerline for a sheet with a 1" = 100' scale, or for 150 ft on each side of the centerline for a sheet with a 1" = 50' scale. Stationing should be shown at 100-ft intervals. The Plan and Profile sheets should include the following.

1. Topography. The topography should include the following:

    a. subdivision lot lines, apparent property lines, no-evidence-of property lines, property owners' names, centerline with stationing, bearings, equations, curve data, and apparent existing right of way;

    b. county lines or corporation limits;

    c. section or quarter-section line labeled as App. Section Line or App. ¼ Section Line;

    d. existing highways, streets, or alleys showing widths and names;

e. cemeteries, railroads, streams, or ditches;

f. private easements of access, if known;

g. sewage disposal systems, utilities, tile drains, wells, lakes, right-of-way markers, section-corner stones, pipes, wood stakes, marks cut in concrete, brass plugs, or other monuments;

h. iron pins or other physical features which could represent property corners, including those located outside the limits of the plan sheet;

i. fences and fence corners;

j. limits of woods, or individual trees if identified during the survey;

k. existing sidewalks, curbs, gutters, pavements, or retaining walls;

l. private roads or entrances, including drive types and materials;

m. quarries, pits, or mines;

n. springs, bridges, or culverts;

o. fire hydrants, manholes, inlets, catch basins, or vents;

p. peat bogs or muck areas, and mitigation sites; and

q. railroads or all other physical features which may affect the acquisition of right-of-way.

2. Stationing. Include the station and angle of intersection at each point where the project centerline or an "S" line crosses a centerline of a street or highway, subdivision boundaries, section lines, quarter-section lines, or county lines.

3. Distances. Include measured distances from the project centerline or an "S" line to property corners inside and nearest property corners outside the proposed right-of-way, and block corners in subdivisions.

4. Closure. Ensure that the computed alignment data for an interchange or paper relocation closes mathematically.

5. Property-Corner Monuments. Reference the station and offset of existing property corner monuments located outside the limits of the plan sheet and show the App. P.L., if applicable.

6. Old Survey Line. For original right of way established from an old survey line, include an equation and enough reference points to allow the Office of Real Estate to re-establish the old right-of-way.

7. Descriptions. Include the section, civil township, congressional township and range, and name of county, subdivision lot numbers (not placed in circles), and north arrow. See Figure 85-2D, Example Description. A circled number on the final right-of-way plans indicates a parcel number. Ensure that conflicts with the construction plans are avoided.

85-2.07(02) Design Information

The following design information should be included on the Plan and Profile sheets.

1. Paper-Relocation Line. If the right of way is referenced from a paper-relocation line or master alignment string, it must be tied to the survey line.

2. Construction Limits. Denote construction limits with dashed lines and label them Construction Limits for the entire length of the project, including each "S" line. Also, show construction limits for each drive, long structure, channel change, etc. Include and label temporary construction limits for a temporary runaround, where applicable.

3. Profile. Include the profile of the existing surface along the project centerline and each "S" line, with the proposed profile-grade lines.

4. Access Lane. A design feature which limits access to or from the highway (raised median curb, removal of median curb, etc.).

85-2.07(03) Property Lines

Each existing property line must be described as completely as practical. Where applicable, extend the property line beyond the right-of-way line for ease in identification. Show the stationing and offset distance for each property line that parallels the survey line. A property line that is not parallel to the survey centerline may be described by either of two methods as follows.

1. Describe one point on the apparent property line by showing a station and offset distance and a second point on the centerline by showing the range station.

2. Describe two points on the apparent property line by showing both stations and offset distances.

Method 2 is the preferred method.

The Plan and Profile sheets should include the following:

1. apparent property lines where evidence exists;
2. N.E.P.L. note at each location where a property line is suspected to exist; or
3. App. Existing R/W for existing right-of-way line if known from old plans or surveys.

If all attempts to determine the apparent existing right of way are unsuccessful, the Office of Real Estate's Acquisition Team should be consulted to provide the apparent existing right of way. If the Team is unable to find evidence of existing right of way, the Property Management Team will prescribe the apparent existing right-of-way lines to be used. A request for right-of-way determination should be sent to the Acquisition Team under the signature of the Production Management Division's Office manager. Copies of the Plan and Profile sheets should be included with the request. A copy of the request, without attachments, should be transmitted to the project manager for tracking.

85-2.07(04) Buildings or Other Improvements

Indicate the following on the Plan and Profile sheets.

1. Building. Show the station and offset dimension of the nearest corner for each improvement within and 75 ft beyond the right-of-way line. It may be necessary to increase this dimension in a rural area. Locate and show each structure containing an overhang which occurs within the above limits. The amount of eave overhang should be shown at each building located close to, but not crossing, the new right-of-way line.

2. Distance. Where the survey is an aerial survey, required or necessary data may be scaled from the aerial topography. However, an aerial mosaic may not be uniformly to scale.

3. Addition. Where during the Preliminary Field Check it is determined that there is an improvement (e.g., sign, underground tank, encroachment) that was not noted by the original survey or included on the plans within or 75 ft beyond the right-of-way line, determine the station, offset dimensions, and plan dimensions of the improvement, and show the improvement on the plans.

4. Utility. Each utility crossing or entering on the proposed right of way must be shown on the plans. For a line suspended on poles, show only the poles. However, for a high-tension line, show the line crossing.

   The correct inclusion of each utility facility should be reviewed by both the Production Management Division and its Utilities Team at the time of the field check. Discrepancies in the plans should be identified at this time so that proper corrections can be made. Where a change is simply noted and revised later in the office, it can too late to secure the necessary location data.

5. Existing Pipe. Each existing pipe and its size and type should be shown on the plans.

85-2.07(05) Notations

The following should be shown on the Plan and Profile sheets.

1. Right-of-Way Note. Include the following notes on each sheet as applicable:

   All R/W described from Line "_____" except as shown.

   Line "____" to be constructed. [only for multiple survey lines or a paper relocation]

   Limited Access R/W requirements to apply where indicated. [only where limited access right of way is to be acquired]

2. Right-of-Way Description. Right of way should be described as follows:

   a. Identification. Except as otherwise provided in Item 2.f. below, each breakpoint in the right-of-way line should be identified with a station and offset distance. A station or offset may be described in terms of a property line or right-of-way line (e.g., +PL/30, +150/RW, +LARW/23, +PL/PL). The right of way should be described from the centerline, which should be the survey or construction centerline, where practical. Show the offset in whole-foot increments.

   b. Parallel. Where the right-of-way line is parallel to the centerline between two breakpoints, it should be identified by using the offset distance (e.g., 75 ft R/W). On a curve, a uniform right-of-way line parallel to the curved centerline may be identified by using the offset distance between the PC and the PT. The PC and the PT of a curve should be labeled on the right-of-way line. See Section 85-4.02 for additional guidance.

c. Non-Uniform. Non-uniform right of way should be marked "R/W" or "L.A. R/W" and should be considered as a straight line between the breakpoints, including where the centerline is curved.

d. Clarity. Right-of-way lines and right-of-way notes should stand out and be easily seen and understood on each sheet. For minimum line thickness and applicable R/W symbols, see Chapter Fifteen. A right-of-way line should not obliterate a physical feature or note that is necessary in the plan or topography presentation.

e. Common PL and R/W. Where a property line is intended to be the right-of-way line for the new project, the right-of-way line should be drawn coincident with the apparent property line. Designate the line either as "P.L. & R/W" or "P.L. & L.A. R/W, A.C.L., & _._.T.F." Ensure that the existing property line or fence symbol is still labeled.

f. Right of Way through Platted Area. In a platted area, the exact right-of-way line location should be dimensioned from a property corner and not from the project centerline. A dimension at every lot line crossed is neither necessary nor desired. It is sufficient to make ties only at streets, alleys, or the platted area boundaries unless additional intermediate right-of-way breakpoints are required. Figure 85-2E, Right of Way Through Platted Area, provides a sample layout. However, proper ties must be established between the platted area and the project centerline.

85-2.08 Detail Sheet

A detail sheet should be included in the right-of-way plans if right-of-way lines are shown on the sheet. All right-of-way lines should be shown, including dimensions and descriptions.

85-2.09 Approach Table Sheet

This sheet should show each approach location, type of approach, width, length, radii, and types of materials, but not quantities (X shown in appropriate space), and distance beyond the right-of-way line.

85-2.10 Plat No. 3

Plat No. 3, as required with preliminary right-of-way plans, will consist of one set of photographic reproduction mylars (36 in. x 24 in.) of the entire length of the project. It should be

prepared using a scale as described in Section 14-3.05(01) Item 3, from an uncontrolled aerial photo enlargement, with 10% overlap and with the error not to exceed 2%.

Mylar enlargements may be prepared from existing aerial photographs produced by a qualified aerial-survey organization within the past three years, from new photography flown, or upon the order of the designer specifically for the coverage required. The photography, especially that of an urban area, should depict acceptable current conditions of civic, personal property, or other improvement of the area involved, and should provide acceptable quality of the photographic image. Include all proposed photography with the right-of-way plans submittal to the Office of Real Estate.

If a property extends beyond the limits of a project, the designer should extend the aerial coverage and description to include the property.

The coverage of the reproduction Mylar in the 24-in. dimension should not be less than 10,000 ft at the 1" = 50' scale, or less than 2000 ft at the 1" = 100' scale.

The 10,000 ft Mylar enlargements should be sufficiently matched and end-lapped between successive sheets, so as to provide for a matched continuous strip of the project length once printed, trimmed, and spliced together.

The reproduction Mylar should include the following information.

1. Centerline. The centerline of the final selected surveyed route should be positioned approximately in the center of the 24-in. dimension. Include the centerline stationing and the curve radius for each portion of the centerline which is on a curve. Include the north arrow on each sheet.

2. Property Lines. The boundary of the entire property ownership on both sides of the centerline and all property adjacent to or bisected by the centerline should be shown with a dashed line and designated with the letters PL.

3. Mitigation Sites. The boundaries should be shown as solid lines. The site should be labeled as a mitigation site.

4. Right-of-Way Lines. The right-of-way lines, as established, should be shown on both sides of the centerline. Station and offset dimensions need not be shown.

5. Property Owners. The name of each property owner involved should be shown.

6. Section Corner. Each section corner appearing within the coverage specified, on both sides of the centerline, should be shown with all four sections indicated in a small circle.

7. Political Boundaries. Appropriate designation of county lines, State or county roads, and streams or ditches should be shown.

8. Area. The areas of the properties should not be included.

9. Title Block. A n appropriate title block in the lower right-hand corner of each reproduction, in a block of approximately 3 in. x 5 in., should indicate the following:

   a. R/W Plat No. 3, for the Office of Real Estate, Indiana Department of Transportation;

   b. project number, designation number, and Office of Real Estate code number;

   c. aerial photo mosaic;

   d. description of controlling project termini;

   e. mosaic scale of 1" = 20', 1" = 50', or 1" = 100';

   f. date and source of aerial photography used; and

   g. sheet number of each reproduction with its relation to the total number of reproduction Mylar involved. A lso include the total number of sheets in the plans.

85-2.11 Checklist

Figure 85-2F provides a checklist which may be used to ensure that the applicable information has been included on a set of right-of-way plans. An editable version of this form may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

85-3.0 PROCESSING RIGHT-OF-WAY PLANS

85-3.01 Preliminary Right-of-Way Plans

The preliminary right-of-way plans will be processed as discussed in Chapter Fourteen. The preliminary right-of-way plans are submitted to the project manager by the designer for subsequent transmittal to the Office of Real Estate's Acquisition Team for its review and comments.

At the completion of Office of Real Estate's review, the preliminary plans will be returned to the designer through the project manager. It is the responsibility of the designer in charge of the project to review the Acquisition Team's comments and resolve differences of opinion between the markup and the designer's intent.

85-3.02 Final Right-of-Way Plans

After the preliminary right-of-way plans have been found to be acceptable, a mylar set of the final right-of-way plans and two sets of prints will be submitted by the designer to the project manager. If the project was developed using CADD, include the CADD files with this submittal. For an in-house project, the designer will only submit one set of prints to the project manager. A memorandum will be prepared by the project manager and transmitted to the Planning Division's Research and Documents Library Team along with the Mylar set and prints for processing. The mylar set and memorandum will be transmitted by the Team to the Office of Real Estate's Acquisition Team for their use. A transmittal letter will be prepared by the Research and Documents Library Team and sent to the county surveyor along with two sets of prints for review by the county drainage board. This submittal from the Research and Documents Library Team will not become complete Final Right-of-Way Plans until the parcel numbers and other right-of-way data have been added and the plans have been signed by the Office of Real Estate director.

Once the designer receives the final right-of-way plans from the Office of Real Estate, the designer should add the offset distances for right-of-way points. After submission of right-of-way plans, the designer is responsible for submitting all right-of-way revisions to INDOT as soon as possible. The Office of Real Estate needs the current information so that it may proceed with the following:

1. prepare legal descriptions for the correct properties;

2. appraise the correct acquisitions; and

3. show the correct project features to the property owners.

If the designer needs access to, or a copy of, a Buyer's Report, the Research and Documents Library Team leader should be contacted.

** *PRACTICE POINTER* **
The district construction engineer should always be consulted

prior to letting a project with right-of-way clearance exceptions.

85-3.03 Revision of Approved Right-of-Way Plans

85-3.03(01) Right-of-Way Change Initiated by the Production Management Division

1. Change Not Requiring Land-Acquisition Suspension. A change to the right of way or access (e.g., raised median curb, removal of median crossover, etc.), initiated by the Production Management Division after the final right-of-way plans have been processed, will require the following.

   a. A memorandum to the Office of Real Estate director from the designer through the Production Management Division director. This memorandum should contain a detailed explanation of the revision and why it was necessary.

   b. A set of prints of the revised sheets.

   This type of revision is submitted to the Office of Real Estate through the Research and Documents Library Team.

2. Change Requiring Land-Acquisition Suspension. If a major design change or scope change is identified that will result in a right-of-way revision, the designer should send a memorandum to the Office of Real Estate requesting that the right-of-way acquisition for the project, or for specific parcels, be temporarily suspended. The design change should involve three or more parcels, or 10% of the total number of parcels, in order for the entire project's right-of-way acquisition to be suspended. For a design change affecting only one or two parcels, the memorandum should indicate that right-of-way acquisition is to be suspended only on such parcels.

   Figure 85-3A is the memorandum form for partial suspension. Figure 85-3B is the memorandum form for complete suspension. Editable versions of these forms may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/.

   The Office of Real Estate should also be notified in writing if the issues causing the delay have been resolved and right-of-way acquisition may resume. Such notification may be included in the transmittal memorandum accompanying the revised right-of-way plans.

85-3.03(02) Right-of-Way Change Initiated by the Office of Real Estate

A change to the right of way, initiated by the Office of Real Estate after the final right-of-way plans have been processed, will require the following.

1. The Office of Real Estate will verbally request that the designer review a p roposed change.

2. The designer will verbally advise the Office of Real Estate of his or her position regarding the request.

3. Once the request has been reviewed and approved, the Office of Real Estate will send a memorandum to the designer authorizing a change to the plans, with a copy to the project manager. T he Office of Real Estate will establish a r easonable due date for the submission and communicate it to the designer in the memorandum.

4. The designer revises the plans in accordance with the Office of Real Estate's memorandum.

    a. If the designer is a consultant, go to Step 5.

    b. If the designer is in house, go to Step 7.

5. The designer submits revised plan sheets, along with a copy of the of the Office of Real Estate's request, to the Production Management Division's project manager. The project manager forwards the submission to the reviewer.

6. The reviewer checks the submission in accordance with the Limited Review policy.

    a. If acceptable, the reviewer transmits the revised plan sheets along with a copy of the Office of Real Estate's request to the project manager. Go to Step 7.

    b. If not acceptable, the designer sends a letter through the project manager to the consultant. The consultant should resolve the matter and resubmit.

7. One copy of the revised plan sheets, along with a copy of the of Office of Real Estate's request, is distributed by the project manager to the following:

    a. the author of the of Office of Real Estate memorandum who requested the change;

    b. the Office of Real Estate's Acquisition Team leader; and

c. the project manager for a consultant-designed project, or the designer for an in-house designed project.

Only a copy of the correspondence is sent to the Office of Real Estate's Property Management Team leader.

85-3.04 Construction Change

A right-of-way change made after a project is let and awarded must be processed as a construction change. A construction change is processed as discussed in Section 14-1.02.

85-4.0 RIGHT-OF-WAY DESIGN

85-4.01 Width

85-4.01(01) Interstate Route

The right-of-way width is based on a desirable clear width of 15 ft between the construction limits and the right-of-way line. For construction beyond the right-of-way limits, see Section 85-5.0.

85-4.01(02) Non-Interstate Route Except County Road

The minimum right-of-way width is based on a desirable clear width of 10 ft between the construction limits and the right-of-way line. Right-of-way width less than desirable is permissible at a specific location based on engineering judgment. A less-than-desirable right-of-way width should only be used where the cost of required right of way is prohibitive, or if physical features control such as those encountered in an urban area.

For construction beyond the right-of-way limits, see Section 85-5.0.

85-4.01(03) County Road (Local-Public-Agency Project)

The minimum right-of-way width is based on desirable clear distance of 3 ft between the construction limits and the right-of-way line.

85-4.02 Design Considerations

In determining right-of-way limits, the designer should consider the following.

1. Minimizing Number of Breakpoints. Except as required below, the number of right-of-way breakpoints should be kept to a minimum.

2. Right-of-Way Break on Property Line. A change in the distance from the centerline to the right-of-way line should not occur on a property line if there is a taking from both properties involved. However, if it is impractical to place the breakpoint approximately 20 ft from the property line, the point should be placed exactly on the property line. The breakpoint should not be placed in or near a stream bed, river, etc.

3. Right of Way Around a Curve. Where the right-of-way line is on a curve, the right-of-way line should be parallel to the centerline. A nearby improvement or other condition may justify using straight-line chords.

4. Abrupt Change in the Right-of-Way Line. An abrupt change in the right-of-way line should be avoided. The maximum desirable rate of change is 5 ft laterally for each 100 ft along the centerline. This low rate of change may not, however, be practical in rough terrain. This will reduce the number of right-of-way markers or corner posts for fencing, and will reduce the maintenance cost of the fence.

5. Adjacent Projects. Where adjacent projects end within the limits of a particular property, each project must show the complete right-of-way requirements across the property in question, both on the plan and profile sheets and on the aerial mosaic (Plat No. 3) or Plat No. 1.

6. Variable Median. The right of way should be described only from one survey centerline for a variable-median roadway. For a wide median of at least 200 ft, it may be necessary to describe the right of way from two centerlines.

7. Hatching of Residue. Landlocked residue should be identified by the use of hatching on Plat No. 3 or Plat No. 1.

8. Construction Limits. Show the construction limits for each area where construction is planned in order to establish the right-of-way requirements for the project.

9. Two-Centerlines Description. Do not describe one right-of-way point from each of two centerlines.

10. Unstakable Breakpoint. Avoid a right-of-way break where the breakpoint cannot be staked (e.g., in a stream or drive).

11. Small Parcel. Additional right-of-way breakpoints or short distances between breaks should be considered where such a procedure will eliminate taking a parcel or will avoid leaving a small remnant.

12. Cemetery. In conformance with *Indiana Statutes*, a Department-maintained route is required to be a minimum of 100 ft from the nearest gravesite wherein burial rights have been transferred, or from a mausoleum in a cemetery. Right of way or temporary right of way can be taken from a cemetery with the consent of the cemetery owner, governing board, or the relatives of interred people. However, avoidance of taking right of way from a cemetery is advisable because of the substantial administrative burden and because the contractor can be enjoined from building a road on cemetery property upon the complaint of a person. Where a small cemetery is affected, relocation of the cemetery may be an acceptable mitigation strategy.

85-5.0 ALTERNATE RIGHTS OF WAY

85-5.01 Temporary Right of Way

Temporary right of way should be specified for where there is a definite time limit on the State's need for the use of the land. The conditions under which temporary right of way will be required are discussed below.

85-5.01(01) Drive Construction

Temporary right of way is not always warranted for drive construction. If permanent right of way is not required from a property owner, temporary right of way from that property should be avoided if possible. This is in effort to reduce the number of parcels on a project.

1. Where to Consider Temporary Right of Way for Drive Construction. Temporary right of way for drive construction should be considered where one of the criteria exists as follows:

    a. the proposed drive grade and vertical curve required to construct the drive tie-in extend beyond the permanent right-of-way line. The drive grade should not exceed the grade shown on the INDOT *Standard Drawings*;

b. if right of way is required from a property for other work, the drive should be paved to the right-of-way line and the necessary temporary right of way for drive construction should be acquired;

c. the drive pavement is in need of replacement to the right-of-way line, or a different drive pavement material than that in place must be used;

d. if the proposed drive is wider than the existing drive, the tapers should be placed outside the permanent right of way as shown on the INDOT *Standard Drawings*; or

e. revising the drainage causes grading work outside the permanent right of way.

2. Where Not to Consider Temporary Right of Way for Drive Construction. Temporary right of way for drive construction should not be considered in one the situations as follows:

a. the proposed drive grade and vertical curve required to construct the drive tie-in are short of the permanent right-of-way line, and the existing pavement beyond the tie-in point may remain in place. Paving should stop at the drive tie-in point, or within 5 ft of the right-of-way line, whichever is farther from the roadway; or

b. for a partial 3R project, a 3-ft wide HMA wedge is placed adjacent to the mainline or shoulder pavement. Therefore, no temporary right of way will be required. See Section 56-4.05(02).

Construction limits for each drive should be shown on the plans within the temporary right of way. Excessive temporary right of way should not be taken outside of the construction limits. The minimum distance from the construction limits to the temporary right-of-way line is 5 ft. This distance can vary depending on the individual situation. A feature such as a tree, well, septic system, planter, garden, sign, lamp post, etc., may appear within the temporary right-of-way limits. If such a feature is within the temporary right of way and is not to be removed, it should be identified on the plans as not to be disturbed.

*** PRACTICE POINTER ***

Where it is necessary for complete construction of a drive to extend outside the permanent right of way, the necessary temporary right of way for construction of the drive should be shown on the plans and labeled as such.

85-5.01(02) Improvement Removal

Where improvement removal is required, the designer should consider the following.

1. Where it is necessary to go outside the permanent right of way to complete the removal of an improvement through which the right-of-way lines pass, show the necessary temporary right of way for the removal on the plans (see Item 3 below).

2. Temporary right of way will be provided for the removal of each improvement that encroaches on the proposed right of way, but is also partially located outside the take (see Item 3 below). Temporary right of way will not be required to remove an encroachment where the existing right of way is adequate and there is no other right-of-way acquisition. The property owner will be required to remove an encroachment of this nature.

   Temporary right of way can be established only for the removal of a partial encroachment upon right of way to be acquired. The removal of a partial or complete illegal encroachment upon existing right of way acquired on previous projects, with no encroachment upon new right of way, is the responsibility of the owner of the encroaching improvement. Therefore, no temporary right of way is required.

   Temporary right of way cannot be acquired from an owner for the removal of an adjoining owner's improvement. If an improvement is on or extends over the property line, the Office of Real Estate should be consulted.

3. The parts of an encroaching building, including signs, which lie outside the permanent right of way, must be embraced with temporary right of way, having limits which are about 20 ft from a part of the building or sign. Where practicable, the perimeter of temporary right of way for building removal will be a four-sided figure formed by two parallel lines (one of which is the designed right-of-way line) and by two lines perpendicular to the centerline. The distance between this temporary right-of-way line and the extremities of the building involved may exceed 20 ft for the purpose of convenience. Exceptions to the 20-ft distance will occur where the distance from the building in question to the boundary of the property involved is less than 20 ft. In this situation, the temporary right-of-way line should follow the property line. The 20-ft distance must be waived where it will embrace a portion of a second building which is situated wholly on the abutting owner's residue and should not be removed.

   For a platted lot, the above described method of designing the quadrilateral should be disregarded if the four bounding lines can be made parallel with lot lines to enable the use of descriptions "By Parallel Lines." For example, such a description may read, "The

north 24’ of the south 49’ of the west 41’ of Lot 29 in Smith’s Addition …. .” This is a perimeter-type metes-and-bounds description, furnishes an easy means of identifying the land, and is easier to compose.

85-5.01(03) Unsuitable Materials

The following discusses where temporary right of way may be required for unsuitable materials.

1. Peat Removal. Where the permanent right of way is not sufficient to provide for disposal of peat, temporary right of way may be taken for this purpose.

2. Other Materials. U nsatisfactory foundation soils other than peat are disposed of as Unsuitable Material, and temporary right of way is not provided for this disposal. Where the quantities of unsatisfactory foundation soils are of the magnitude that it is desirable to provide temporary right of way adjacent to the proposed facility, the plans must state the nature of the soils to be disposed of on the temporary right of way.

3. Disposal. Temporary right of way for the deposit of soils to be wasted as in Items 1 and 2 above should be determined on the basis of depositing the waste soil at a depth of 3 ft.

85-5.01(04) Grading as Excavation on Temporary Right of Way

Where temporary right of way will not be returned to its original condition, this fact must be shown on t he plans. Where material from the temporary right of way is to be used in the roadway fill, a note to this effect must be shown, e.g., *Excavation of 120 yd^3 from the channel change shall be used in the roadway fill*.

85-5.01(05) Concrete Slab Removal

Do not include temporary right of way for concrete slab removal where the slab can be sawed along the permanent right-of-way line.

85-5.01(06) Describing Temporary Right of Way

Where temporary right of way is required, define on t he plans the purpose for which the temporary right of way is being taken.

85-5.01(07) Permanent Construction

Permanent construction may not take place on temporary right of way. Permanent right of way must be acquired for this purpose. An exception may be made to this for grading in a residential area where a shallow cut or fill is involved. Temporary right of way for yard grading may be specified for up to 2 ft difference in elevation. Otherwise, permanent right of way should be purchased. Exceptions to this method of establishing right of way should be used upon the recommendation of the Office of Real Estate with the concurrence of the property owner.

85-5.01(08) Restriction on Temporary Right of Way for Drive Construction

Temporary right of way cannot be acquired from one owner to construct an adjoining owner's drive. If the drive cannot be relocated entirely upon the adjoining owner's property, permanent right of way should be acquired.

85-5.02 Provisional Right of Way

Where there is a continuing need (no definite time limit) for entrance onto a property outside the permanent right of way line, the area so required should be taken as provisional right of way. Provisional right of way must be shown on the plans, and the purpose for which it is being taken clearly indicated (e.g., Provisional Right of Way to Limit Line-of-Sight Obstruction).

Provisional right of way cannot be condemned. Where provisional right of way cannot be acquired through negotiated purchase or gift, the fee simple title will need to be secured by condemnation and the right of way will be considered permanent.

85-5.03 Perpetual Easement for Off-Highway Construction

Where an off-highway sewer, ditch, drain, or other permanent item is to be constructed and subsequently maintained by the State, and it is not necessary or desirable to acquire the fee simple title to the right of way, the plans should show the acquisition as a *Perpetual Easement for* _____."

The relocation of a legal ditch or legal pipe drain requires the acquisition of a perpetual easement so that the county can maintain the portions of the ditch or pipe drain outside the permanent right-of-way limits.

The amount of legal-ditch- or pipe-drain-usable easement right-of-way overlap will vary from 0 where right-of-way costs are minimal, to a maximum where extensive damages are indicated.

The amount of overlap should be discussed on the field check. Right-of-way markers will not be required for delineation of a perpetual easement.

The design should be incorporated into the applicable Right-of-Way Plans not yet submitted to the Office of Real Estate. Revisions to such plans now in review by the Office of Real Estate should be made per its request.

85-6.0 FIELD CHECK

85-6.01 Purpose

A field check is held during preparation of design plans, at which time the proposed right of way may be reviewed. A field check may be held specifically for right-of-way review, particularly in an urban area where there are a large number of right-of-way decisions to be made.

85-6.02 Types of Inspections

The following describes the right-of-way field inspections that may occur.

1. Preliminary Field Check. Right-of-way requirements are a primary consideration at the Preliminary Field Check. Access provisions on a limited-access facility should be resolved at this time as discussed in Chapter Eighty-six. The Preliminary Field Check Plans which are provided to the Office of Real Estate for use at the field check must be prepared showing the right-of-way lines.

2. Final Field Check, If Required. Right-of-way requirements should be shown in complete detail on the Final Field Check Plans. At the time of the Final Field Check, the right-of-way requirements are to be reviewed by the members of the field-check party and either revised or approved.

An Office of Real Estate representative should be present at the Preliminary and Final Field Checks to consult with the designer regarding right-of-way impacts. The Office of Real Estate representative should be encouraged to make an independent review of the plans, not only from a right-of-way viewpoint, but also in anticipation of appraising and buying problems.

85-7.0 REINFORCED-CONCRETE RIGHT-OF-WAY MARKERS

85-7.01 Specifications

Reinforced-concrete right-of-way markers should be in accordance with the INDOT *Standard Drawings* and the INDOT *Standard Specifications.*

85-7.02 Warrants

Reinforced-concrete right-of-way markers are used to define the right-of-way for the following.

1. Route within the State system including that on the Interstate System.

2. That portion of a county road or city or town street where right of way is purchased by the State to permit reconstruction of a portion of the road even though the road and the right of way may be subsequently abandoned to the local agency.

3. Local-service road where the State is purchasing the right of way for a new location but intends to subsequently abandon the right of way and the local-service road to the local agency.

4. County-Federal aid route.

Right-of-way markers may be eliminated in a highly-urbanized area where recommended or approved by the appropriate district office.

85-7.03 Placement

The back face of each marker should be set on the right-of-way line approximately 1000 ft apart. A marker should also be placed as follows:

1. at each corner or angle point of an irregularly-shaped right-of-way line;

2. opposite each PC and PT of each curve on each right-of-way line;

3. a maximum of 500 ft apart on the inside and outside of each curve; and

4. where, at a given marker, the adjacent marker on that line is visible assuming an eye level of 60 in. at the intermediate marker.

The location of each right-of-way marker should be shown on the plans. The locations will also be tabulated in a table showing station and offset and designated as Right or Left of the centerline.

85-7.04 Fence as Right-of-Way Marker

The following will apply to fencing as a right-of-way marker.

1. A right-of-way marker is not required where the plans provide for a fence on the Limited-Access Right-of-Way line (L.A. R/W).

2. Where the L.A. R/W is not fenced, markers should be provided as set out in Section 85-7.03.

3. Where a fenced L.A. R/W line ends and non-fenced right of way begins, the end fence post should be considered as a right-of-way marker in determining the placement of the first right-of-way marker.

4. A corner or angle point should not be artificially introduced so as to require a marker at less than the normal distance after a fence post at the end of L.A. R/W.

85-7.05 Resetting Right-of-Way Marker

At one of the field checks, the Production Management Division representative should, in cooperation with the district representative, determine if there are existing right-of-way markers that should be reset. The number of new markers plus the number of markers to be reset should equal the total number of markers required for the project.

85-7.06 Quantities and Pay Items

Quantities and pay items should be determined as described in the INDOT *Standard Specifications*.

Sheet No.	Description
1	Title
2	Index
3-4	Location Control Route Survey Plat *
5-6	Plat No. 1 *(if no Plat No. 3 is furnished)*
7-8	Typical Cross Sections
9-26	Plan and Profile
27	Interchange Geometrics
28	Interchange R/W
29	Interchange Drainage
30-33	Interchange Details
34	Approach Table
	Plat No. 3 *(if required)*

**This sheet is provided by the district Office of Surveying.*

SAMPLE RIGHT-OF-WAY INDEX, ROAD PLANS

Figure 85-2A

Sheet No.	Description
1	Title and Index
2	Location Control Route Survey Plat*
3	Plat No. 1
4-5	Typical Cross Sections
6	Approach Details
7	Temporary Runaround Details
8-9	Road Plan and Profile
10	Layout
11	Channel Change Layout
12	General Plan
13	Bridge Summary

**This sheet is provided by the district Office of Surveying.*

SAMPLE RIGHT-OF-WAY INDEX, BRIDGE PLANS

Figure 85-2B

Section	Index No.	Owner
25	1	John & Mary Brown

PLAT No. 1 PROPERTY-OWNER TABULATION EXAMPLE

Figure 85-2B(1)

1.	Section corner tie-in included if project did not have a Location Control Route Survey Plat.	☐
2.	Section corners, section lines, and quarter-section lines identified.	☐
3.	For all properties impacted by the proposed construction, property owners identified and apparent property lines shown, but not labeled as such.	☐
4.	Name of stream, river, etc., identified, with flow direction.	☐
5.	Civil township; and section, township, and range; and county identified.	☐
6.	Stations shown in 100-ft (100-m) increments.	☐
7.	All right-of-way lines shown and identified. Stations and offsets for right-of-way points should not be shown.	☐
8.	All temporary right of way shown and labeled. The purpose for temporary right of way need not be specified.	☐
9.	Line designation of project centerline and all S-lines identified. Centerlines shown from which new right of way is described.	☐
10.	Stations and locations of begin-project and end-project points identified.	☐
11.	All station equations shown and labeled.	☐
12.	Applicable subdivision names and lot numbers identified.	☐
13.	North arrow shown.	☐
14.	Drawing scale indicated.	☐
15.	Existing roads shown and labeled.	☐
16.	Landlocked residues identified with crosshatching.	☐
17.	Hexagons placed around numbers used for property owner legend / index.	☐
18.	All mitigation sites delineated and labeled.	☐

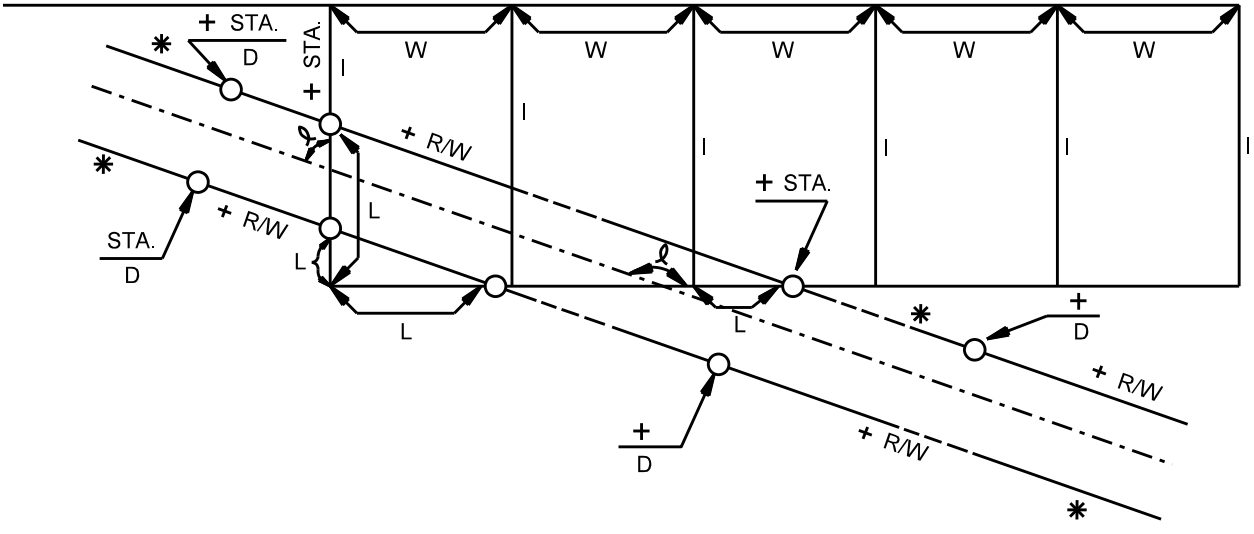
CHECKLIST FOR PLAT NO. 1

SEC. 21, T-23N, R-3W
PERRY TWP.
TIPPECANOE COUNTY

The top line is the congressional township description.
The middle line is the civil township description.

EXAMPLE TOWNSHIP DESCRIPTION

Figure 85-2D



\+ -- R/W described as shown will be considered variable R/W
* -- R/W beyond the first point outside the plattedarea may or may not be uniform
D -- Dimension from project centerline to the proposed R/W line
L -- Dimension from a property corner or lot corner to the proposed R/W line
W -- A lot dimension (width)
1 -- A lot dimension (length)
∝ -- Angle of intersecting lines

R/W THROUGH PLATTED AREA

Figure 85-2E

CHECKLIST FOR RIGHT-OF-WAY PLANS

1.	Section-line and section-corner locations identified.	☐
2.	Civil and congressional township information and county name shown.	☐
3.	All apparent property lines identified.	☐
4.	Names of last property owners of record shown.	☐
5.	Apparent existing right-of-way lines identified.	☐
6.	Property-corner monumentation identified, including iron pins, etc.	☐
7.	All proposed and temporary right of way identified, including purposes for temporary right of way.	☐
8.	Centerline bearing identified.	☐
9.	Right-of-way lines made to match up with those on abutting sheets or abutting projects.	☐
10.	Right-of-way project number and code number shown on each sheet.	☐
11.	Approach table completed.	☐
12.	Cross sections not furnished.	☐
13.	Note, “All R/W described from Line “__”, except as shown,” appears on all Plan and Profile sheets.	☐
14.	If more than one survey line is shown, the line intended as the construction line is identified as such.	☐
15.	R/W Index labeled as such.	☐
16.	Signature block included, equivalent to the one shown on the Right-of-Way Plans title sheet frame.	☐
17.	Construction limits shown to be inside the right-of-way lines.	☐
18.	Drafting line styles used as shown in *IDM* Chapters Fourteen and Fifteen.	☐
19.	The right-of-way lines and names of property owners shown on Plat No. 1 match those shown on the Plan and Profile sheets.	☐
20.	Equations and enough reference points included for old survey lines that original right of way was acquired from so that they can be re-established by the Office of Real Estate.	☐
21.	Station and offset of the nearest building corner shown and labeled for each building within 25 m (75 ft) of the new right-of-way line.	☐
22.	All subdivision names, lot lines, and numbers identified.	☐
23.	All mitigation sites delineated and labeled.	☐

PARTIAL SUSPENSION OF
RIGHT-OF-WAY ACQUISITION ACTIVITIES

, 20

MEMORANDUM

TO: , Manager
Real Estate Office

THRU:
Roadway Services or Structural Services Manager,
or Design Office Manager, District

FROM:
Project Manager

SUBJECT: Partial Suspension of Right-of-Way Acquisition Activities

Route:
Des. No.:
P.E. Project No.:
R/W Project No.:
R/W Code No.:
Project Description:

The above referenced project will be undergoing substantial design changes that will result in a right-of-way revision to Parcel No(s). .

We hereby request that right-of-way acquisition of such parcel(s) be suspended until the design changes are finalized.

:

cc: , Real Estate Office Property Management Team leader
, project manager
, reviewer
, designer

COMPLETE SUSPENSION OF
RIGHT-OF-WAY ACQUISITION ACTIVITIES

, 20

MEMORANDUM

TO: , Manager
Real Estate Office

THRU:
Roadway Services or Structural Services Manager,
or Design Office Manager, District

FROM:
Project Manager

SUBJECT: Complete Suspension of Right-of-Way Acquisition Activities

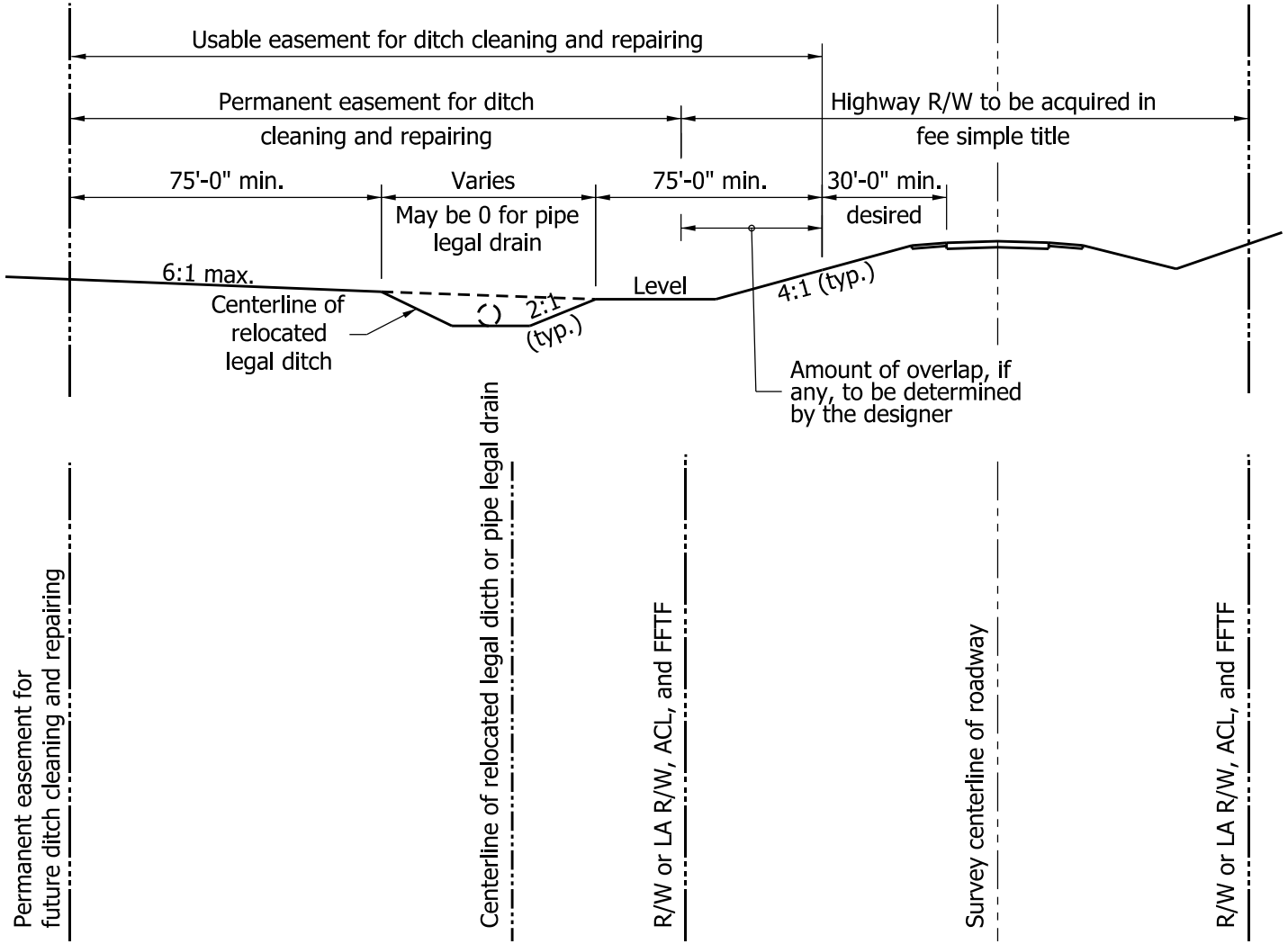
Route:
Des. No.:
P.E. Project No.:
R/W Project No.:
R/W Code No.:
Project Description:

The above referenced project will be undergoing substantial design changes that will result in a right-of-way revision to Parcel Nos. .

We hereby request that all right-of-way acquisition activities be suspended until the design changes are finalized.

:

cc: , Real Estate Office Property Management Team leader
, project manager
, reviewer
, designer



PERMANENT EASEMENT FOR MAINTENANCE OF LEGAL DITCH

Figure 85-5A

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER EIGHTY-SIX

ACCESS CONTROL

The regulated limitation of access is called access control and is accomplished on a new project by purchasing of Limited-Access Right of Way (L.A. R/W). Access control is a proven effective method to provide a safe environment for the highway user and preserves the investment in the geometric and capacity elements of a highway design. Full control of access means that connections are provided only with selected public roads through interchanges. Partial control of access allows connections with selected public roads and with selected drives necessary to serve the abutting properties. A drive necessary to serve a property may be on a local service road, on a frontage road, or directly connected with the highway, depending on the type of project. Cost studies should be made to determine the economics of each situation.

86-1.0 ACCESS STUDIES

86-1.01 Definitions

In addition to the definitions discussed in Sections 85-1.02 and 40-5.0, the designer should consider the following.

1. Landlocked Property. A property is considered legally landlocked where it is left without access by the purchase of limited access right of way across its existing access or where a physical barrier (e.g., a high fill, stream channel relocation) has been constructed across its existing access or property frontage.

2. Local-Service Road. The term may be defined as a road or street designated on the right-of-way plans to provide access to one or more properties. The term also applies to a proposed road or street open at one end only and designed specifically for service to one or more abutting properties or adjacent areas. The use of the term *access road* or *frontage road* is prohibited.

86-1.02 Preparation of Cost Studies for Access vs. Landlocking

If a property is left without access, a study should be conducted to determine whether it is more economical to provide access to the property or to leave it without access. An access study may not be necessary if it is obvious by inspection of the plans that it would not be feasible to provide access.

Conversely, it may be obvious that access should be provided without preparing an access study.

The designer should prepare a rough estimate to determine the construction costs per linear foot of the local service road, considering the amount of grading required, the typical pavement section, and drainage structures required. The designer will also need to determine the total area to be landlocked and the area required for the local-service road. Figure 86-1A, Comparative Cost Study for Local-Service Road (Form R/W-16), should be completed for each landlocked property showing the comparative cost study. Where there are two or more landlocked properties, the information for each property should be incorporated onto the form shown in Figure 86-1B, Local-Service-Road Study for Multiple Properties. All backup data should be included with Form R/W-16. Where more than one local-service road alternative has been studied to provide access to a property, the most practical and cost-effective alternative should be selected. Editable versions of these forms may also be found on the Department's website at www.in.gov/dot/div/contracts/design/dmforms/

Figures 86-1D and 86-1E illustrate a completed Form R/W-16 for a sample project shown in Figure 86-1C.

The designer will forward Form R/W 16 to the project manager. The project manager will forward this information to the Office of Real Estate for completion and recommendation.

86-1.03 Design Considerations for Local-Service Road

The designer should consider the following.

1. Minimum Criteria. Use the local road or street minimum design criteria for the type, thickness, and width of the roadway section, and for the minimum right-of-way requirements. It will be the responsibility of the designer to get this information from the local agency's officials. Such information should be used to determine the applicable surface type and exceptions based upon economic or legal factors as requested by the Office of Real Estate. If no local criteria exist, use the minimum AASHTO *Policy on Geometric Design of Highways and Streets* criteria or the criteria provided in Chapters Fifty-three and Fifty-five.

2. Closure. It will be the responsibility of the designer to ensure that each local-service road which forms a closed circuit will mathematically close.

3. Access. Each local-service road must connect to the public highway system. A local-service road must not be established for the purpose of crossing through one property to connect between two non-contiguous residues of another property unless a further connection is made to the public highway system. Otherwise, the local-access road will have two dead ends and cannot be of public use. Consequently, the right of way cannot be condemned. Because

public maintenance would be impractical, its transfer to a county or municipal authority would be prevented.

4. Landlocking. Where there is not a substantial difference in the estimated costs between landlocking versus construction of a local-service road, the designer, in conjunction with the Office of Real Estate's representative, should recommend landlocking the parcel. If the comparative cost study indicates that the construction of a local -service road is justified, the typical section for the road should satisfy the local agency's criteria; see Item 1 above. The Office of Real Estate's representative will review the comparative cost study to determine the justification for landlocking versus the construction of the local-service road at the time of the preliminary field inspection.

5. Dead End. Additional right of way should be acquired at the end of a dead-end local-service road to accommodate a cul-de-sac where developer or local-agency criteria require such action.

6. Local-Service-Road Terminus. A local-service road that provides access to more than one property should end at the terminal property's boundary. Treat road work necessary beyond that point as drive construction for which temporary right of way should be acquired.

7. Right-of-Way Width. Once the engineering and economic feasibility of a local-service road has been established, select a right-of-way width which best fits the usage of the land that it is intended to serve, provides the least practical disturbance to neighboring properties, and considers all construction costs. Zoning restrictions (including minimum county or municipal criteria for a highway or street) should be considered regarding the potential uses of the property. Existing ordinances may be secured for consideration as documentation affecting the market value of the land. The designer should consider zoning restrictions due to their influence upon potential land use and to avoid a local-service-road right-of-way width which is inconsistent with the zoning restrictions. With a narrow right-of-way width, temporary right of way may be required to accommodate minor grading, etc.

8. Cattle Pass or Other Private Underpass. If a private underpass is provided, it should be justified by the Office of Real Estate. The appropriate right-of-way plan and profile sheet should include a note which reads as follows: *Structure No. _____ (Cattle Pass) Included to Mitigate R/W Damages.*

86-1.04 Preliminary Field Check

The Preliminary Field Check plans should show the most reasonable means of providing access to each property that is not to be landlocked. More than one local-service road location may be studied

to access the same property. The designer should complete the access study form (Form R/W-16) in Figure 86-1A for each proposed local-service road location. The form, together with a set of Preliminary Field Check Plans, should be provided to Office of Real Estate's representative at the Preliminary Field Check. The Office of Real Estate's representative should also complete Form R/W-16 and Figure 86-1B, the multiple-property form, if required, and return them to the Production Management Division as a part of the Preliminary Field Check Report.

If access problems are discovered after the time of the Preliminary Field Check, forward this information to the Office of Real Estate's manager by memorandum for the project manager's signature, requesting that the forms be completed and returned to the Production Management Division with the recommendations regarding access versus landlocking. Processing of forms and accompanying correspondence will be through the Production Management Division's project manager.

86-1.05 Federal Highway Administration Involvement

An access study and recommendation should be prepared and reviewed in-house and approved by the Production Management Division director. This applies whether the project is exempt or not exempt from FHWA oversight. However, if a unique problem arises, provide an extra set of plans at the Preliminary Field Check stage for the FHWA. Include one copy of each of the forms discussed in Section 86-1.02 and a complete set of plans showing all access provisions. This material should be transmitted by letter for the signature of the Production Management Division director with definite recommendations in the letter identifying each affected property owner and a recommendation to either provide access or landlock the particular property.

Access provisions as recommended by the Department may be included in the right-of-way plans after they have been reviewed and approved by the FHWA.

86-2.0 DESIGN CONSIDERATIONS

86-2.01 Interstate-Route Right of Way

Full access control will apply. The right of way will be designated as Limited-Access Right of Way (L.A. R/W).

86-2.02 Non-Interstate Route

For a non-Interstate route, the following will apply.

1. Freeway. Full access control will apply. The right of way will be designated as L.A. R/W.

2. Divided Roadway. Access control will consist of the following.

   a. New Location. Partial access control will apply. Access to a new facility will be only at selected public roads. Conduct cost studies to determine the need and effectiveness of local-service roads to serve abutting landowners.

   b. Existing Location with Additional Right of Way. The addition of lanes or other safety features requires a considerable expenditure of funds. The physical taking of land adds a considerable cost to the project. The acquisition of access control and construction of local-service roads is well-justified because it helps to prevent obsolescence of the design and helps to ensure future capacity and safety.

      Partial access control will apply. Access will only be from selected public roads. Consider using local-service roads to provide reasonable access to abutting properties. It may be necessary to provide direct access to an abutting parcel. Private direct access should be minimized. Adverse impacts should be analyzed or cost studies made to determine the best access alternative.

   c. Existing Location within Existing Right of Way. Partial access control will apply. Access control that will provide as much preference as practical to the highway user but yet serves the developments and abutting properties without the need for local-service roads is desirable. On a divided lane facility, access points on alternate sides of the highway should be opposite each other and located at crossovers if practical to minimize points of potential traffic conflicts. Where properties abutting the highway are numerous with narrow frontage, it may not be economically feasible or practical to acquire access rights.

3. Two-Way Facility. This is a connector route providing access between communities or to a higher-type roadway. For a new location, partial access control should be provided that will give preference to the highway user. On an existing alignment, developments and abutting properties must be served. The designer should provide reasonable access and minimize the right-of-way costs, as practical.

86-2.03 Limited-Access Right of Way on Crossroads at Interchange

This is shown in Figures 86-4A, 86-4B, 86-4C, 86-4D, 86-4E, and 86-4F. The figures are titled as listed below.

86-4A	L.A. R/W at Interchange, Case I
86-4B	L.A. R/W at Interchange, Case II
86-4C	L.A. R/W at Interchange, Case III
86-4D	L.A. R/W at Interchange, Case IV
86-4E	L.A. R/W at Interchange, Case V
86-4F	L.A. R/W at Interchange, Case VI

86-2.04 Opening in Limited-Access Right of Way

Where an opening is required, the designer should consider the following.

1. Width. If a project is designated a Partially-Controlled Access facility and some access points are permitted on the L.A. R/W, provide a 50-ft minimum opening at the right-of-way line. An opening of larger than 50 ft should be provided where necessary to accommodate the land use and to avoid excessive damage to adjoining properties. However, an opening wider than 60 ft is not necessary unless a drive is skewed. The opening for each drive should be measured at a right angle to the centerline of the drive outside the L.A. R/W line, or 25 ft on each side for a 50-ft opening. See Figure 86-2A, L.A. R/W Opening (Horizontal Curve), and Figure 86-2B, L.A. R/W Opening (Angled Approach). No dimensions are required on End L.A. R/W and Begin L.A. R/W. It is the responsibility of the designer to provide a minimum width for a road and street approach consistent with local-agency requirements or criteria.

2. Tabulations. Tabulate all openings in limited-access right of way using the centerline stationing on the respective plan and profile sheet as shown in Figure 86-2B(1), Access Openings Tabulation Example.

3. Designations. In designating right-of-way openings on the plan and profile sheets, the designer should consider the following.

    a. Indicate each End Limited-Access Right of Way, Access-Control Line and *(type)* Fence location by showing the station and offset distance. The symbol [E] may be used provided a legend is given. The fence should either be the chain-link type (CLTF) or the farm-field type (FFTF). Use the correct abbreviations on the plans rather than the complete description; see Chapter Fourteen.

    b. Indicate Begin L.A. R/W, ACL & *(type)* Fence locations by providing the station and offset distance. The symbol [B] may be used provided a legend is given.

c. Designate right of way across each private or commercial approach. However, do not provide a designation across a railroad, street or highway, or navigable stream or lake. If a railroad is abandoned, L.A. R/W across the old railroad right of way may be considered.

d. Each Begin Fence or End Fence point should be assigned a station and offset distance from a control line, except as shown in Item 1 above.

e. Examples for designating an opening are provided in the figures in Section 86-4.0.

4. Designating an Approach. On the plan and profile and interchange-details sheets, indicate the type of drive with the note *(width)* Class *(type)* Drive Req'd. Also include the station location and an arrow pointing to the right of way for drive construction. Include the drive details on the approach table.

86-2.05 Bypass

Indiana Statutes require that where INDOT constructs a bypass around a city or town, the Department must designate and establish the highway as a limited-access facility.

86-2.06 Improvements Within Limited-Access Right of Way

No part of a private improvement will be permitted inside the limited-access right of way. A deviation from this policy must be approved in advance by the Production Management Division director and the Federal Highway Administration, where applicable.

86-2.07 Railroad

Limited-access right of way should not be shown across operating-railroad right of way. The description of the opening should be as discussed in Section 86-2.04. On a non-Interstate-route project where the new roadway parallels a railroad, it will not be necessary to take limited access right of way along the railroad. Consideration should be given to where more than the minimum distance exists between the highway and the railroad, and there is a possibility of commercial development on the property. Do not leave an area large enough to permit later development between a highway and a railroad which can result in a request for access to a limited-access facility at some future date.

86-2.08 Access to Adjoining Properties with a Common Approach

Figure 86-2C illustrates the preferred method for providing access with a common approach to adjacent properties.

86-3.0 FENCING

86-3.01 Warrants

Limited-access right of way should be fenced. Exceptions to this criterion include the following:

1. through a floodplain where the fence will be below the high-water elevation;

2. on new or reconstruction work where the property is a residence or a business and has a maintained lawn;

3. parallel to existing railroad right of way (see Section 86-2.07);

4. where entrances are relatively close and short runs of fence would provide minimal benefit;

5. where an existing fence is considered adequate or has been requested to remain by the property owner;

6. where a physical feature (e.g., large cut, public land, heavily-wooded area) discourages the development of an unapproved access point; or

7. other unique situation which may preclude the practicality and need for a fence.

For an Interstate-route rehabilitation project, the need to repair or replace the right-of-way fence should be discussed at the field check. If the field-check recommendation is different than the recommendation shown in the Engineer's Report, it should be indicated in the field-check minutes.

The guidelines for fence repair or replacement are as follows.

1. For a partial 3R project, the fence design life is about 10 years. Hence, if the fencing will last 10 years, a quantity of fence patching should be determined.

2. For a crack and seat project, the fence design life is about 15 years. Hence, if the fencing will last 15 years, a quantity of fence patching should be determined.

3. For a pavement rubblization and replacement project, the fence design life is about 25 to 30 years. Therefore, the fence should be replaced.

86-3.02 Application

Fence used to define and control limited-access right of way is placed on the access-control line. Two exceptions are at a separation structure or large culvert. The fence is terminated at the near corner of a bridge structure and begun again at the far corner. The fence may be either terminated at one side of a large culvert and started at the other side or carried over the top of the culvert.

Provide chain-link type fence in front of a house (lawn area) or in an urban or suburban or other area where aesthetics may be important to the occupant (e.g., motel, office, school, church). Farm-field type fence should be used at all other locations. A short section of farm-field type fence should not be used where it would detract from the appearance of the installation. The project engineer may change the type of fence shown on the plans upon receipt of reasonable written justification from a property owner.

86-3.03 Fence Posts

Group 1 fence posts should be used where new fence is required. Group 2 fence posts should be used for existing fence which requires repair or replacement. The fence-post type must be identified where fencing requirements are shown on the plan and profile sheets as in the example notes as follows:

L.A.R./W., A.C.L. & F.F.T.F. w/ Gp. 1 Posts Required
or
___ l ft of C.L.T.F. w/ Gp. 2 Posts Required

86-4.0 ACCESS-CONTROL FIGURES

The following figures illustrate INDOT's limited-access right-of-way policy and fencing practice.

1. L. A. R/W at Interchange. Figures 86-4A through 86-4F illustrate the application of limited-access right of way at an interchange. The following are shown.

    a. Case I. Figure 86-4A illustrates an outer-ramp connection with a divided facility in a rural or urban area.

b. Case II. Figure 86-4B illustrates a typical at-grade ramp connection for an undivided facility in a rural or an urban area.

c. Case III. Figure 86-4C illustrates an outer-ramp connection with a divided facility where the divided facility is transitioned from a two-lane facility in a rural area.

d. Case IV. Figure 86-4D illustrates an at-grade ramp connection with a divided facility where the divided facility is transitioned from a two-lane facility in a rural area.

e. Case V. Figure 86-4E illustrates an outer-ramp connection with a divided facility where the divided facility is transitioned from a two-lane facility in an urban area.

f. Case VI. Figure 86-4F illustrates an at-grade ramp connection with a divided facility where the divided facility is transitioned from a two-lane facility in an urban area.

2. Limited Access Control. Figures 86-4G through 86-4 O illustrate typical examples for access control for a facility crossing a freeway. The following examples are provided.

a. Figure 86-4G illustrates where the access control is carried along the crossroad over the freeway.

b. Figure 86-4H illustrates where a fenced and a non-fenced crossroad passes under the freeway.

c. Figure 86-4 I illustrates where a fenced and a non-fenced railroad passes under the freeway.

d. Figure 86-4J illustrates where a crossroad is closed and where a railroad is abandoned.

e. Figure 86-4K illustrates where the freeway passes under a crossroad left at its original grade.

f. Figure 86-4L illustrates where the freeway passes under a crossroad and the crossroad has been elevated.

g. Figure 86-4M illustrates where the freeway passes over a navigable river, stream, or lake.

h. Figure 86-4N illustrates where the freeway passes over a non-navigable river, stream, or lake.

i. Figure 86-4 O illustrates where the crossroad passes under a freeway with a wide median.

j. Figure 86-4P illustrates where the freeway passes under a relocated crossroad.

State Review By

ROUTE: PROJECT:	AREA LANDLOCKED: ac
COUNTY:	FROM STA. TO STA. ,
PARCEL NO.:	ft LT. ft RT.
OWNER:	ACCESS ROAD NO.

A. WITH ACCESS PROVIDED		C. R/W COST OF LOCAL SERVICE ROAD	
VALUE OF RESIDUE AFTER TAKE:		AREA REQUIRED FOR LOCAL SERVICE ROAD	
LAND	$	ac @ $ / ac =	$
IMPROVEMENTS	$	IMPROVEMENTS VALUE	$
"A" TOTAL VALUE	$	DAMAGES DUE TO LOC. SVC. ROAD	$
B. LANDLOCKED		"C" TOTAL COST OF R/W	$
VALUE OF RESIDUE AFTER TAKE:		D. SPECIFICATIONS AND COSTS OF LOCAL SERVICE ROAD	
LAND	$	LENGTH: ft WIDTH: ft	
IMPROVEMENTS	$	TYPE OF SURFACE:	
"B" TOTAL VALUE	$	COST PER RUNNING FOOT:	$
		OTHER COSTS:	$
		"D" TOTAL CONSTRUCTION COST:	$

ADDITIONAL COST LANDLOCKED RESIDUE "A" MINUS "B"	$
LESS TOTAL COST LOCAL SERVICE ROAD "C" PLUS "D"	$
DIFFERENCE, plus or minus	$

OTHER REASONS WHY LOCAL SERVICE ROAD SHOULD BE PROVIDED:

PROVIDE LOCAL SERVICE ROAD: YES ☐ NO ☐ SIGNED _____

LAND VALUE BY: TITLE: DATE:

Company Name if other than INDOT personnel:

ROAD COST BY : TITLE: DATE:

Company Name if other than INDOT personnel:

Note: Worksheets should be placed in Right-of-Way File.

COMPARATIVE COST STUDY FOR LOCAL SERVICE ROAD

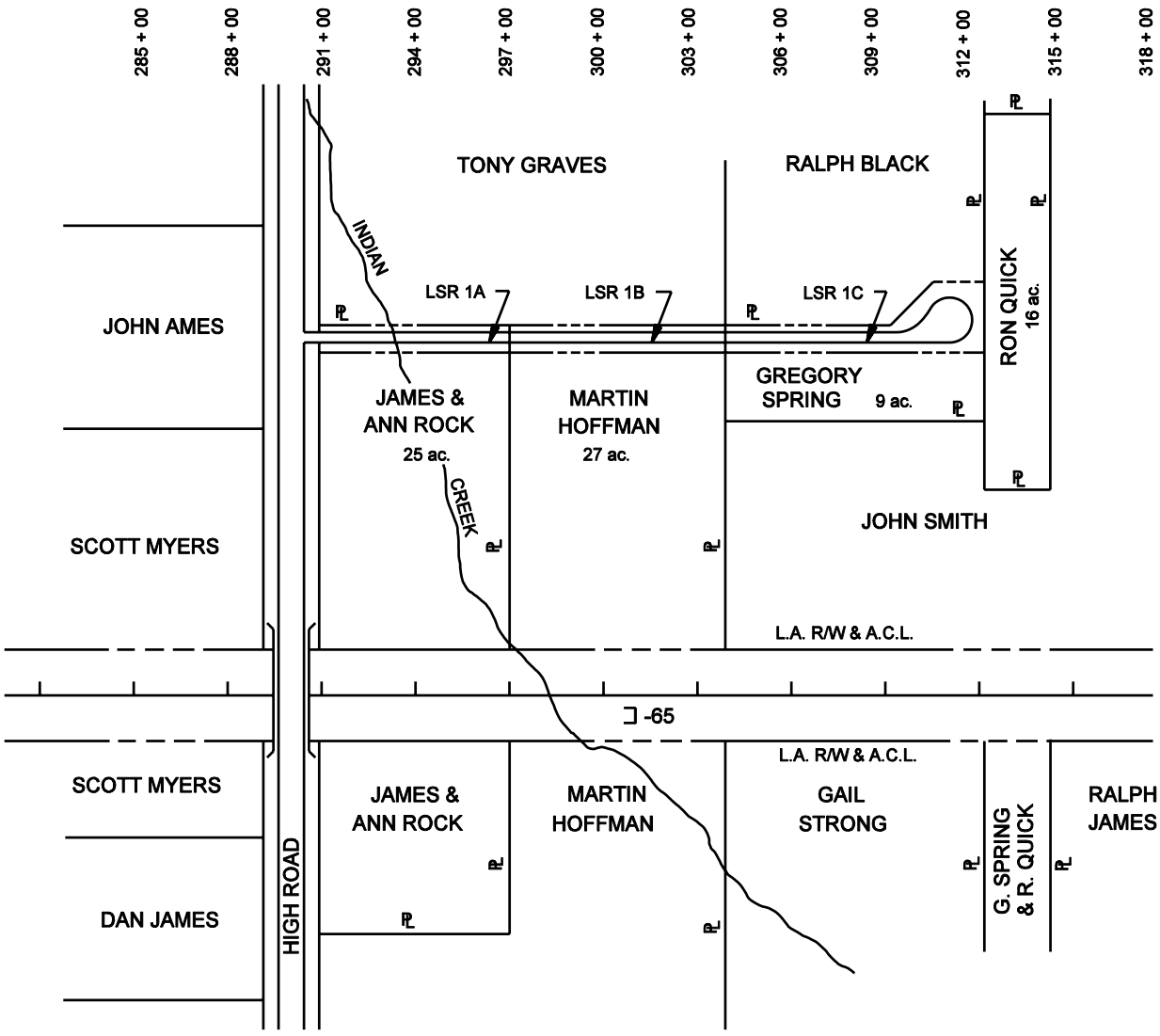
(Form R/W-16)

LOCAL-SERVICE-ROAD (LSR) STUDY, MULTIPLE PROPERTIES

Route: County: Sec. T- R-

LSR No.	From Sta.	To Sta.	Across Property Owner	To Property Owner	Acres Req'd.	(1) Value of Residue, Size with LSR	(2) Value of Improve ments Added	(3) Value of Residue Without LSR	(4) R/W Cost for LSR	(5) Constr. Cost for LSR	(6) Net Gain or Loss for Parcel	Cumula-tive total Gain or Loss
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$
						$, ac	$	$	$	$	$	$

Note: $(6) = [(1) - (3)] - [(4) + (5)]$



EXAMPLE ACCESS STUDY

Figure 86-1C

State Review By _____

AREA LANDLOCKED 26.7 ac	PROJECT I-65-3( )
FROM STATION 873 + 01 TO STATION	COUNTY Marion
880 + 35 LEFT X RIGHT	PARCEL NO. 21
ACCESS ROAD NO. 1A	OWNER John White

WITH ACCESS PROVIDED

VALUE OF RESIDUE AFTER TAKE

LAND 26.7 ac @ $2,524	$ 67,392
IMPROVEMENTS	$ 60,000
"A" TOTAL VALUE	$ 127,392

LANDLOCKED

VALUE OF RESIDUE AFTER TAKE

LAND 26.7 ac @ $981	$ 26,190
IMPROVEMENTS	$ 20,800
"B" TOTAL VALUE	$ 46,990

R/W COST OF LOCAL SERVICE ROAD

AREA REQUIRED FOR ACCESS ROAD

1.14 ACRES @ $	2,623	= $	2,990
IMPROVEMENTS VALUE		$	1,500
DAMAGES DUE TO ACCESS ROAD		$	500
"C" TOTAL COST OF R/W		$	4,990

SPECIFICATIONS AND COSTS OF LOCAL SERVICE ROAD

LENGTH 820 ft WIDTH 22'-0"

TYPE OF SURFACE Asphalt

COST PER LIN.FT. $ 51.50 x 820 ft = 42,250

OTHER COST $ 60-in. pipe-200 lft @ 60 = 12,000

"D" TOTAL CONST. COST $ 54,250

ADDITIONAL COST LANDLOCKED RESIDUE "A" MINUS "B"	$ 80,402
LESS, TOTAL COST ACCESS ROAD "C" PLUS "D"	$ 59,240
DIFFERENCE, plus or minus	$ + 21,162

STATE ANY OTHER REASON ACCESS ROAD SHOULD BE PROVIDED.

PROVIDE ACCESS - YES 3 NO _____ SIGNED Howard Jones

LAND VALUE BY H. Jones TITLE Appraiser II DATE 9-12-95

ROAD COST BY N. Adams TITLE HE II DATE 9-7-95

If values and road cost are provided by other than Department personnel, give name, company and title. Work sheets should be placed in Right-of-Way File.

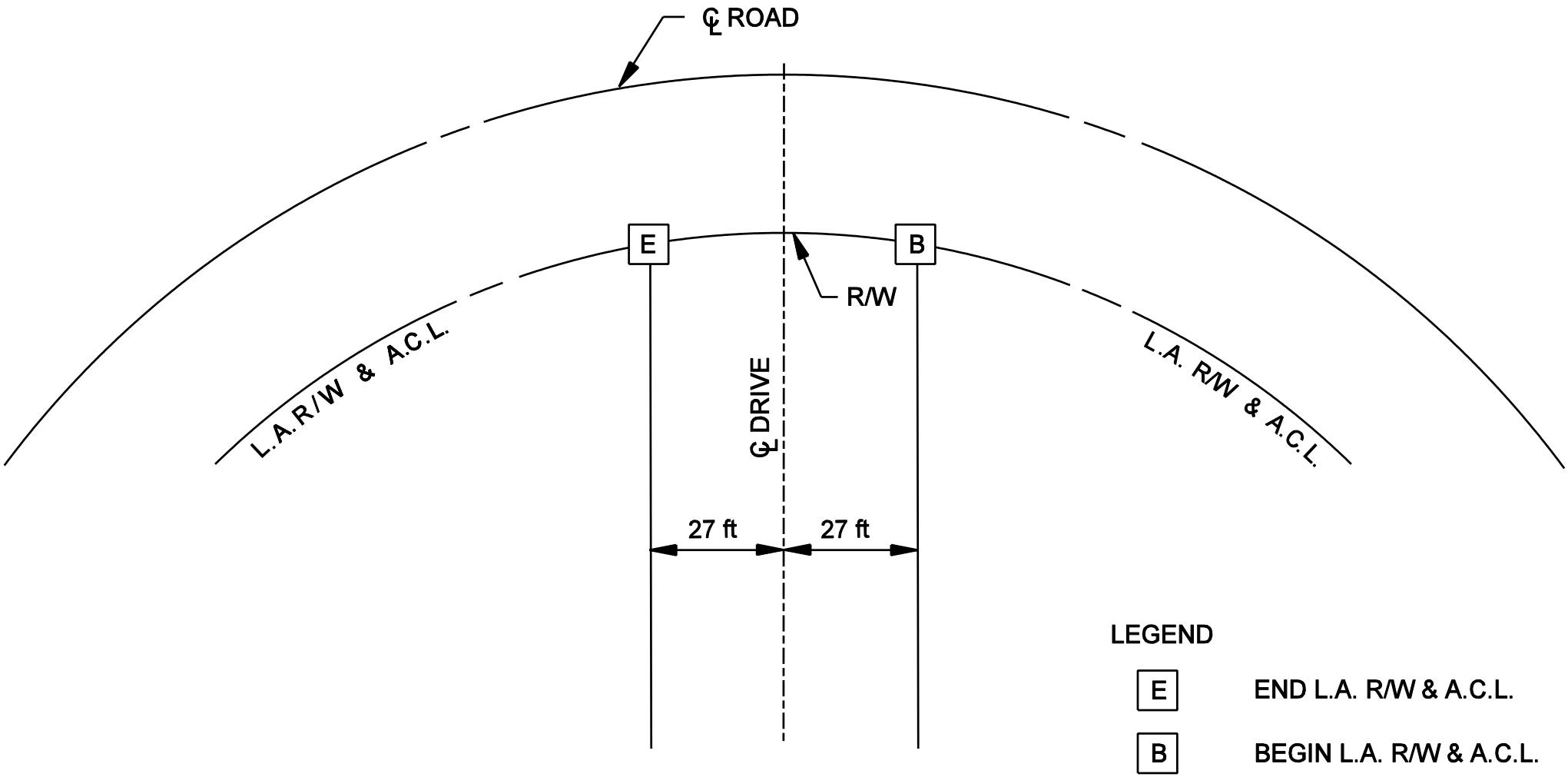
EXAMPLE FORM R/W-16
Figure 86-1D

Marion (County) I-65-3 (Route) ( ) (Section)

Local Service Road No.	Stations From To	Across Parcel Owner	To Parcel Owner	Number of Acres Required	(1) (-) Value & Size of Residue with Service Road	(2) Value of Improve-ments Affected	(3) (-) Value of Residue W/O Service Road	(4) (-) R/W Cost for Service Road	(5) (-) Construction Cost for Service Road	(6) ℜ Net Gain for Parcel	Cumulative Total (+Gain) (-Loss)
ℵ 1A	873+01 - 880+35	James & Ann Buck		1.14				4990	54 250		
ℑ			Martin Hoffman		127 392 (29.5 ac)	(60 000)	46 990			+21 162	+21 162
1B	880+85 889+34	M. Hoffman		1.11				2900	42 000		
			G. Spring		21 100 (8.6 ac)	(7900)	9700			-33 500	-12 338
1C	889+34 - 891+54	G. Spring		1.11				1000	12 600		
			R. Quick		46 800 (16.1 ac)	-	16 000			+17 200	+4862

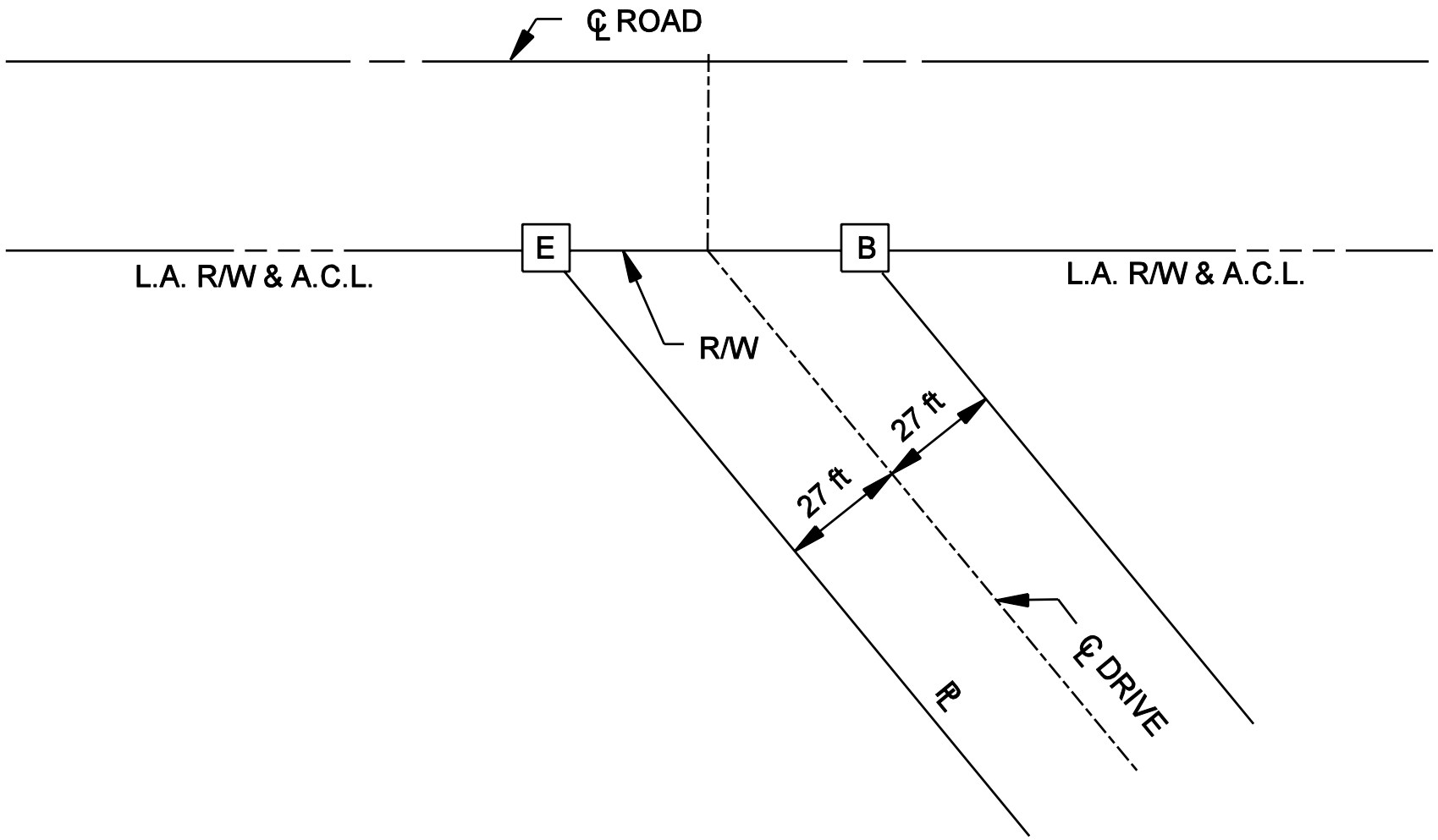
ℵ First line for items relating to local road.
ℑ Second line for items relating to property served by local service road.
ℜ Difference of values in columns (1) and (3) minus sum of columns (4) and (5).

EXAMPLE ACCESS STUDY FORM
Figure 86-1E



L.A. R/W OPENINGS
(Horizontal curves)

Figure 86-2A



L.A. R/W OPENINGS
(Angled Approaches)

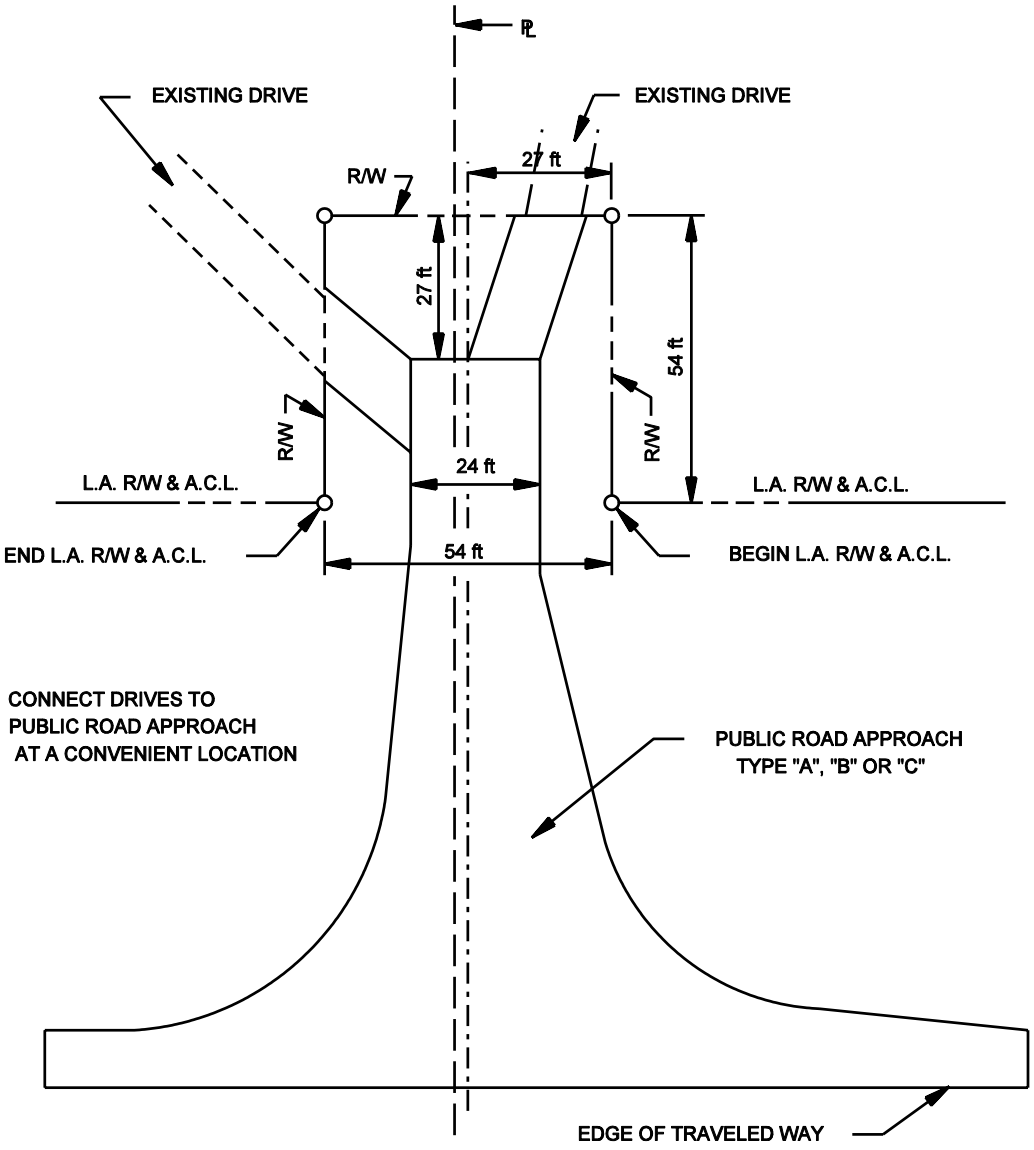
Figure 86-2B

C/L Access Opening *	Approach Type or Class	C/L of Approach
Sta. 100 + 51 “A” Lt.	Class II	Sta. 100 + 62 Lt.
Sta. 100 + 61 “A” Rt. & Lt.	Public-Road Approach, Type B	Sta. 100 + 72 Rt. & Lt.

** Each access opening in a rural area should be 50 ft or wider unless otherwise shown.*

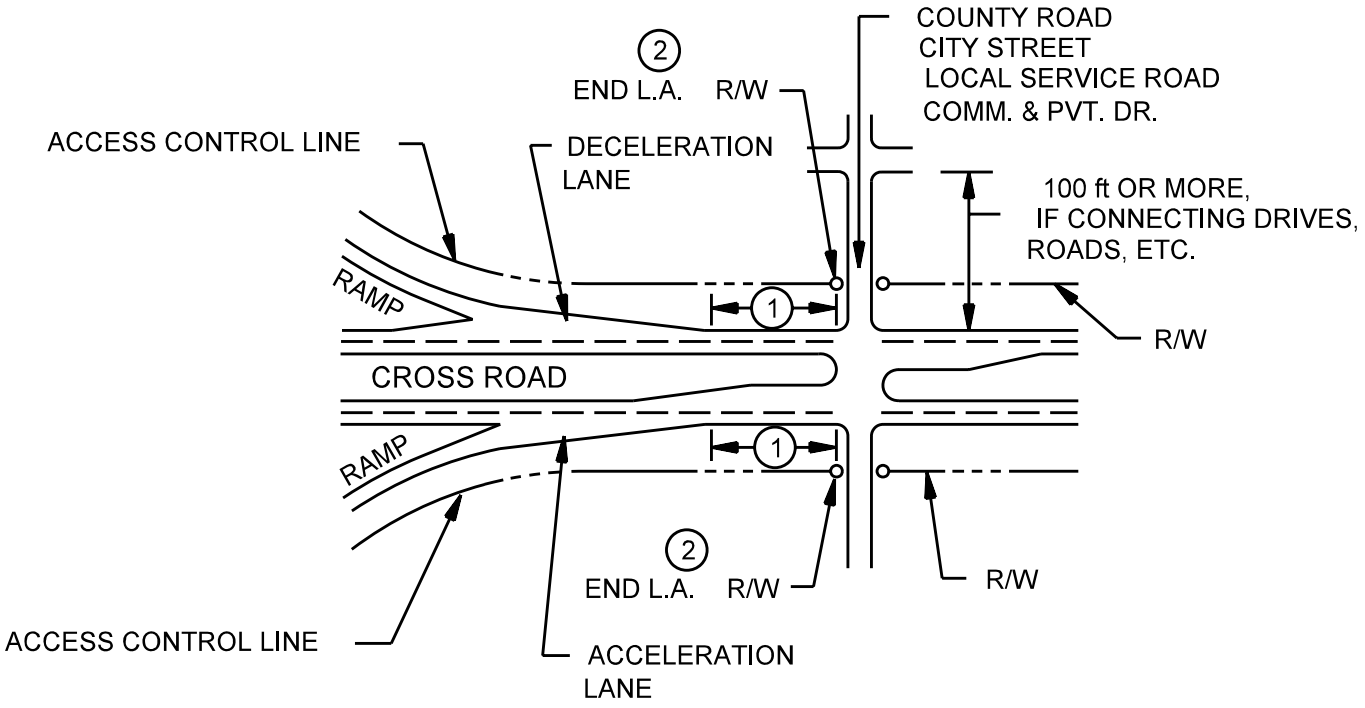
ACCESS-OPENINGS TABULATION EXAMPLE

Figure 86-2B(1)



ACCESS OPENINGS FOR ADJACENT DRIVES

Figure 86-2C



(1) FULL ACCESS CONTROL LINE SHOULD EXTEND ALONG THE CROSS ROAD BEYOND THE RAMP TERMINAL TAPER EXTREMITY (BOTH SIDES OF ROAD) 100 ft MINIMUM TO 200 ft DESIRABLE IN URBAN AREAS AND 300 ft MINIMUM TO 500 ft DESIRABLE IN RURAL AREAS. THE AUXILIARY LANE TERMINATING THE GREATER DISTANCE FROM THE INTERCHANGE AREA SHOULD GOVERN.

(2) THE END OF ACCESS CONTROL SHALL BE AT OPPOSITE POINTS, WHERE FEASIBLE.

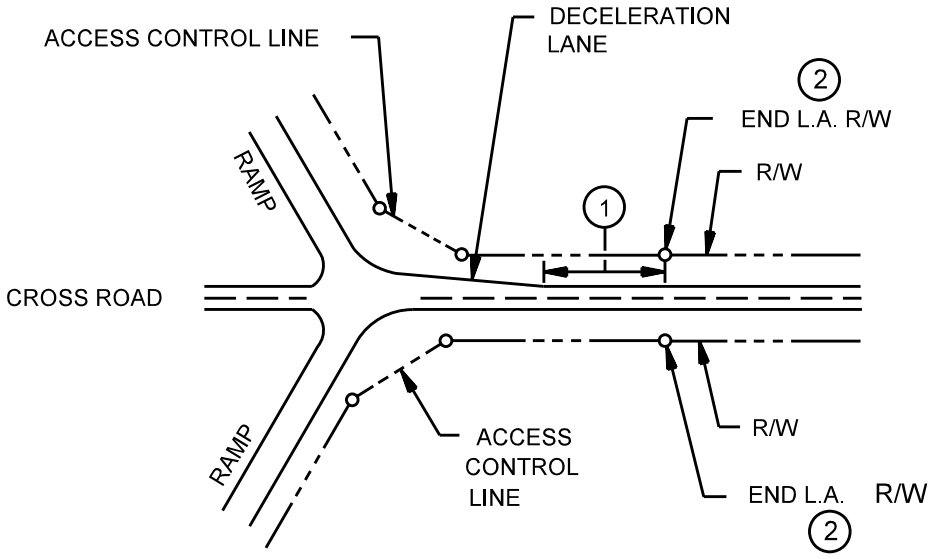
Notes:

1. *This figure illustrates a typical outer connection for divided facilities in rural and urban areas.*

2. *Where high-traffic crossroads, streets, commercial drives or signalized intersections are located or may be potentially constructed just beyond the interchange outer connectors, extension of the limited access right-of-way beyond the limits shown should be consider enhance operational safety and efficiency and to minimize congestion. Where a signalized intersection is anticipated, the distances should be increased to 600 ft minimum, 800 ft desirable, where feasible in urban areas.*

L.A. R/W AT INTERCHANGES (CASE I)

Figure 86-4A



(1) FULL-ACCESS CONTROL LINE SHOULD EXTEND ALONG THE CROSS ROAD BEYOND THE RAMP TERMINAL TAPER EXTREMITY (BOTH SIDES OF ROAD) 100 ft MINIMUM TO 200 ft DESIRABLE IN URBAN AREAS AND 300 ft MINIMUM TO 500 ft DESIRABLE IN RURAL AREAS. THE AUXILIARY LANE TERMINATING THE GREATER DISTANCE FROM THE INTERCHANGE AREA SHOULD GOVERN.

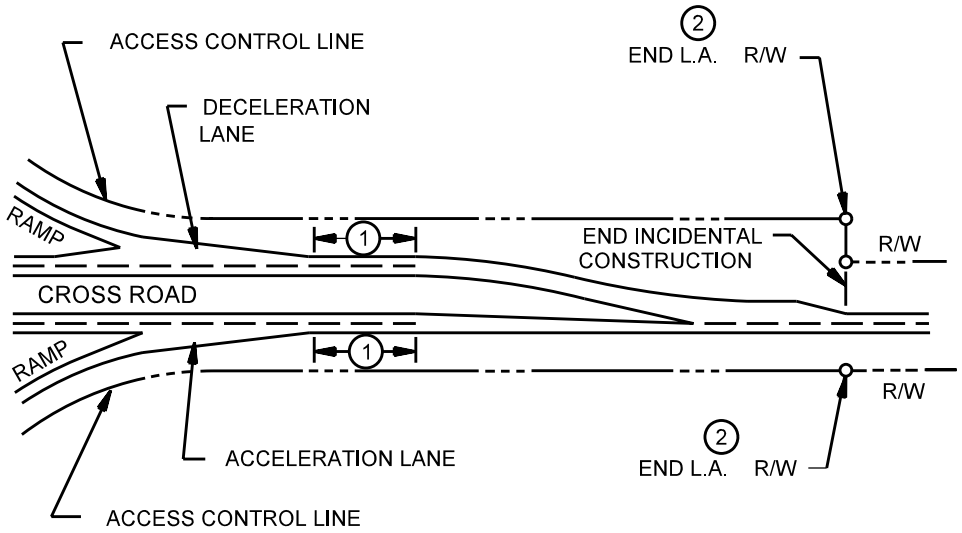
(2) THE END OF ACCESS CONTROL SHOULD BE AT OPPOSITE POINTS, WHERE FEASIBLE.

Notes:

1. *This figure illustrates an at-grade ramp intersection with an individual facility in rural and urban areas.*
2. *If there is no acceleration or decleration lane, a point 400 ft or more from the intersecting ramp ℄ with the cross road should be used to establish the end of L.A. R/W or closest point of access*
3. *Where high-traffic crossroads, streets, commercial drives or signalized intersections are located or may be potentially constructed just beyond the ramp intersections, extension of the limited right-of-way beyond the limits shown should be considered operational safety and efficiency and to minimize congestion. Where a signalized intersection is anticipated, distances should be increased to 600 ft minimum, 800 ft desirable, where feasible in urban areas.*

L.A. R/W AT INTERCHANGES (Case II)

Figure 86-4B



(1) A DISTANCE OF 300 ft MINIMUM TO 500 ft DESIRABLE SHOULD BE PROVIDED BETWEEN THE RAMP TERMINAL TAPER EXTREMITIES AND THE LANE TRANSITION. THE AUXILIARY LANE TERMINATING THE GREATER DISTANCE FROM THE INTERCHANGE AREA SHOULD GOVERN.

(2) THE END OF THE FULL CONTROL ACCESS LINE SHOULD BE AT OPPOSITE POINTS WHERE FEASIBLE.

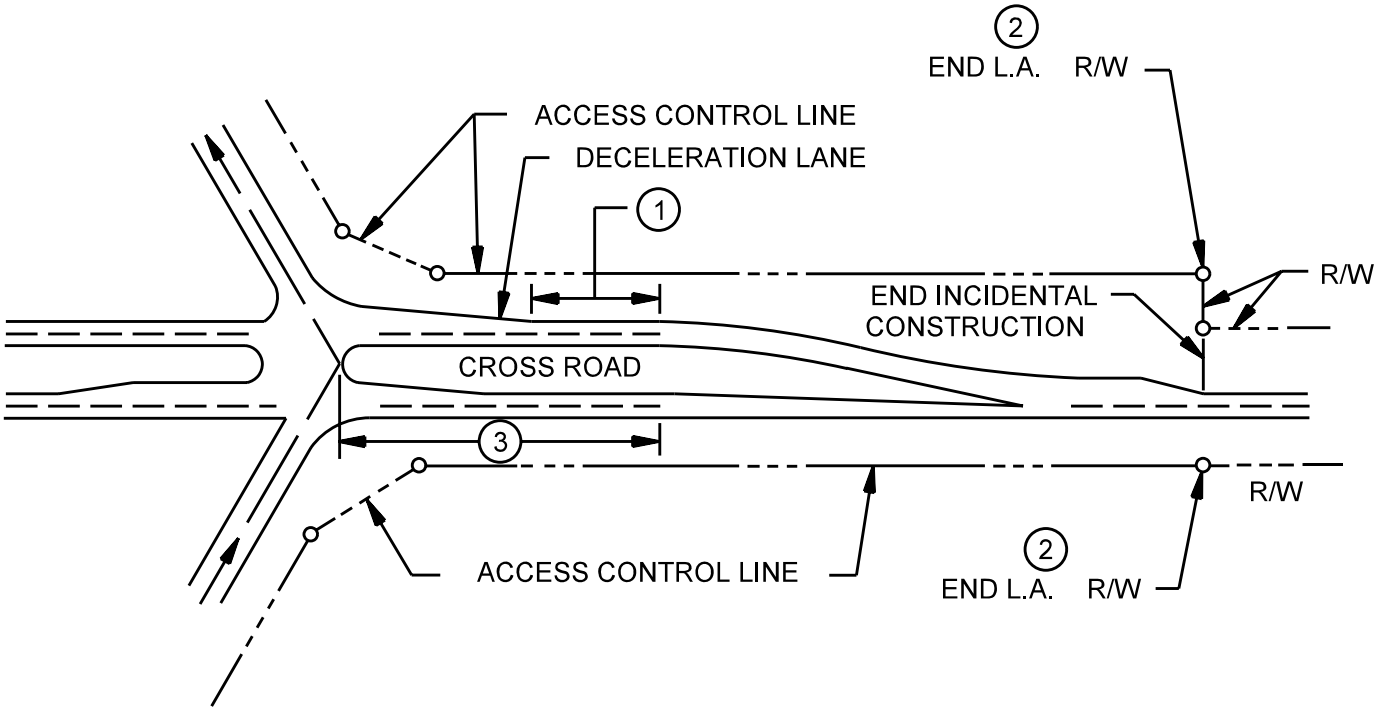
Notes:

1. *This figure illustrates a typical outer connection on a rural divided facility which transitions to an undivided facility.*

2. *Where high-traffic crossroads, streets, commercial drives or signalized intersections are located or may be potentially constructed just beyond the interchange outer connectors, extension of the limited access right-of-way beyond the limits shown should be considered to enhance operational safety and efficiency and to minimize congestion. Where a signalized intersection is anticipated, the distances should be increased to 600 ft minimum, 800 ft desirable.*

L.A. R/W AT INTERCHANGES (Case II)

Figure 86-4C



(1) A DISTANCE OF 300 ft MINIMUM TO 500 ft DESIRABLE SHOULD BE PROVIDED BETWEEN THE RAMP TERMINAL TAPER EXTREMITIES AND THE LANE TRANSITION. THE AUXILIARY LANE TERMINATING THE GREATER DISTANCE FROM THE INTERCHANGE AREA SHOULD GOVERN.

(2) THE END OF THE FULL CONTROL ACCESS LINE SHOULD BE AT OPPOSITE POINTS WHERE FEASIBLE.

(3) IF THERE IS NO ACCELERATION OR DECELERATION LANE, A DISTANCE OF 400 ft OR MORE SHOULD BE PROVIDED BETWEEN THE INTERSECTION OF THE RAMP $\mathcal{C}_L$ WITH THE CROSS ROAD AND THE LANE TRANSITION.

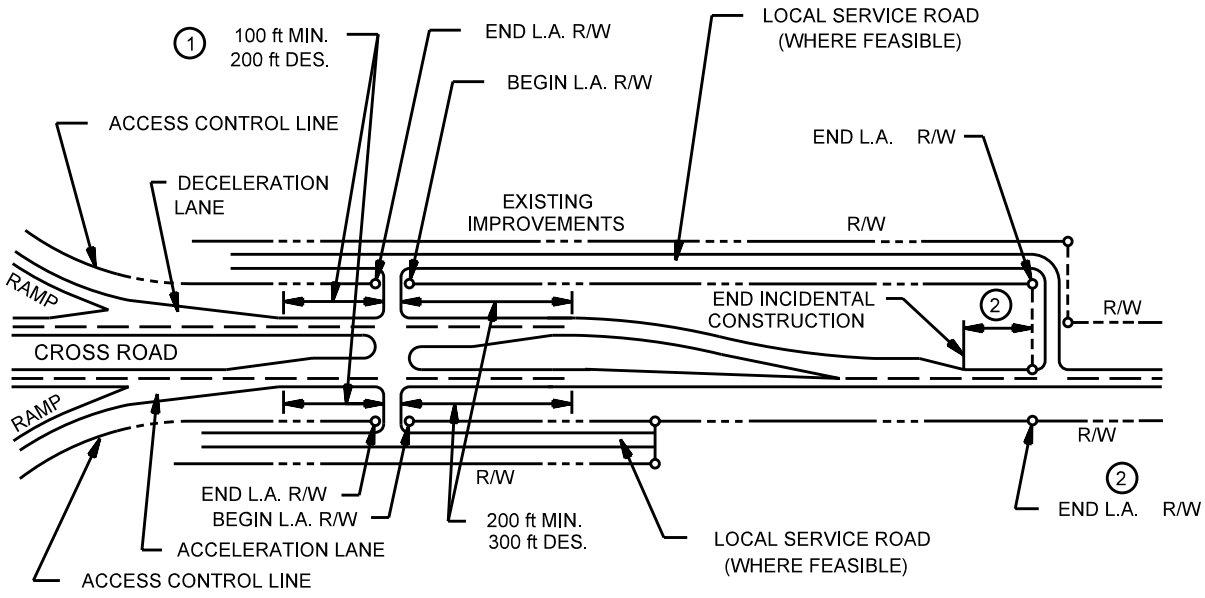
Notes:

1. *This figure illustrates a typical ramp intersection with a rural divided facility which transitions to an undivided facility*

2. *Where high-traffic crossroads, streets, commercial drives or signalized intersections are located or may be potentially constructed just beyond the ramp intersections, extension of the limited access right-of-way beyond the limits shown should be considered to enhance operational safety and efficiency and to minimize congestion. Where a signalized intersection is anticipated, the distances should be increased to 600 ft minimum, 800 ft desirable.*

L.A. R/W AT INTERCHANGES
(Case IV)

Figure 86-4D



1 THE AUXILIARY LANE TERMINATING THE GREATER DISTANCE FROM THE INTERCHANGE AREA SHOULD GOVERN.

2 THE END OF ACCESS CONTROL SHALL BE AT OPPOSITE POINTS WHERE FEASIBLE, 100 ft MINIMUM TO 200 ft DESIRABLE BEYOND THE LANE TRANSITION AREA.

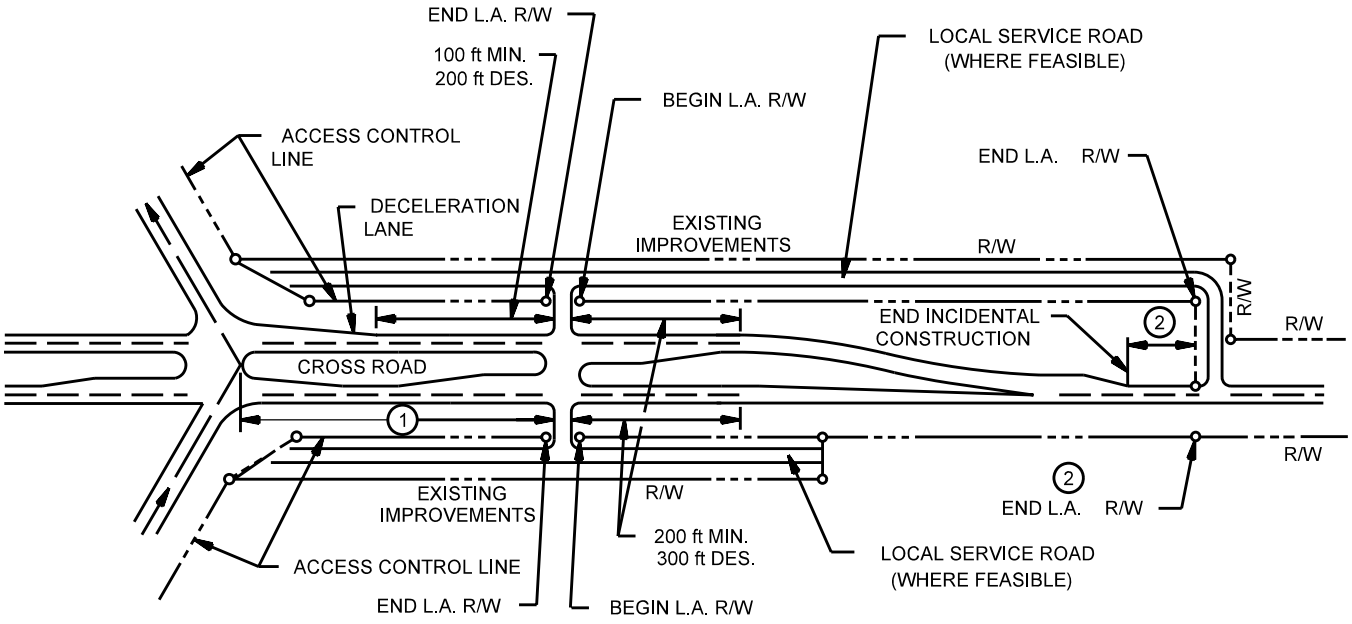
Notes:

1. *This figure illustrates a typical outer connection on an urban divided facility which transitions to an undivided facility*

2. *Where high-traffic crossroads, streets, commercial drives or signalized intersections are located or may be potentially constructed just beyond the interchange outer connectors, extension of the limited access right-of-way beyond the limits shown should be considered to enhance operational safety and efficiency and to minimize congestion. Where a signalized intersection is anticipated, the distances should be increased to 600 ft minimum, 800 ft desirable, where feasible.*

L.A. R/W AT INTERCHANGES
(Case V)

Figure 86-4E



(1) IF THERE IS NO ACCELERATION OR DECELERATION LANE, A POINT 400 ft OR MORE FROM THE INTERSECTION OF THE RAMP ℄ WITH THE CROSS ROAD SHOULD BE USED TO ESTABLISHED THE END OF L.A. R/W ON CLOSEST POINT OF ACCESS.

(2) THE END OF ACCESS CONTROL SHOULD BE AT OPPOSITE POINTS WHERE FEASIBLE, 100 ft MINIMUM TO 200 ft DESIRABLE BEYOND THE LANE TRANSITION AREA.

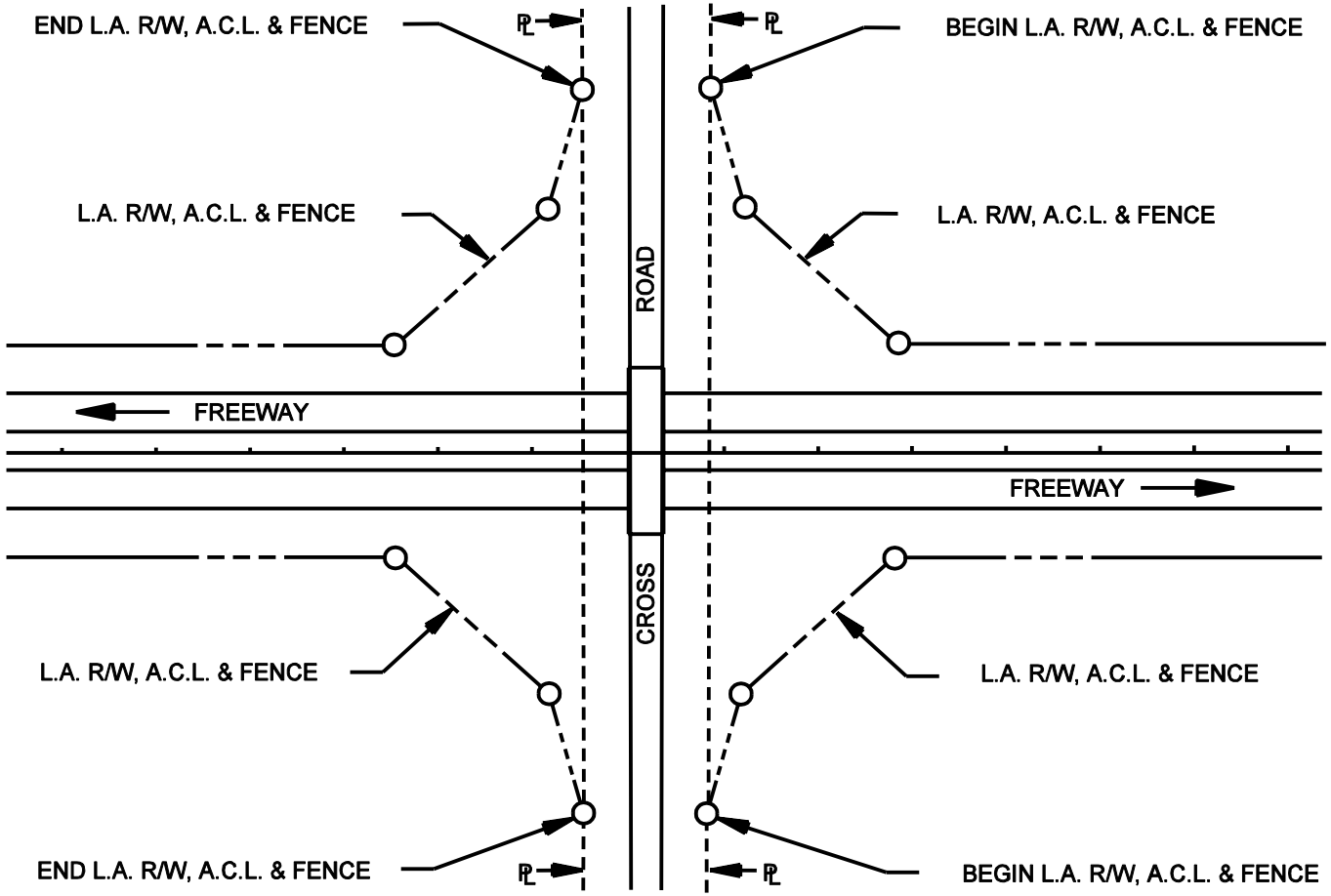
Notes:

1. *This figure illustrates a typical ramp intersection with an urban divided facility which transitions to an undivided facility.*

2. *Where high-traffic crossroads, streets, commercial drives or signalized intersections are located or may be potentially constructed just beyond the ramp intersections, extension of the limited access right-of-way beyond the limits shown should be considered to enhance operational safety and efficiency and to minimize congestion. Where a signalized intersection is anticipated, distances should be increased to 600 ft minimum, 800 ft desirable, where feasible.*

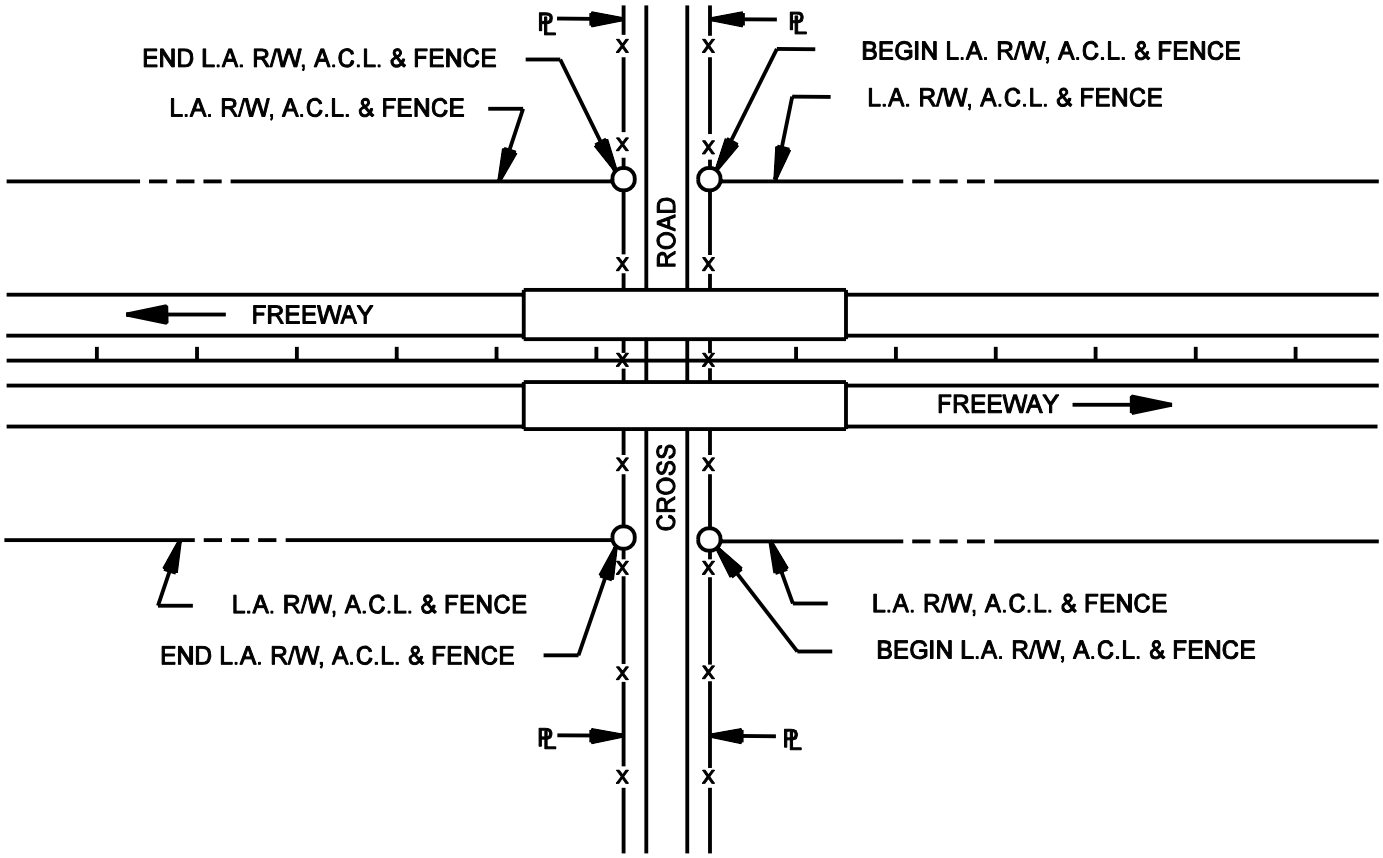
L.A. R/W AT INTERCHANGES
(Case VI)

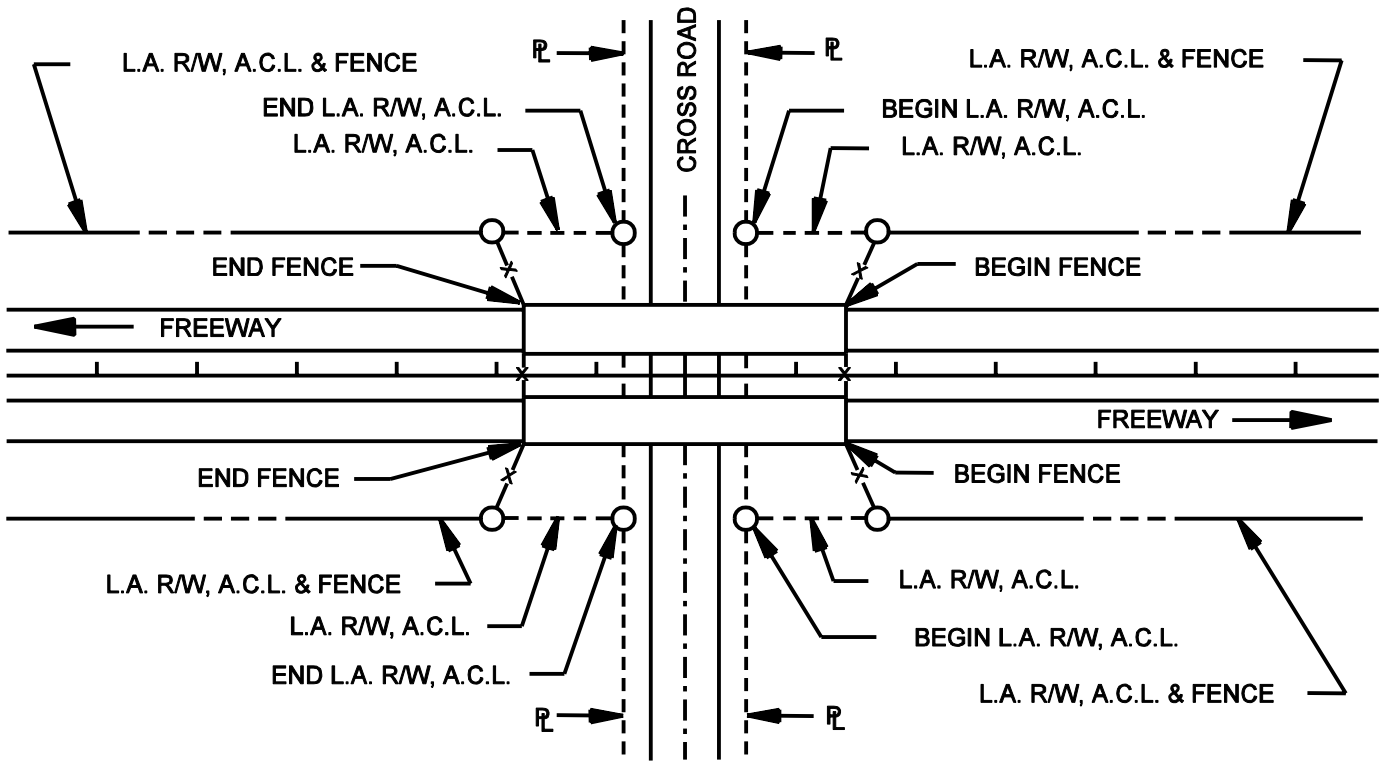
Figure 86-4F



CROSSROADS OVER FREEWAY

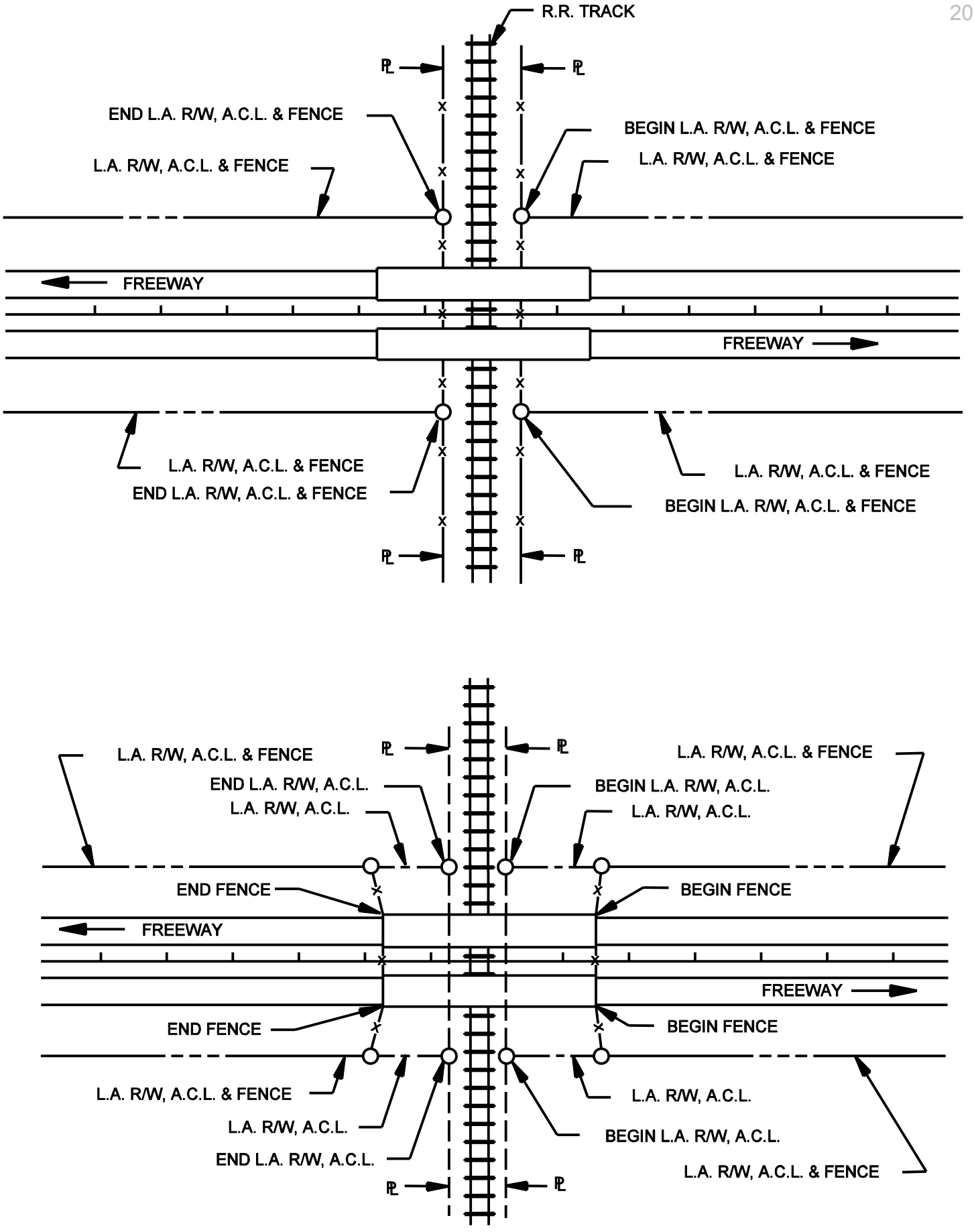
Figure 86-4G





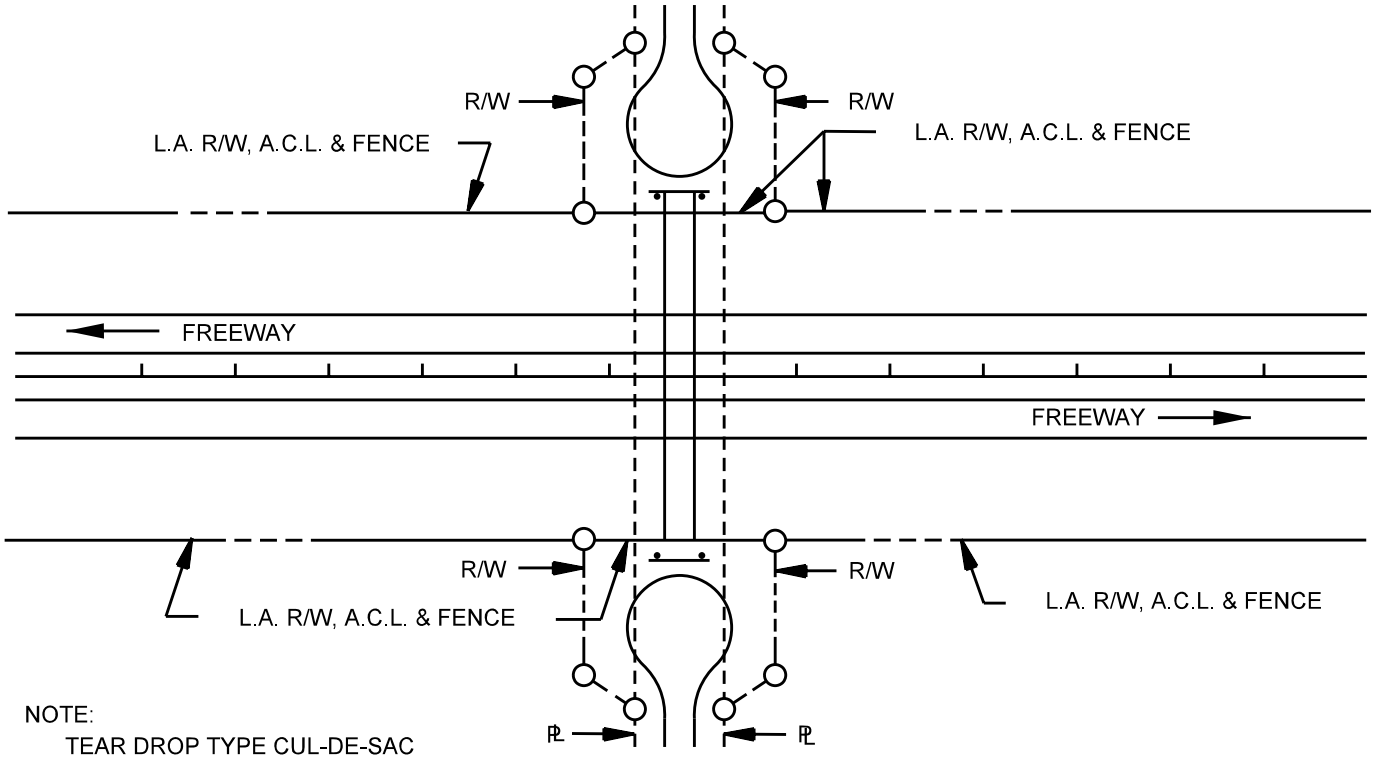
CROSSROADS UNDER FREEWAY

Figure 86-4H



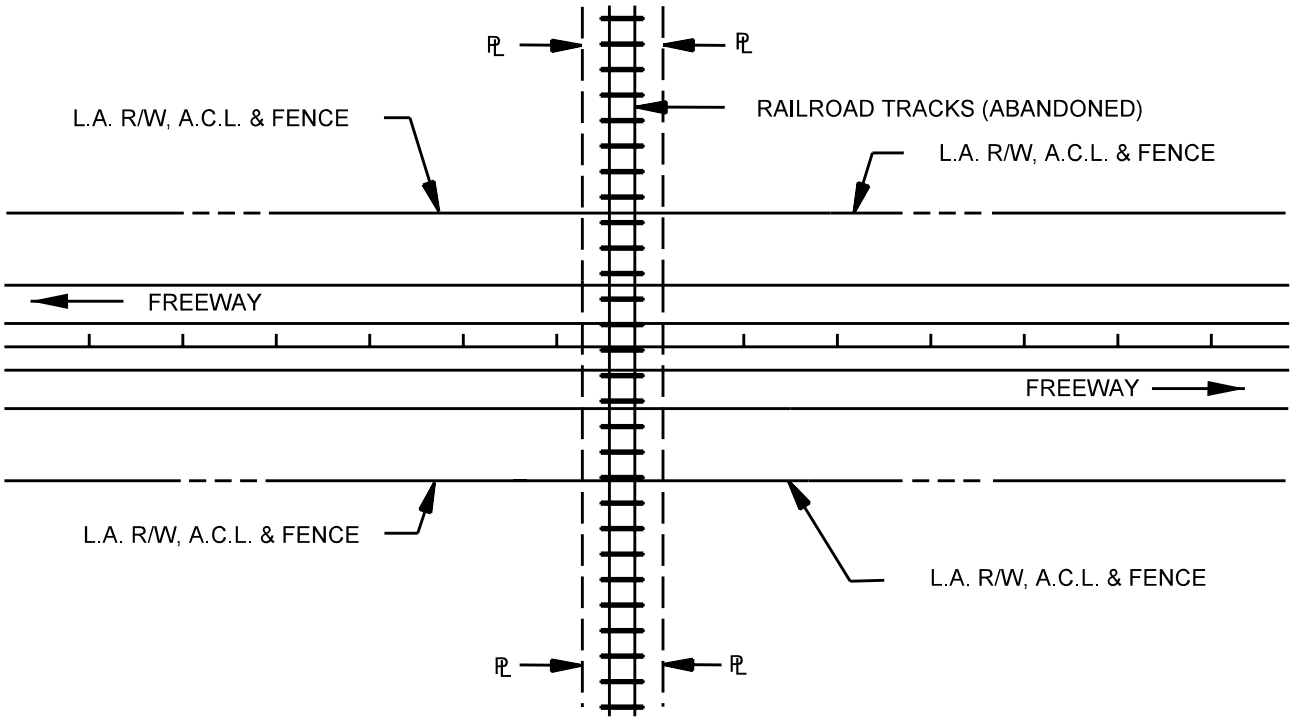
RAILROAD UNDER FREEWAY

Figure 86-4I



NOTE:
TEAR DROP TYPE CUL-DE-SAC IS PREFERED TO MINIMIZE THE NUMBER OF PROPERTIES AFFECTED UNLESS IMPROVEMENTS, ETC. REQUIRE RIGHT-OF-WAY TAKING FROM BOTH SIDES.

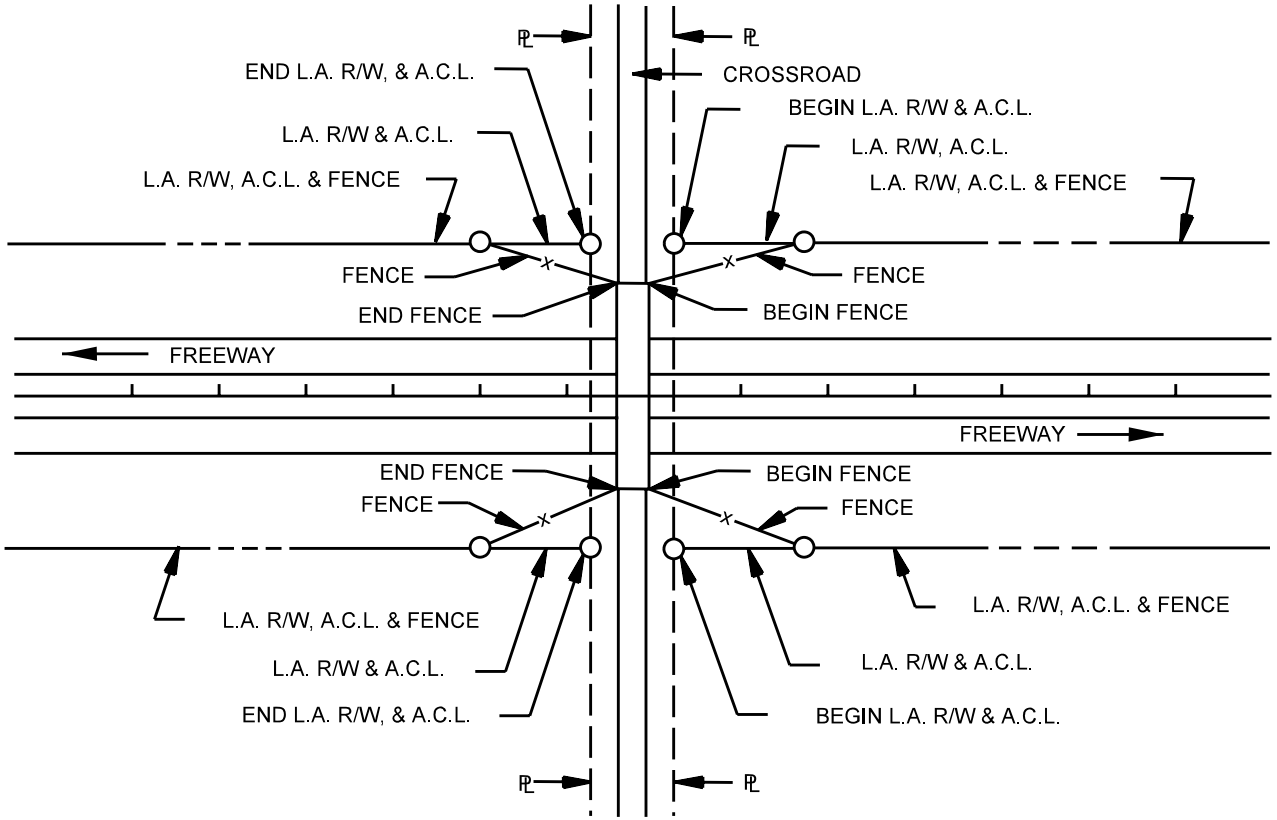
CROSS ROAD



RAILROAD

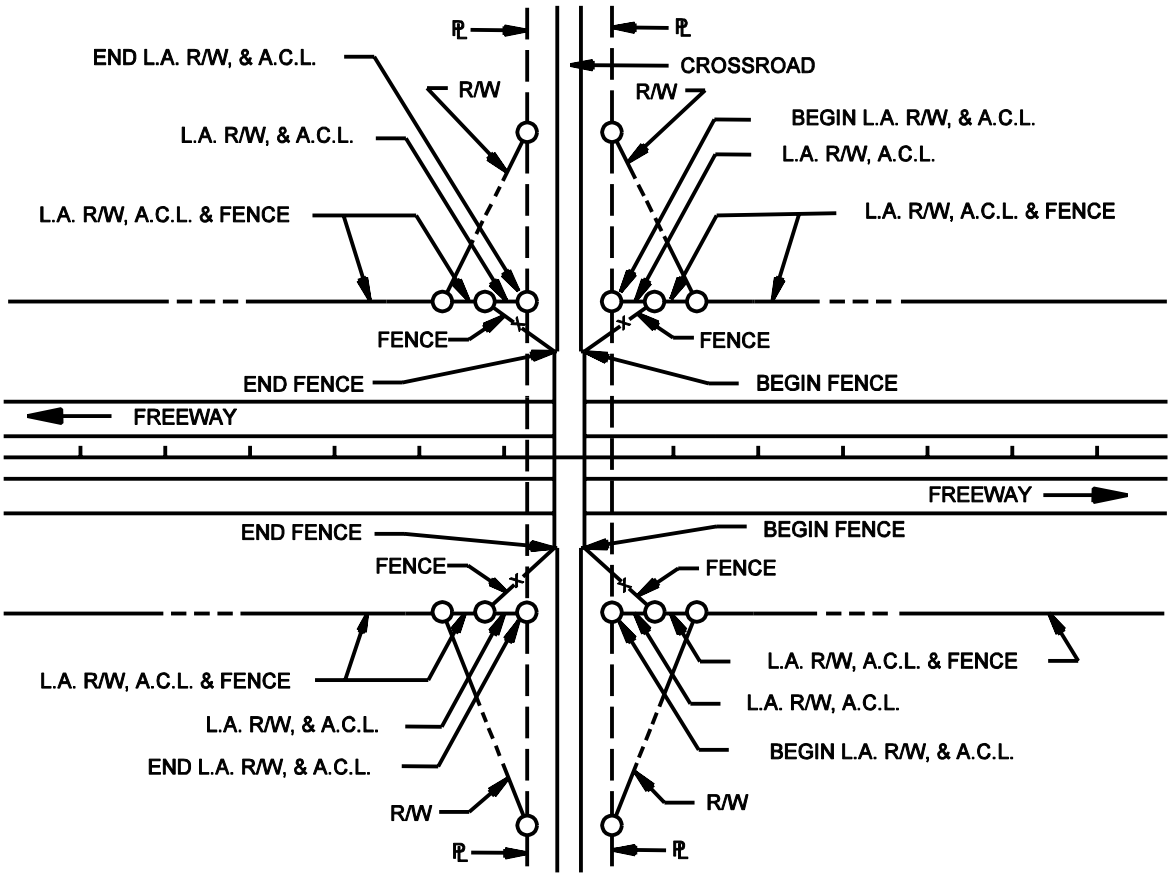
CLOSED FACILITIES

Figure 86-4J

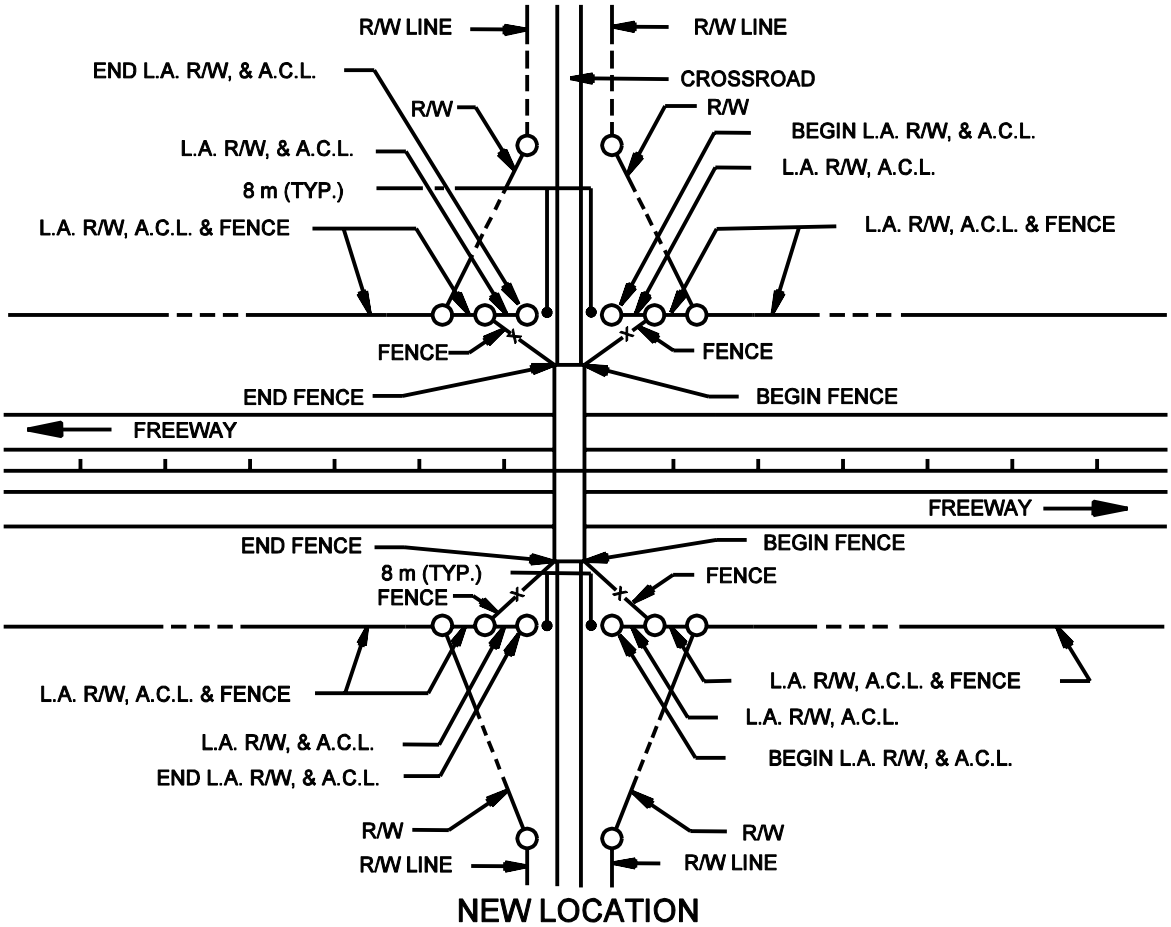


FREEWAY UNDER CROSSROAD AT ORIGINAL GRADE

Figure 86-4K



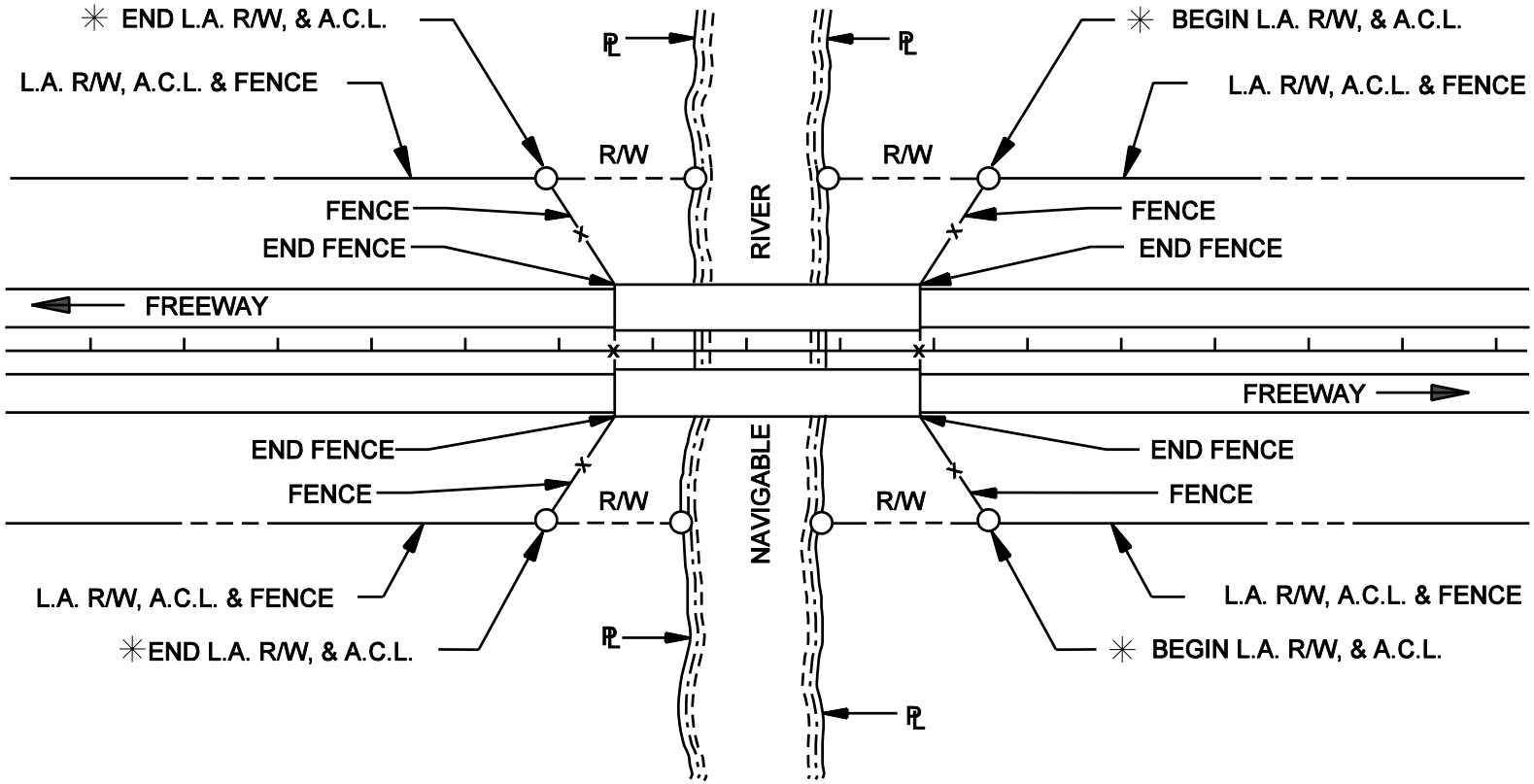
ORIGINAL LOCATION



NEW LOCATION

FREEWAY UNDER ELEVATED CROSSROAD

Figure 86-4L

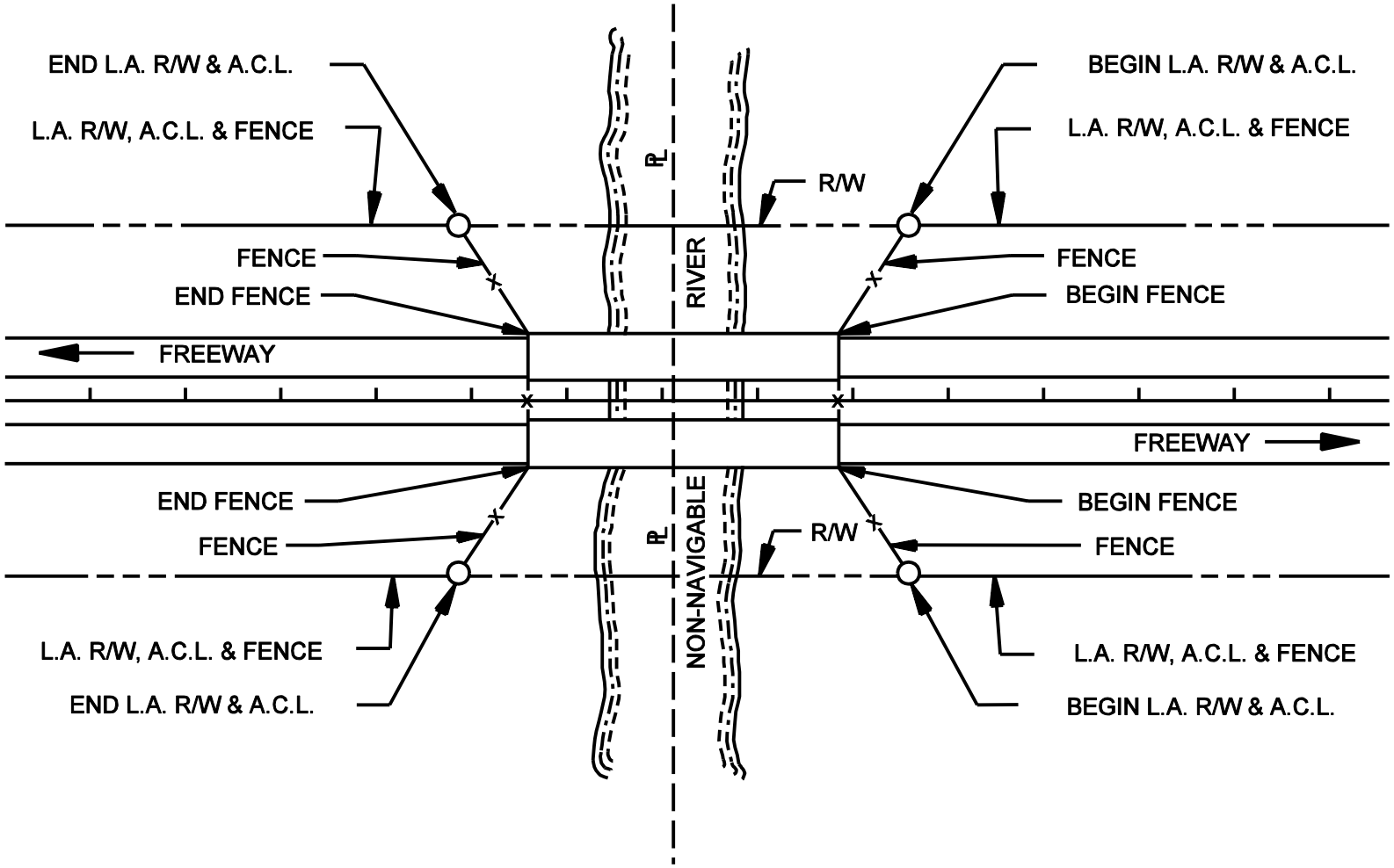


✳ POINT OF BEGINNING AND END OF L.A. R/W & A.C.L. SHOULD BE EXTENDED TO THE APPROX. ℄ IF THE OWNERSHIP OF THE PROPERTY ON EACH SIDE OF THE ROADWAY CENTERLINE IS DIFFERENT.

Note: This figure applies to any lake in Indiana except Lake Michigan.

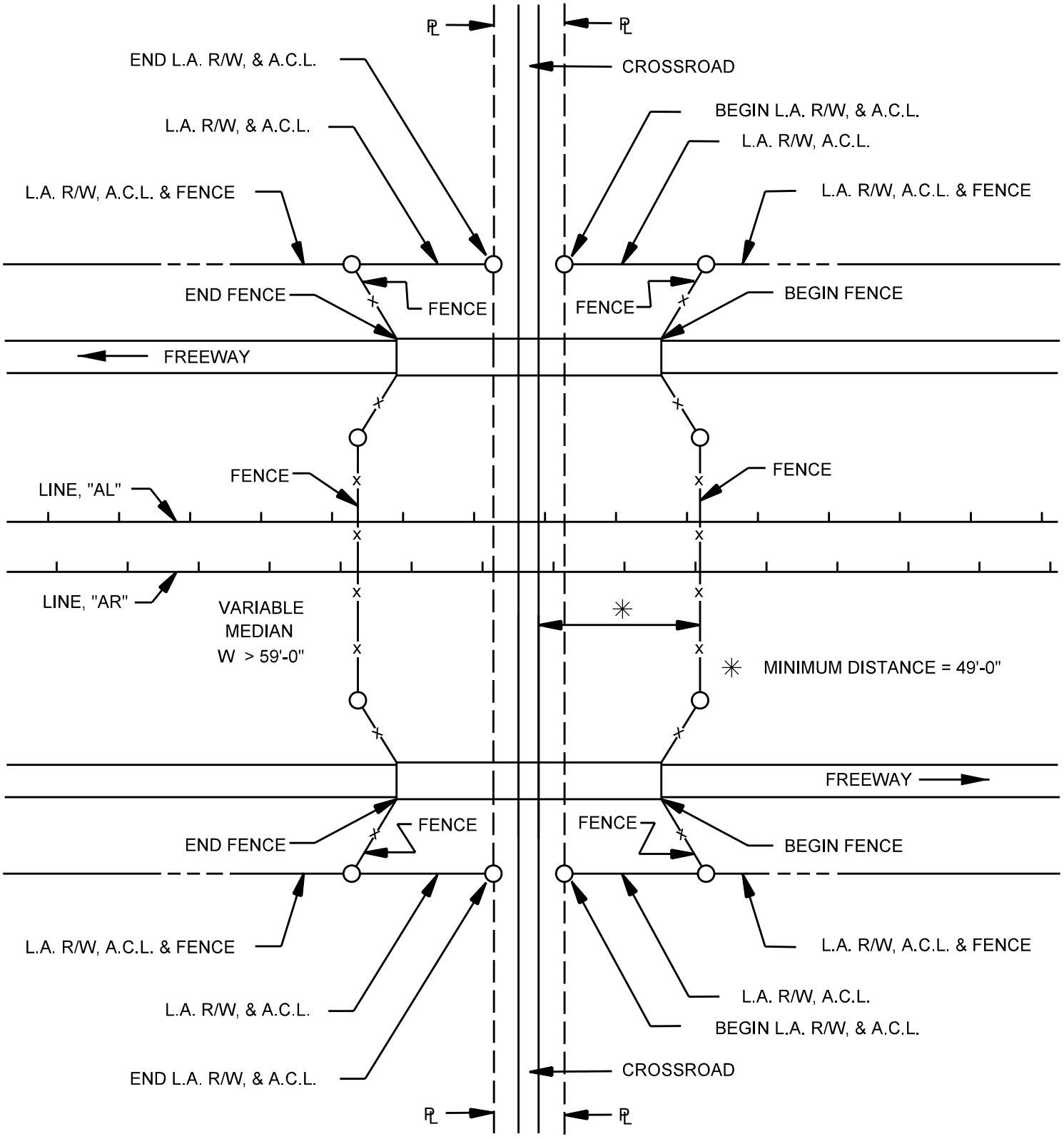
FREEWAY OVER NAVIGABLE RIVER, STREAM OR LAKE

Figure 86-4M



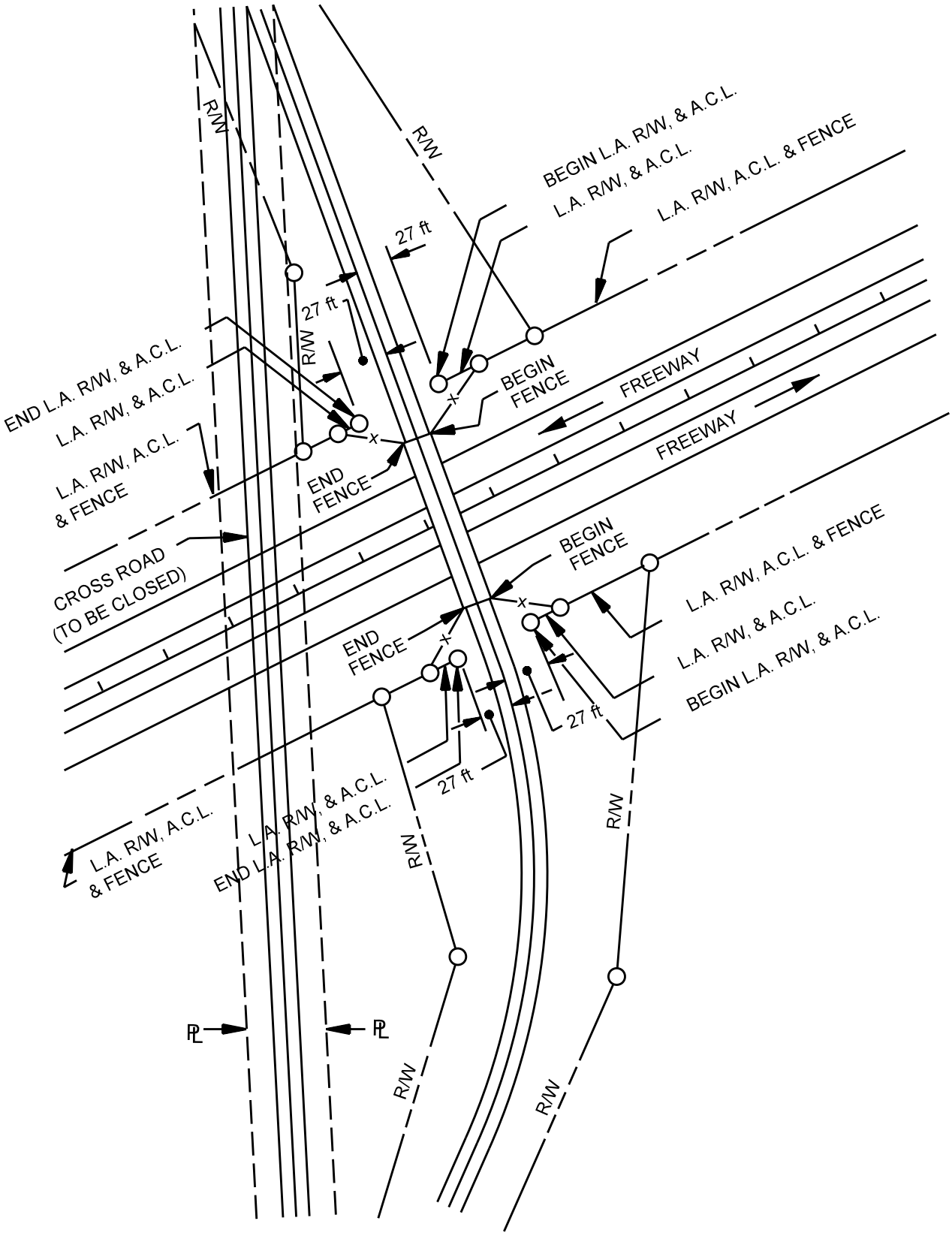
FREEWAY OVER NON-NAVIGABLE RIVER, STREAM OR LAKE

Figure 86-4N



CROSSROAD UNDER FREEWAY
(Wide Median)

Figure 86-4O



FREEWAY UNDER RELOCATED CROSSROAD

Figure 86-4P