TABLE OF CONTENTS

Table of contents 1
List of Figures 3
14-1A Sheet Preparation Responsibilities for Road, Bridge, or Traffic Project 3
14-1B(c) Field-Check Notification, Consultant-Designed Project 3
14-1B(h) Field-Check Notification, INDOT-Designed Project 3
14-1C Contract-Preparation Documents to Contract Administration Division 3
14-1D Asbestos Certification 3
14-1E Construction Change memorandum 3
14-2A Existing Elevations from Electronic Cross-Section Data 3
14-2B Underground Storage Tanks Removal information request 3
14-3A Recommended Plans Legends 3
14-3B Plans Abbreviations 3
14-3C Title Sheet Information Block 3
14-3D Horizontal Curve Data on Plans Sheets 3
Chapter Fourteen 4
14-1.0 PLAN DEVELOPMENT 4
14-1.01 Responsibilities 4
14-1.02 Project Development 5
14-1.02(01) Project Initiation 5
14-1.02(02) Field Check – Consultant Project 6
14-1.02(03) Final Tracing Submittal 7
14-1.02(04) Plan Revisions Prior to Letting 10
14-1.02(05) Contract Information Book Certification 11
14-1.02(06) Construction Changes 11
14-1.02(07) Shop Drawings 12
14-2.0 PLAN SHEET SUBMISSIONS 13
14-2.01 Road Design Plans (New Construction/Reconstruction Project) 14
14-2.01(01) Grade Review Submission/Hydraulic Review Submission 14
14-2.01(02) Interchange Geometrics Submission 16
14-2.01(03) Preliminary Field Check Plans 17
14-2.01(04) Design Hearing Plans and Preliminary Right-of-Way Plans Submission 20
14-2.01(05) Right-of-Way Tracings Submission 21
14-2.01(06) Final Design Summary Submission 21
14-2.01(07) Final Field Check Plans Submission 22
14-2.01(08) Final Check Prints Submission 24
14-2.01(09) Final Tracings Submission 25
14-2.02 Road Rehabilitation Plans for Project with No Additional Right of Way Required 25
14-2.02(01) Grade Review Submission/Preliminary Field Check 26
14-2.02(02) Information Meeting 31
14-2.02(03) Final Design Summary Submission 33
14-2.02(04) Final Field Check Plans Submission 34
14-2.02(05) Final Check Prints Submission 34
14-2.02(06) Final Tracings Submission 36
14-2.03 Bridge Plans (New Bridge Construction/Bridge Replacement) 36
14-2.03(01) Hydraulics Review Submission 37
14-2.03(02) Grade Review and Structure Type and Size Selection Submission 37
14-2.03(03) Preliminary Field Check Plans 40

14-2.03(04) Design Hearing Plans and Preliminary Right-of-Way Plans Submission 42
14-2.03(05) Right-of-Way Plans Submission 43
14-2.03(06) Preliminary Plans for Final Approval Submission 44
14-2.03(07) Final Check Prints Submission 44
14-2.03(08) Final Tracings Submission 48
14-2.03(09) Bridge within Limits of Road Project 48
14-2.04 Bridge Rehabilitation Project 49
14-2.04(01) Preliminary Field Check and Inspection Report 49
14-2.04(02) Design Approval of Report 49
14-2.04(03) Preliminary Plans Submission 50
14-2.04(04) Final Plans Submission 51
14-2.04(05) Final Field Check 51
14-2.04(06) Tracings Submission 51
14-2.04(07) Bridges within Limits of Road Project 51
14-2.05 Traffic-Signs Plans 52
14-2.05(01) Preliminary Plans 52
14-2.05(02) Preliminary Field Check Plans Submission 52
14-2.05(03) Final Field Check Plans Submission 53
14-2.05(04) Final Check Prints Submission 55
14-2.05(05) Final Tracings Submission 55
14-2.06 Signalization Plans 55
14-2.06(01) Preliminary Plans 55
14-2.06(02) Preliminary Field Check Plans Submission 56
14-2.06(03) Final Field Check Plans Submission 57
14-2.06(04) Final Check Prints Submission 57
14-2.06(05) Final Tracings Submission 58
14-2.07 Lighting Plans 58
14-2.07(01) Preliminary Plans 58
14-2.07(02) Preliminary Field Check Plans Submission 58
14-2.07(03) Final Field Check Plans Submission 59
14-2.07(04) Final Check Prints Submission 60
14-2.07(05) Final Tracings Submission 60
14-2.08 Partial 3R Project Plan Development 60
14-2.08(01) Preliminary Plans 60
14-2.08(02) Assessing Preliminary Pavement Design 63
14-2.08(03) Preliminary Field Check 63
14-2.08(04) Right of Way 63
14-2.08(05) Public Hearing 64
14-2.08(06) Utilities and Railroads 64
14-2.08(07) Calculations 64
14-2.08(08) Returned Correspondence 64
14-2.08(09) Final Pavement Design 64
14-2.08(10) Final Check Prints 65
14-2.08(11) Review of Final Check Prints 66
14-2.08(12) Shelf-Ready Project 67
14-2.08(13) Signatures and Stamps 67
14-2.08(14) Contract Documents Package 67
14-2.08(15) Review Process 68
14-2.09 Bridge Plans Complementary to Road Work 68

14-2.09(01) INDOT Route Project 69
14-2.09(02) Local Public Agency Project 69
14-3.0 DRAFTING GUIDELINES 69
14-3.01 Drafting Methods 69
14-3.02 Plotting Survey Data 70
14-3.03 Working Sheets 70
14-3.04 General Guidelines 71
14-3.04(01) Dimensions 71
14-3.04(02) Symbols and Legends 72
14-3.04(03) Text 72
14-3.04(04) Plan Notes 73
14-3.04(05) Miscellaneous 73
14-3.04(06) Title Sheet Information Block 75
14-3.05 Scales 76
14-3.05(01) Road Project 76
14-3.05(02) Bridge Project 78
14-3.05(03) Traffic Project 78
14-3.06 Plan Sheet Accuracies 79
14-3.06(01) Road and Traffic Plans 79
14-3.06(02) Bridge Plans 81
14-3.07 Plan Sheet Organization 82
14-3.07(01) Road Project 82
14-3.07(02) Bridge Project 84
14-3.07(03) Traffic-Sign Project 85
14-3.07(04) Signalization Project 86
14-3.07(05) Lighting Project 86

LIST OF FIGURES

Figure Title

14-1A Sheet Preparation Responsibilities for Road, Bridge, or Traffic Project
14-1B(c) Field-Check Notification, Consultant-Designed Project
14-1B(h) Field-Check Notification, INDOT-Designed Project
14-1C Contract-Preparation Documents to Contract Administration Division
14-1D Asbestos Certification
14-1E Construction Change memorandum
14-2A Existing Elevations from Electronic Cross-Section Data
14-2B Underground Storage Tanks Removal information request
14-3A Recommended Plans Legends
14-3B Plans Abbreviations
14-3C Title Sheet Information Block
14-3D Horizontal Curve Data on Plans Sheets

CHAPTER FOURTEEN

PLAN PREPARATION

Other Parts of this *Manual* provide the designer with uniform criteria and procedures for the design of a highway facility. These designs must be incorporated into the construction plans so that they can be clearly understood by contractors, material suppliers, and Department personnel assigned to inspect the construction of the project. 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 generally be the same. This Chapter provides the general information and details 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 PLAN DEVELOPMENT

14-1.01 Responsibilities

Figure 14-1A, Sheet Preparation Responsibilities for Road, Bridge, or Traffic Project, illustrates who is responsible for preparing the various details of an in-house designed project. For consultant-designed plans, the consultant will be responsible for the preparation of all plan sheets. For a project that is longer than 1 mile, or an interchange, rest area, or weigh station project, separate traffic-signs and lighting plans will typically be required.

The designer will initially complete all plan sheets, computation sheets, quantity estimates and cost estimates. A second qualified individual will independently review these documents. The qualifications of the checker should be commensurate with the item to be reviewed. For example, a second drafter would be qualified to check the preliminary drafting, but an engineer will generally be required to review the structural details and computations for a bridge design.

At several design stages the plans will be submitted to various Department units for review. Section 14-2.0 identifies the construction plan sheets that should be completed at the various design stages.

Prior to any of 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 meets the Department's criteria.

> ** *PRACTICE POINTER* **
>
> If a consultant submits full-size plans to the Design Division's project coordinator for distribution, the plans must be clearly labeled on the outside of the roll.

14-1.02 Project Development

Chapter Two illustrates the steps the designer should follow when preparing a set of construction plans. Using this process will ensure that all appropriate information will be addressed in the construction documents. The following sections briefly discuss the project development relative to the plan sheets.

14-1.02(01) Project Initiation

The Environment, Planning and Engineering Division is responsible for preparing the Engineer's Report. This Report provides the scoping information the designer requires to initiate the project design. Chapter Five discusses the typical contents of an Engineer's Report.

Prior to beginning design on an existing facility, the designer should review the as-built plans and/or the final design plans. Final design plans are on file, on microfilm, in the Central Office. The actual as-built plans and/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. For a traffic signal project, the final design plans will be corrected to the as-built condition and stored within the Design Division's traffic signal design unit.

Although the as-built plans are an important resource, the designer will typically conduct a field review and/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 generally not be performed. However, a field review will still 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. Inclusion of a detail in the plans.

2. Reference 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 2.4 m 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 approach table "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. Attention should be given to the pay items (i.e., if one has QC/QA pavement, the other must also use QC/QA pavement even 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 – Consultant Project

The consultant preparing plans for an INDOT project is responsible for preparing and distributing plans for all field checks. This will consist of the following:

1. INDOT Review. Prior to the field review, the consultant is required to forward one set of plans to the Central Office. If the plans are satisfactory for a field check, INDOT will notify the consultant to schedule the field check. If the plans are not satisfactory, marked-up plans will be returned to the consultant for re-submittal.

2. Meeting Date. The consultant is responsible for arranging a mutually agreeable field check date with the INDOT project manager and the district construction area engineer. In general, the field check should be scheduled at least three weeks in advance.

3. Plan Distribution. The consultant is responsible for preparing field check notification letters and plans so that they are received by all parties on the distribution list at least two weeks prior to the field check. Plans distributed within the Central Office may be delivered to the applicable Design Division project coordinator. All other plans and letters should be sent directly to the necessary individuals. 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/.

*** PRACTICE POINTER ***

For work in Vanderburgh, Warrick, Gibson, or Posey counties, 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 consultant will be responsible for preparing the report of meeting and listing the comments from all individuals involved in the field check. Copies of this report will be 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 Tracing 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 project manager will submit the final tracings to the project coordinator. The project coordinator will submit the plans to the Records Unit. This submittal will include the following:

1. one set of final tracings (mylar) and cross sections (reproducible vellum or mylar);

*** PRACTICE POINTER ***

Prior to submitting the final tracings, the designer should contact the Design Division's Records Unit to obtain the contract number, for transmittal purposes and placement onto each sheet of the final tracings, excluding cross sections.

2. set of marked-up final check prints;

3. two sets of prints;

4. a 3.5-in. diskette or CD-ROM containing the following:

a. 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;

b. one 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.

c. modified recurring special provisions and unique special provisions in Microsoft Word.

5. three hard copies of the final cost estimate and four hard copies of the special provisions;

6. two copies of Figure 14-1C, Contract-Preparation Documents to Contract Administration Division memorandum, to Contracts Services Section which contains 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/.

7. four copies of permits or permit information. See Section 9-1.03 for additional information;

8. subsurface investigation, or geotechnical summary;

9. 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/.

10. one bound copy of the design computations and two copies of the quantity calculations;

11. project correspondence files;

12. original survey book(s) and electronic survey files on 3.5 in. diskette or CD-ROM;

13. 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/.

14. 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/.

15. Figure 14-1D, Asbestos Certification (for new bridge construction, bridge replacement, or bridge rehabilitation project), original to the appropriate district bridge inspector; a copy to the Environment, Planning and Engineering Division's environmental services manager; 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/;

16. 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/; and

17. 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/.

The map of the official detour route, where applicable, as developed by the district, should be provided to the Contracts and Construction Division's Contracts Section for incorporation into the Contract Information book. 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 in the Records Unit as a reference file for the project. Two sets of prints from the final plans, the disk, cost estimate, special provisions, copies of permits or permit information, Federal Fiscal Management Form (completed by the Records Unit), and the Memorandum to Contracts Services Section are submitted to Contracts and Construction Division's Contracts Services Section.

Figure 14-1C, Contract-Preparation Documents to Contract Administration Division Office of Estimating memorandum, should be completed by the project manager. The project manager should contact the appropriate district construction engineer for assistance in completion of the Contract Requirements Worksheet portion. Once completed, the entire memorandum should be transmitted to the Planning Division's Research and Documents Library Team with 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.

An editable version of the memorandum/worksheet may be found 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 Design Division's Records Unit in time for processing.

The Records Unit enters the preliminary data on the project into BAMS 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 Records Unit 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 Design Division Chief.

The designer should review the plans and Contract Information book received of the Contracts and Construction Division's Contracts Section within one week after such receipt. The designer should complete the Contract Information Book Certification form and return it to the Design Division's project coordinator. 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(04) Plan Revisions Prior to Letting

Any changes made to the tracings after a project is turned in to the Design Division's Records Unit, but before bids are opened, should be handled as follows:

Changes are 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 contain the date of the revision, the revised sheet numbers, and a short explanation of the changes. 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 Records Unit 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 the revised tracings, special provisions package, quantity computations, construction cost estimate using Estimator, and diskette or CD-ROM containing the unique special provisions and construction cost estimate.

5. No changes are permitted one week prior to the letting date.

Note that 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 one week after receipt, the designer should review the plans and Contract Information book if the designer is signing and sealing some or all of the plan sheets. The designer should complete the Contract Proposal Book Certification form and send the original to the appropriate district construction engineer with copies to the Contracts and Construction Division's Contracts Section. An editable version of this document may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/. If errors are noted, the designer should also contact the appropriate district construction engineer to determine how the errors should be handled (as revisions before the letting date, construction changes after the letting date, etc.). This determination should be documented in a memorandum to the appropriate district construction engineer with copies to the Contracts Section and project coordinator.

14-1.02(06) Construction Changes

Any changes made after a project is let and awarded must be processed as a construction change. A construction change is processed as follows:

1. Plan Sheets. Where changes are 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 contain the date of the revision, the revised sheet numbers and a short explanation of the changes. 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 because 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 new sheet should be added to the original set of plans with the same sheet number as the deleted sheet followed by an alpha character (e.g., Delete Sheet 7, Add Sheet 7A). Revisions on the new sheet should also be shown in "clouds."

2. Records Unit. A memorandum will be prepared by the Design Division's Records Unit to the district construction engineer (see Figure 14-1E, 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. Any 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. Contracts and Construction Division;
   e. Land Acquisition Division, if R/W revised;
   f. Design Division's project manager;
   g. the consultant, if applicable;
   h. Program Development Division's Bridge Inventory Unit, if a bridge project; and
   i. Design Division's Records Unit.

14-1.02(07) Shop Drawings

The contractor will often be required to submit shop drawings to the Department for review and approval. It is recommended that the original plans and contract documents be used in reviewing shop drawings. For shop drawings, the following will apply.

1. Cover Memorandum. The cover memorandum accompanying the shop drawings should include the following:

   a. contract number;
   b. des number;
   c. route/road location;
   d. district; and
   e. exact description of the item(s) being submitted.

2. Structures. For concrete structural members, structural steel and expansion joints, the procedure for reviewing shop drawings will be as follows:

   a. The fabricator will provide the shop drawings to the designer for review and approval.

b. After the shop drawings have been reviewed and approved, the designer will forward the approved drawings to the Operation Support Division for distribution.

c. The designer will provide one set of prints to the Records Unit for filing.

d. After fabrication is completed, the fabricator will submit one set of mylar prints directly to the Records Unit supervisor. These mylars are stored in the vault until they are microfilmed.

e. The microfilm of the shop drawings is stored in the Design Division's Records Unit.

3. Pipe, Guardrail, Handrail, and Bridge Railing. Shop drawings for these items are to be reviewed by the district's project engineer.

4. Traffic Project. For signing, lighting, and traffic signals items, Figure 14-1D, Shop Drawing Review Responsibility (Traffic Items), indicates the responsible review unit for shop drawings. After the shop drawings have been approved, the designer should distribute two copies of the approved drawings as noted in Item 7 below.

5. Local Agency Project. Shop drawings for a local agency project should be submitted to the local agency for review and approval.

6. Other Shop Drawings. For all shop drawings other than those listed above, the fabricator will provide the shop drawings to the designer for review and approval. After the shop drawings have been approved, the designer will distribute the approved drawings to individuals listed in Item 7.

7. Distribution. After shop drawings have been approved, they should be distributed to the individuals as follows:

   a. designer (Traffic - see Item 4);
   b. fabricator;
   c. contractor (Traffic - see Item 4);
   d. shop inspector;
   e. Records Unit; and
   f. construction engineer (Traffic drawings only – see Item 4).

14-2.0 PLAN SHEET SUBMISSIONS

The designer should submit a Level One Checklist, including computations, with each submission, for the mainline, each S-line, and each traffic maintenance phase. In addition, the designer should include computations for the required intersection sight distance at each public road, including local service roads and frontage roads 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 designer should submit a completed Limited Review Certification form for projects at the final check prints and final tracings stages.

The computations for the Level One items and intersection sight distance are to be initialed and dated by the designer and reviewer before submission to INDOT.

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.

14-2.01 Road Design Plans (New Construction/Reconstruction Project)

14-2.01(01) Grade Review Submission/Hydraulic Review Submission

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 meet all Level One design elements in this area, e.g., maximum grade, vertical stopping sight distance, and intersection sight distance.

The proposed design information for this submittal should be plotted in MIcrostation. However, the plans need not be in final form. The designer is encouraged to add notes on the plans explaining special situations or items which are not readily apparent which may influence the proposed design. These notes are to be removed in 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 note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Title Sheet. At this project stage, information on the Title Sheet should include the following:

a. project numbers;

b. project Des numbers;

c. county location map;

d. project location map including north arrow and scale;

e. 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 12.86 kilometers 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. reference points at the beginning and end of the project (not required for local agency projects);

g. gross and net project lengths, not including incidental construction or lengths along S-lines;

h. design data including design speed, project design criteria, functional classification, terrain, traffic data, urbanness, etc.; and

i. signature block(s); note that these blocks will not be filled in at this stage.

3. Index and General Notes Sheet. The Index and General Notes Sheet should provide a list of utility owners and addresses. The index blocks should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

4. Typical Cross Sections. Typical cross sections for this submittal should only show basic configuration and design features. This will typically include the following:

a. lane and shoulder widths;

b. profile grade, construction centerline, paper relocation line and survey line locations;
c. cross slopes;
d. curbs;
e. sidewalk locations and widths;
f. bicycle facilities;
g. side slopes;
h. shoulder corrugations if warranted; and
i. ditches.

5. Plan and Profile Sheets. At this project stage, the plan and profile will generally only include the preliminary design information. Plotting of the existing topography should be complete. Some of the details that should be addressed include the following:

a. horizontal alignment (e.g., horizontal curve data, PC, PI, PT, bearings);

b. vertical alignment and its relationship to grade controlling features;

c. all alignment controlling features (e.g., high-water levels, existing cross roads and bridges, regulated drains, drainage structures, railroads, underdrain criteria, traffic maintenance considerations, cemeteries, historical buildings, parks, ADA requirements, etc.); and

d. preliminary drainage details, e.g., bridges and mainline culverts.

6. Interchange. If the project includes at least one interchanges, the general layout of the interchange should be shown, including preliminary ramp gradients, horizontal alignment, vertical alignment, etc.

7. Cross Sections. Provide sample cross sections through critical areas.

8. Design Information. In addition to the plans, the designer should include copies of the preliminary hydraulic analysis for mainline culverts, if applicable, and results of any economic analysis that may have been completed for alternative grade lines.

9. Certification. Include an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification form.

14-2.01(02) Interchange Geometrics Submission

For a project which includes at lest one interchange, a separate submittal of the proposed horizontal alignment for the interchange may be required prior to the Grade Review. The following elements 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 note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Geometrics. The plan sheets for the interchange geometrics should be graphically completed including stationing, curve data, bearings, etc. The design speeds for ramps should be noted.

3. Ramp Grades. Investigate ramp grades in as much detail as required to determine their effect on the proposed horizontal alignment.

4. Traffic Elements. The traffic elements to be reviewed 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).

5. Design Information. Include all applicable design information with this submission (e.g., economic analysis, drainage analysis).

14-2.01(03) Preliminary Field Check Plans

Plans should be approximately 40% complete at this stage. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Previous Reviews. The marked-up plans from the previous submittal should be include with this submission, i.e., Grade Review and/or Interchange Geometrics.

2. Conformance. The plans should be reviewed for conformance with the Level One controlling design criteria listed in Section 40-8.02(01). Any apparent or possible design exceptions should be noted. Also, any discrepancies from the Level Two design criteria listed in Section 40-8.02(02) should be noted. The required documentation for all Level One and Level Two design exceptions should be submitted.

3. Plat Sheet. A preliminary Plat No. 1 should be included for each project on a Department-maintained route requiring right of way. See Section 85-2.0.

4. Plan and Profile Sheets. Elevations and grades of ditches should be shown so that accurate right-of-way requirements can be determined. In addition to the criteria required for prior submittals, the plan and profile sheets should include the following:

   a. project limits;

   b. drainage features (e.g., pipe structures, ditch grades, preliminary inlet spacing for storm-sewer trunk line design, etc.) and proposed drainage notes;

   c. public road approach and drive locations;

   d. construction limits;

   e. proposed right-of-way;

   f. approximate roadside barrier locations;

   g. permanent erosion protection, including paved side ditches, riprap, sodding limits; and

   h. new sidewalks, bicycle lanes, etc., if not shown on the detail sheets.

5. Detail Sheets. The preliminary layouts or sketches for the detail sheets should be included as follows:

   a. major intersections, including turning movements, turn lanes and pavement markings;

   b. signals;

   c. signs, including sign structures;

   d. lighting;

   e. retaining walls;

   f. special drainage structures;

   g. superelevation transition diagrams;

h. weigh stations and associated facilities; and

i. rest areas and associated facilities.

If shoulder corrugations are warranted, and the plans include details for non-standard public road approaches, driveways, 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 when determining the limits of corrugations installation related to the feature shown in the detail.

6. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined.

7. Approach Table. The preliminary information to be included in the approach table is as follows:

a. location (station);
b. type of approach;
c. radii;
d. width of approach;
e. length of approach;
f. grade of approach;
g. surface materials; and
h. distance beyond R/W.

8. Structure Data Table. The preliminary information to be included in the structure data table is as follows:

a. location;
b. size;
c. type;
d. approximate elevations and grades where necessary for clarity; and
e. type of end section.

9. Cross Sections. The preliminary draft for the cross sections 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.

10. Design Information. Include the preliminary draft of the Design Summary and the draft Fish and Wildlife Review, if applicable. The preliminary storm sewer analysis should also be included with this submittal. Unique special provisions should be initiated with this submittal.

14-2.01(04) Design Hearing Plans and Preliminary Right-of-Way Plans Submission

Plans for this submittal should be close to their final form. The construction plan sheets for this submittal should be legible and consistent with the quality desired for public viewing. If one or more ramps are to be closed for 7 days or longer, a public information meeting will be required. The procedure for such meeting should be in accordance with Section 14-02(02). The right-of-way plans should be consistent with the requirements in Chapter Eighty-five. 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 previous submittal with this submission.

2. Title Sheet. Finalize the Title Sheet for right-of-way plans.

3. Index and General Notes Sheet. Prepare the right-of-way index.

4. Plat Sheets. All plat sheets, if required, should be consistent with the plans.

5. Plan and Profile Sheets. Right of way should be finalized and consistent with the detail sheets. Storm-sewer design should be complete and should be included in the plans.

6. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate for the project and a copy of the draft Design Summary. The Department's cost estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will generally consist only of major items with a percentage added to cover smaller items. If practical, the traffic-related items should be segregated.

7. Certification. Include an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification form.

14-2.01(05) Right-of-Way Tracings Submission

Chapter Eighty-five presents the criteria and information that should be included with a set of right-of-way plans. In addition, the designer should review the instructions for Quality Assurance as follows:

1. include the marked-up preliminary right-of-way plans with this submission, if requested to do so;

2. incorporate all revisions made during the Preliminary Right-of-Way Plans Submission review;

3. complete all sheet cross references;

4. complete all project information boxes in the right-of-way plans, including right-of-way project number and sheet numbers; and

5. complete the checklist shown in Figure 85-2F.

14-2.01(06) Final Design Summary Submission

Submit a request for the final pavement design to the Materials and Tests Division at this time. Include and review these elements for Quality Assurance as follows:

1. plan revisions resulting from the Design Hearing comments;

2. environmental requirements satisfied by either 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 the Federal Highway Administration; or

    c. The Categorical Exclusion is complete. If there is a line on which the Federal Highway Administration is to sign, it must be signed;

3. a final Design Summary, including the resolution of hearing comments;

4. permit information as required; and

5. updated Scope/Environmental Compliance Certification/Permit Application Certification form.

14-2.01(07) Final Field Check Plans Submission

If a Final Field Check is required, the designer should 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. Plan Sheets. The plans should be nearly complete. Changes from the Design Hearing, soils 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. In addition, the designer should consider the following for the plan sheets.

    a. Title Sheet. Complete the Design Data Block.

    b. Index and General Notes Sheet. Check the general notes to ensure they are up-to-date and accurate. Revise the index as necessary.

    c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items noted.

    d. Detail Sheets. Ensure all details are completed and included with this submission. This includes details for temporary erosion control, traffic maintenance details, and traffic design elements (e.g., intersections, signals, signing and lighting).

    e. Tables. Complete all data tables including the following:

        (1) structure data table;
        (2) approach table;
        (3) underdrain table;
        (4) paved side ditch and sodding table;
        (5) guardrail table; and
        (6) sign summary table.

f. Cross Sections. Design information on cross sections should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

The Contracts and Construction Division's field engineers will require the elevations for existing cross sections in order to calculate 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.

3. Preliminary Cost Estimate. An updated preliminary construction cost estimate is required at this time. Quantities for all major items should be included in the cost estimate. Miscellaneous pay items previously accounted for as a percentage of the cost estimate and which are not required to complete tables in the plans do not need to be quantified at this time.

4. Computations and Miscellaneous Documents. Include the computations, quantities, and other documents with this submission as follows:

a. final drainage design;
b. structure quantities;
c. underdrain quantities;
d. sodding, riprap, and paved side ditch quantities;
e. preliminary earthwork quantities;
f. paving quantities for the approach table;
g. signing, traffic signals, illumination and pavement marking quantities; and
h. preliminary special provisions.

5. Underground Storage Tanks Removal. If this work is required, the designer should coordinate such activity with the Environment, Planning and Engineering Division's environmental services manager. The designer should complete Figure 14-2B, the Underground Storage Tanks Removal Memorandum. 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 Contracts date.

This coordination is to ensure that required pay items such as excavation and handling of contaminated soil are included in the contract.

14-2.01(08) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete and meet the criteria presented in the Engineer's Report and the Design Summary. The following should be completed and reviewed 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 note any approved dates for any design exceptions.

3. Pavement Design. Incorporate the final pavement design into the typical cross sections and quantities.

4. Quantities. Finalize all quantities and include a bound copy.

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 items have been included. Finalize the construction cost estimate using Estimator.

7. Certification Form. Include a copy of the Scope/Environmental Compliance Certification/ Permit Application Certification form.

8. Special Provisions. Complete the special provisions including special provisions for non-standard pay items.

9. Erosion Control Plans. Include the completed set of erosion control plans.

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. Road and Bridge 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 www.in.gov/dot/div/design.

> ** *PRACTICE POINTER* **
>
> The word "bituminous" which has appeared in pay item names and where it still may appear for asphalt materials should be changed to "HMA."

a. Road Summary. 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, 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.

b. Bridge Summary. The Summary of Bridge Quantities table should be completed and necessary miscellaneous information should be shown. Each bridge project will have a Bridge Summary sheet and a Road Summary sheet.

14-2.01(09) Final Tracings Submission

Complete the following and review these instructions for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Identification Numbers. Ensure that the proper contract, project, and sheet numbers are included on all sheets. The designer should contact the Design Division's Records Unit to obtain the contract number.

3. Signatures. Have the appropriate individuals complete the signature blocks on the appropriate sheets.

4. Submittal. Review the procedures in Section 14-1.02(03) for guidance on submitting the final tracings to the project coordinator and Records Unit.

14-2.02 Road Rehabilitation Plans for Project with No Additional Right of Way Required

14-2.02(01) Grade Review Submission/Preliminary Field Check

For a 4R project with realignment, a separate Grade Review Submission and a Preliminary Field Check Submission will be required. For information on Grade Review Submission, see Section 14-2.01(01). For a 4R project with no realignment or for a 3R project, only a Preliminary Field Check Submission will be required.

The designer should invite a representative from each of the affected local public agencies (counties, cities, or towns) to the field check. If one or more local agencies are not represented at the field check, the designer should contact them and meet with them independent of the field check.

It is not necessary to wait until the preliminary field check to initiate the geotechnical investigation. As soon as possible, the designer should provide the Materials and Tests Division's Geotechnical Section with the information as follows:

1. Location (SR, US, or I-___ from _____ to _____);

2. Anticipated pavement treatment, i.e., resurface, rubblize, etc., from the scope 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 Geotechnical Section, the designer should immediately notify the Geotechnical Section.

The proposed design information for this submittal should be plotted in Microstation. The designer is encouraged to add notes on the plans explaining special situations or items which are not readily apparent which may influence the proposed design. These notes must be removed in 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 note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02). Submit the required documentation for all Level One and Level Two design exceptions.

2. Title Sheet. At this project stage, the Title Sheet should include the information as follows:

a. project numbers;

b. Des numbers;

c. county location map;

d. project location map including north arrow and scale;

e. description of the project work type and location;

f. reference points at the beginning and end of the project (not required for local agency projects);

g. project length;

h. design data including design speed, project design criteria, functional classification, terrain, traffic data, etc.; and

i. signature block(s), though not to be completed at this stage.

3. Index and General Notes Sheet. The Index and General Notes Sheet should provide a list of utility owners and addresses. Include any general notes that are known at this time. The index blocks should be completed to indicate the sheet numbers for the plans at this stage. Note that the sheet numbers will change for future submittals.

4. Typical Cross Sections. Typical cross sections for this submittal should show typical configuration and design features. This will typically include the following:

a. lane and shoulder widths;

b. profile grade, construction centerline, paper relocation line and survey line locations;

c. detailed pavement design, if available from the Engineer's Report; at a minimum, note whether the design will consist of resurfacing, crack and seating, rubblizing or pavement replacement;

d. roadway cross slopes;

e. curbs;

f. underdrains, with location shown relative to pavement;

g. side slopes;

h. ditches;

i. shoulder corrugations if warranted; and

j. clear zones on a 4R project.

5. Plat Sheet. If right-of-way acquisition is required, include a preliminary Plat No.1. See Section 85-2.0. A plat sheet is not required for a local agency project.

6. Plan and Profile Sheets. At this project stage, the plan and profile design information will generally be essentially completed. Some of the details that should be addressed include the following:

a. complete the plotting of the existing topography;

b. project and construction limits;

c. proposed or existing right-of-way limits;

d. horizontal alignment (e.g., horizontal curve data, superelevation, PC, PI, PT, bearings);

e. vertical alignment and its relationship to grade controlling features;

f. any alignment controlling features (e.g., high-water levels, existing cross roads and bridges, regulated drains, drainage structures, railroads, underdrain criteria, maintenance of traffic considerations);

g. drainage features (e.g., storm sewers, pipe structures, structure end treatment, ditch grades) and proposed drainage notes;

h. approximate roadside barrier locations;

i. permanent erosion protection, including whether paved side ditches, riprap or sodding will be required;

j. temporary erosion control details; and

k. permanent median crossovers. For approved locations, see Chapter Fifty-four.

7. Interchanges. If applicable, the general layout of each interchange should include ramp gradients, horizontal alignment, vertical alignment, etc.

8. Detail Sheets. The preliminary layouts or sketches to be included are as follows:

   a. major interchanges and/or ramp intersections, including turning movements, turn lanes and pavement markings;

   b. signals;

   c. signs, including sign structures;

   d. lighting;

   e. pavement markings;

   f. retaining walls;

   g. special drainage structures;

   h. spot elevations;

   i. superelevation transitions diagrams;

   j. weight stations; and

   k. rest areas.

   If shoulder corrugations are warranted, and the plans include details for non-standard public road approaches, driveways, 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 when determining the limits of corrugations installation related to the feature shown in the detail.

9. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined including traffic crossovers, ramp closures, number of through lanes maintained in each direction, etc.

10. Approach Table. The preliminary information to be included in the approach table if a crossroad is present is as follows:

a. location (station);
b. type of approach;
c. radii;
d. width of approach;
e. length of approach;
f. grades of approach;
g. pavement thickness;
h. surface materials; and
i. distance beyond R/W.

11. Structure Data Table. The preliminary information to be included in the structure data table is as follows:

    a. location;
    b. size;
    c. type;
    d. approximate elevations and grades where necessary for clarity; and
    e. type of end section.

12. Sign Summary Table. The sign location (station) and type (sign code) should be noted on the sheet. However, the sign size, summary columns and post size need not be completed at this project stage.

13. Guardrail Summary Table. Complete the applicable information for the table.

14. Cross Sections. The preliminary draft for the cross sections should include the following:

    a. profile grade elevations in an area with new full depth pavement;
    b. templates of the typical sections placed on the existing cross sections;
    c. drainage structures;
    d. any embankment widening;
    e. benching and widening for guardrail; and
    f. ditch cross sections.

15. Design Information. In addition to the plans, the designer should include the preliminary draft of the Design Summary. Unique special provisions should be initiated with this submission.

16. Certification. Provide an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification form with this submission.

14-2.02(02) Information Meeting

A Public Information Meeting will be held as soon as practical after the field check, and allowing time for review of traffic maintenance plans. If all affected local public agencies were not represented at the field check, the designer should meet with those who did not attend to describe the project and proposed traffic maintenance plan. The designer should prepare minutes of each of these meetings. If significant additional right of way is required, a Public Hearing will be required as noted in Section 14-2.01(04). A Public Information Meeting will be held if any ramp within the project limits will be closed for 7 days or longer. After a Public Information Meeting is held, the designer will be required to document the concerns raised by the public at the meeting. If a meeting is required, review the following sheets and information for Quality Assurance and include them with this submission.

1. Maintenance of Traffic Plans. In preparation for a Public Information Meeting, the designer may be asked to perform the following activities.

    a. Displays. Prepare displays that can be used in a coordination meeting or a Public Information Meeting. This will include, but 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 open during each construction phase.

    b. Transportation Management Plan (TMP). Address the requirements of any TMP that has been developed for the project.

    c. Queues. Analyze the capacity constraints due to lane closures, including anticipated queue and user costs. This can be done using the QUEWZ software discussed in Chapter Eighty-one.

2. Plan Sheets. These plans should be close to their final form. All revisions from previous submittals should have been incorporated into the plans. The construction plan sheets for this submittal should be legible and consistent with the quality desired for public viewing and reproduction for right-of-way plans. The designer should review the *INDOT Typical Plan Sheets* document to determine what information should be included on each sheet. This submittal should include the following.

    a. Title Sheet. Include the written description of the project work type and location and other pertinent data on the Title Sheet and finalize all previous information. However, note that the signature blocks will still be incomplete. If necessary, finalize the Title Sheet for right-of-way plans.

b. Index and General Notes Sheet. The information on this sheet should be essentially complete. However, the sheet numbering on the index may change.

c. Typical Sections. Typical sections should include all necessary details and be finalized.

d. Plan and Profile Sheets. Include all necessary information on the plan and profile sheets. Right-of-way should be consistent with the details.

e. Details. All necessary information should be presented. However, changes may be made at a later date.

f. Interchanges. If one or more interchanges is present, the plans should include the layout of each interchange including ramp gradients, horizontal alignment, vertical alignment, etc.

g. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined including traffic crossovers, ramp closures, number of through lanes, etc.

h. Tables. Approach and Structure Data Tables can be preliminary but should be neat and legible.

i. Cross Sections. Cross sections are generally not included with Public Information Meeting Plans. However, one set should be made available for public viewing.

j. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate for the project and a copy of the draft Design Summary. The Department's cost estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will generally consist only of major pay items with a percentage added to cover minor items. If practical, the traffic-related items should be segregated.

3. Design Summary. For a road rehabilitation project which requires a Public Information Meeting, provide a draft copy of the Design Summary at the time the meeting is scheduled, 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.

a. Title Block. Use the guidelines for full Design Summary presented in Chapter Seven.

b. Location and Project Description. Describe the location of the project by showing the beginning and ending points in miles from a State-maintained route. Identify the project length and the county. Briefly describe the type of pavement rehabilitation treatment that is being specified. Do not discuss the bridge rehabilitation work, as it is included in the Bridge Inspection Report. It is also unnecessary to address any signing or lighting requirements.

c. Maintenance of Traffic During Construction. Indicate whether the mainline traffic will be maintained by means of 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 give the proposed marked detour route. Describe any improvements that will be made to local roads or streets that will be used as a marked or unmarked detour. Determine if a formal agreement with the local government agency will 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. Give 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 discussed above are most often not required, unless ramp closures or long delays are anticipated.

d. Resolution of Field Check Items or Scope Changes. Discuss any items which may have been left unresolved in the field check minutes or attach memorandums which may indicate how field check issues were resolved. Provide brief written documentation of any changes from the original project scope.

e. Design Exceptions. If applicable, list any critical design elements for which a design exception was obtained. Also include the date of the design exception.

f. Attachments. The Design Summary should include any field check minutes, the pavement design letter, and the cost estimate.

14-2.02(03) Final Design Summary Submission

The request for final pavement design must be submitted to the Materials and Tests Division prior to this stage if the desired pavement treatment is different than that noted in the Engineer's report. For this submission, include and review for Quality Assurance the following:

1. any revisions to the plans resulting from the Public Information Meeting;

2. environmental requirements satisfied by either 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 the Federal Highway Administration; or

    c. The Categorical Exclusion is complete. If there is a line on which the Federal Highway Administration is to sign, it must be signed;

3. the final Design Summary, with all required attachments;

4. necessary permit information, including Rule 5 as required; and

5. an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification form.

14-2.02(04) Final Field Check Plans Submission

If a final field check is required, see the requirements listed in Section 14-2.01(07).

14-2.02(05) Final Check Prints Submission

The purpose of this submittal is to ensure the plans are complete and meet the criteria presented in the Engineer's Report and the Design Summary. The following should be completed and reviewed 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 note approval dates for any design exceptions.

3. Plan Sheets. The plans should be nearly complete. Changes from the Design Hearing, soils 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. In addition, the designer should consider the following for the plan sheets.

   a. Title Sheet. Complete the Design Data Block.

   b. Index and General Notes Sheet. Check the general notes to ensure they are up-to-date and accurate. Revise the index as necessary.

   c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items are noted.

   d. Detail Sheets. Ensure all details are completed and included with this submission. This includes details for temporary erosion control, traffic maintenance details, and traffic design elements (e.g., intersections, signals, signing and lighting).

   e. Tables. Complete all data tables including the following:

      (1) structure data table,
      (2) approach table,
      (3) underdrain table,
      (4) paved side ditch and sodding table,
      (5) guardrail table, and
      (6) sign summary table.

   f. Cross Sections. Design information on cross sections should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

4. Computations and Miscellaneous Documents. Include the following computations, quantities and other documents with this submission.

   a. final drainage design;
   b. structure quantities;
   c. underdrain quantities;
   d. sodding, riprap and paved sodded ditch quantities;
   e. preliminary earthwork quantities;
   f. paving quantities for the approach table;
   g. signing, traffic signals, illumination and pavement marking quantities; and

h. preliminary special provisions.

5. Pavement Design. Incorporate final pavement design into the typical cross sections and quantities.

6. Quantities. Finalize all quantities and include a bound copy.

7. Cost Estimate. Conduct a detailed review to ensure that all necessary items have been included. Finalize the construction cost estimate using Estimator.

8. Certification Form. Include a copy of the Scope/Environmental Compliance Certification/ Permit Application Certification form.

9. Special Provisions. Complete the special provisions including special provisions for non-standard items.

10. Erosion Control Plans. Include the completed set of erosion control plans.

11. Rule 5. If required, complete the Rule 5 Submission as described in Chapter Thirty-seven.

14-2.02(06) Final Tracings Submission

Complete the following and review these instructions for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Identification Numbers. Ensure that the proper contract, project, and sheet numbers are included on all sheets.

3. Signatures. Have the appropriate individuals complete the signature blocks on the appropriate sheets.

4. Submittal. Review the procedures in Section 14-1.02(03) for guidance on submitting the final tracings to the Project Coordinator and Records Unit.

14-2.03 Bridge Plans (New Bridge Construction/Bridge Replacement)

14-2.03(01) Hydraulics Review Submission

A submittal for hydraulics review will be required prior to or concurrent with the Grade Review and Structure Type and Size Selection submittal. When preparing this submission, 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 and cross sections of the T-line.

3. For a crossing with roadway overflow, include the Road Plan and Profile sheets so that the road profile can be determined.

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 the hydraulic analysis.

5. If the project is a local public agency project, include the hydraulic analysis computations and recommendations for review.

6. The plan sheets will be for information purposes only except for the Layout sheet which will include the preliminary structure geometrics.

14-2.03(02) Grade Review and Structure Type and Size Selection Submission

Place the proposed design information for this submittal in Microstation. However, the plans need not be in final form. The designer is encouraged to add notes on the plans explaining special situations or items which are not readily apparent which may influence the proposed design. These 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 note approval dates of any design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02).

2. Computations. Include the computations as follows:

    a. design computations for determining the structure size and geometrics; and

b. project length computations including guardrail lengths and other contributing factors.

3. Economic Analysis. Include a copy of any structural economic analysis that may have been conducted to determine the most economic structural alternative.

4. Index and Title Sheet. At this project stage, the Index and Title Sheet should include the information as follows:

   a. project numbers;

   b. description (des) number;

   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;

   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 block(s); note that these blocks will not be completed at this stage; and

   j. an index of plan sheets at this stage. Note that sheet numbers will change for future submittals.

5. Typical Cross Sections. Typical cross sections for this submittal should only show basic configuration and design features. This will typically 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.

6. Road Plan and Profile Sheets. At this project stage, the Road Plan and Profile sheets will generally 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.

7. Layout Sheet. The Layout sheet 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}.

8. Channel Change Layout Sheet. Include this sheet when the extent of the channel change goes beyond the general layout. The Channel Change Layout 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.

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. drainage structures.

10. Certification. Provide an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification Form with this submission.

14-2.03(03) Preliminary Field Check Plans

Plans should be approximately 40% complete at this stage. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Conformance. Review the plans, including the temporary runaround and other traffic maintenance plans excluding detours for conformance with the Level One controlling design criteria listed in Section 40-8.02(01) and note any apparent or possible design exceptions. Also note any discrepancies from the Level Two design criteria listed in Section 40-8.02(02). Submit the required documentation for all Level One and Level Two design exceptions.

3. Plat Sheet. Include a preliminary Plat No. 1 (does not apply to local agency project).

4. Road Plan and Profile Sheets. In addition to the information in Section 14-2.03(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.

5. Detail 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 non-standard public road approaches, driveways, 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 when determining the limits of corrugations installation related to the feature shown in the

detail.

6. Traffic Maintenance Details. The proposed traffic maintenance scheme and phasing should be outlined.

7. General Plan Sheet. The General Plan sheet 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: "Designed for HS 25 loading, in accordance with the 2002 AASHTO *Standard Specifications for Highway Bridges* and its subsequent interims;" and
   e. suggested substructure type.

8. Road Summary Sheet. The preliminary Road Summary sheet should include the following:

   a. approach table with type, location and geometric data included and type of materials noted; and

   b. structure data table with location, size and type noted.

9. Cross Sections. See information for cross sections in Section 14-2.03(02). Finalize the cross sections according to the revisions from the Grade Review plans. Also show the public road approaches and drives.

10. Design Information. In addition to the plans, the designer should include the preliminary draft of the Design Summary, the draft Fish and Wildlife Review and a request for preliminary woody revegetation determination, if applicable.

14-2.03(04) Design Hearing Plans and Preliminary Right-of-Way Plans Submission

Plans for this submittal should be close to their final form. The construction plan 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 designer should review the *INDOT Typical Plan Sheets* document to determine what information should be included on each sheet. The following sheets and information must be reviewed for Quality Assurance and included with this submission.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Index and Title Sheet. Finalize the Title Sheet for right-of-way plans and include the right-of-way index.

3. Plat Sheets. Finalize all plat sheets, if required.

4. Road Plan and Profile Sheets. Finalize the right-of-way.

5. Layout Sheet. The Layout sheet should be essentially complete.

6. General Plan Sheet. The General Plan sheet should be essentially complete.

7. Design Information. In addition to the construction plans, this submittal should include an updated cost estimate for the project and a copy of the draft Design Summary. The Department's cost estimating procedures should be used for the preliminary construction cost estimate; see Chapter Twenty. Quantities will generally consist only of major pay items with a percentage added to cover minor items. If practical, the traffic-related items should be segregated.

8. Certification. Provide an up-to-date copy of the Scope/Environmental Compliance Certification/Permit Application Certification form with this submission.

14-2.03(05) Right-of-Way Plans Submission

Chapter Eighty-five presents the criteria and information that should be included with a set of right-of-way plans. This submission is not required for a local agency project. In addition to completing the following, the designer should review these instructions for Quality Assurance.

1. Include the marked-up preliminary right-of-way plans with this submission, if required to do so.

2. Incorporate all revisions made during the Preliminary Right-of-Way Plans Submission review.

3. Complete all sheet cross references.

4. Complete all project information boxes in the right-of-way plans, including right-of-way project number and sheet numbers.

5. Complete the checklist shown in Figure 85-2F.

14-2.03(06) Preliminary Plans for Final Approval Submission

Submit a request for the final pavement design to the Materials and Tests Division at this time. Include the and review these elements for Quality Assurance as follows

1. plan revisions resulting from the Design Hearing comments;

2. any revisions to the plans due to the Geotechnical Report recommendations;

3. Soil Borings sheets (prepared by the Materials and Tests Division for an in-house project or by the consultant for a consultant-designed project);

4. Foundation Review form;

5. a final Design Summary including resolution of hearing comments;

6. environmental requirements satisfied by either 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 the Federal Highway Administration; or

    c. The Categorical Exclusion is complete. If there is a line on which the Federal Highway Administration is to sign, it must be signed;

7. permit information as required; and

8. updated Scope/Environmental Compliance Certification/Permit Application Certification form.

14-2.03(07) Final Check Prints Submission

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 note approval dates of any 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, sidewalk 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; and
   r. completed special provisions.

5. Reports. Ensure that the recommendations from the Geotechnical Report and 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 project stage and should include the following.

   a. Title Sheet. Complete the Design Data Block and update the index as necessary.

   b. Typical Cross Sections. Add the final pavement design information to the Typical Cross Sections.

c. Plan and Profile Sheets. Ensure that structure notations are completed; sodding, riprap and paved sodded ditch locations are indicated; earthwork balances are shown; and removal items noted.

d. Detail Sheets. Ensure all details are completed and included with this submission. This includes details for the following:

(1) reinforced concrete bridge approach bill of materials and/or details;
(2) temporary erosion control;
(3) traffic maintenance details; and
(4) traffic designs elements (e.g., intersections, signals, signing and lighting).

e. Bridge Sheets. Finalize the design for the bridge sheets as follows.

(1) 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.

(2) Layout Sheet. Ensure that the riprap and slope wall quantities are noted and the earthwork summary is completed.

(3) General Plan Sheet.

(4) End Bent and/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 on cross sections should be essentially complete. This includes final structure notations, earthwork areas and volumes, and benching areas and volumes.

7. Certification Forms. Include a copy of the Scope/Environmental Compliance Certification/Permit Application Certification form.

8. Rule 5 Submission. If required and not previously submitted, submit in accordance with Section 9-1.02.

9. Bridge Load Rating. The Design Division's project coordinator will submit a copy of the bridge plans, excluding cross sections, with a cover letter indicating the designer's name, design firm (if applicable), telephone number and/or e-mail address, and any other necessary information to the Program Development Division's bridge inspection engineer. The bridge inspection engineer will run the available bridge load rating program and provide the project coordinator with the bridge load rating analysis and output results, not later than four weeks from the date of plans submittal.

If the analysis shows an inventory rating less than that required by Section 60-3.02, the project coordinator will send the information to the designer to revise the design and plans or resolve any input errors.

The Design Division should submit to the bridge inspection engineer a copy of any 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 Design Division will provide the bridge inspection engineer with the structural calculations including computer output for 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 inspection engineer.

* 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 for will be furnished after shop plans are approved.

14-2.03(08) Final Tracings Submission

Complete the following and review these instructions for Quality Assurance.

1. Previous Reviews. Include the marked-up plans from the previous submittal with this submission.

2. Sheet Number. Ensure that the proper sheet and project numbers are included on all sheets.

3. Signatures. Have the appropriate individuals complete the signature blocks on the appropriate sheets.

4. Submittal. Review the procedures in Section 14-1.02(03) for guidance on submitting the final tracings to the Project Coordinator and Records Unit.

5. Memorandum to Contract Services and Bridge Search Data Forms. These forms should be completed and submitted at this stage. Editable versions of these documents may be found on the Department's website, at www.in.gov/dot/div/contracts/design/dmforms/.

14-2.03(09) Bridge within Limits of Road Project

Plans for bridges which are 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 numbers and Des numbers for all such structures included in the road plans should be shown on the title sheet.

A separate set of plans with just 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 numbers and Des numbers for all structures included in the road plans should be shown on the road title sheet.

14-2.04 Bridge Rehabilitation Project

14-2.04(01) Preliminary Field Check and Inspection Report

Based on the initial inspection of the structure, prepare the Inspection Report. The Report should include but not be limited to the following:

1. existing condition status;
2. rehabilitation recommendations;
3. a tabulation of design criteria;
4. a 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 consultant survey to verify geometric information.

Section 72-2.05 presents 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 noted on the initial inspection, the Hydraulics Unit should be contacted.

14-2.04(02) Design Approval of Report

Once the Inspection Report has been determined by the reviewer to be satisfactory, then Design Approval of the Report is recommended. The designer will be requested to make a Preliminary Plans Submission upon Design Approval of the Report.

14-2.04(03) Preliminary Plans Submission

After receiving Design Approval, begin preparation of the preliminary plans. Information on these plans will include the following.

1. Index and Title Sheet. At this project stage, the Index and Title Sheet should include the information as follows:

    a. project numbers, bridge file number and designation 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 block(s); note that these blocks will not be completed at this stage; and

    g. an index of plan sheets at this stage. Note that sheet numbers may change for future submittals.

2. Maintenance of Traffic Details. The proposed traffic maintenance scheme and phasing should be outlined.

3. Layout. A Layout Sheet is generally not required unless the rehabilitation project is significant enough to warrant a full survey.

4. General Plan. The General Plan 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).

Preliminary plans will be sent to the Design Division's Railroads and Utilities units for their use. Preliminary Plans may be utilized in the application of any relevant environmental permits. Upon approval of the Preliminary Plans, the designer will be requested to submit the Final Plans.

14-2.04(04) Final Plans Submission

This submittal will include the following:

1. any revisions to the Preliminary Plans;
2. all necessary plan details required to adequately define the required repairs;
3. final quantity computations;
4. final design computations;
5. special provisions; and
6. final construction cost estimate.

The Final Plans should also include any specific measures proposed by the Railroads, Utilities, or Hydraulics unit.

14-2.04(05) Final Field Check

After reviewing the Final Plans and finding them substantially complete and correct, the Bridge Rehabilitation Unit will schedule a Final Field Check. 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.

14-2.04(06) Tracings Submission

Any revisions resulting from the Final Field Check and Final Plans review will be completed for this submission.

14-2.04(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.

14-2.05 Traffic-Signs Plans

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 typically occurs if the project is 1.5 km or longer or for a major project including an interchange.

> ** *PRACTICE POINTER* **
>
> Existing traffic-sign plans for non-Interstate routes are not required unless instructed otherwise.

14-2.05(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 all intersecting roadways labeled, and centerline stationing.

14-2.05(02) Preliminary Field Check Plans Submission

For the Preliminary Field Check submittal, the plans should include the sheets as follows.

1. Title Sheet. Include the layout map and note 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. Note that the sheet numbers will change for future submittals.

3. Signs Plan Sheets. These sheets should include the information as follows:

    a. plan view of the roadway;

b. route 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 all proposed signs;

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 noted on the sheets. However, the sign size, summary, and post size need not be completed at this project stage.

14-2.05(03) Final Field Check Plans Submission

For the Final Field Check submittal, the plans should be in their final form. However, some changes still may occur. Plans at the Final Field Check submission will include the following.

1. Title Sheet. The Title 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 Plan Sheets. These sheets will provide the stationing, identification number and message of the existing signs.

4. Proposed Signs Plan 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. Panel sign layout 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 Section Sheets. The cross section sheets should include the following:

a. for each box truss, monotube span, tri-cord, or cable-span structure, the full roadway cross sections;

b. for each cantilever structure, half cross sections 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 sections 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. The detail sheets to be included are as follows:

   a. completed Sign Summary Table;
   b. proposed route markers 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.

14-2.05(04) Final Check Prints Submission

The purpose of this submittal is to ensure 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 included with the submittal. Conduct a detailed review to ensure that all necessary pay items have been included and that special provisions are provided for all non-standard pay items. A finalized cost estimate should also be included.

14-2.05(05) Final Tracings Submission

The final plan submittal will include any necessary revisions from the Final Check Print submittal. Section 14-1.02(03) discusses what is required for the Final Tracings Submission.

14-2.06 Signalization Plans

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;
3. outline of signalized intersections; and
4. centerline stationing.

14-2.06(02) Preliminary Field Check Plans Submission

For the Preliminary Field Check submittal, the plans should include the following.

1. Title Sheet. Include the layout map and note 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. Note that 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 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, the number of wires in each cable run, power service location, detector housing, hand holes, disconnect hangers, etc.);

   h. other applicable information that should be noted 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.

14-2.06(03) Final Field Check Plans Submission

For the Final Field Check submittal, the plans should be in their final form. However, some changes still may occur. Plans at the Final Field Check submission 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 detail sheets should be included with this submission.

14-2.06(04) Final Check Prints Submission

The purpose of this submittal is to ensure 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 included in the submittal. Conduct a detailed review to ensure that all of the necessary pay items have been included and that special provisions are provided for all non-standard items. A finalized cost estimate should also be included.

The detail sheets should include the following:

1. intersection alignment and proper number of lanes;
2. all approaches with posted speeds clearly identified;
3. all private drives;
4. all property lines;
5. all right-of-way lines;
6. all edges of pavement and shoulders;
7. location 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.

14-2.06(05) Final Tracings Submission

The final plan submittal will include any necessary revisions from the Final Check Print submittal. Section 14-1.02(03) discusses what is required for the Final Tracings Submission.

14-2.07 Lighting Plans

The lighting portion for each project should be submitted as a separate set of plans, including the Title Sheet, Index and General Notes Sheet, etc.

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. mainline and all intersecting roadways labeled; and
4. centerline stationing.

14-2.07(02) Preliminary Field Check Plans Submission

For the Preliminary Field Check submittal, the plans should include the following.

1. Title Sheet. Include the layout map and note 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. Note that 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 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 with the Preliminary Field Check Plans 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.

14-2.07(03) Final Field Check Plans Submission

For the Final Field Check submittal, the plans should be in final form. However, some changes still may occur. Plans for the Final Field Check submission 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 at this stage.

3. Lighting Plan Sheets. In addition to the criteria for Preliminary Field Check plan 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. The Summary Table 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. High-mast tower plans 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 that should be included with this submission may include the following:

a. voltage drop and breaker rating calculations;
b. design calculations;
c. special provisions; and
d. cost estimates.

14-2.07(04) Final Check Prints Submission

The purpose of this submittal is to ensure 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 included with the submittal. Conduct a detailed review to ensure that all of the necessary pay items have been included and that special provisions are provided for all non-standard items. A finalized cost estimate should also be included.

14-2.07(05) Final Tracings Submission

The final plan submittal will include any necessary revisions from the Final Check Print submittal. Section 14-1.02(03) discusses what is required for the Final Tracings Submission.

14-2.08 Partial 3R Project Plan Development

14-2.08(01) Preliminary Plans

1. Title Sheet. The title sheet is the first page and should contain the information as follows:

   a. contract and description code 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 names 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 standards 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. The strip map is usually a line drawing showing 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. The typical cross sections 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.); and

(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 when applicable.

c. Title block.

(1) Route number; and

(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.

14-2.08(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.

14-2.08(03) Preliminary Field Check

The preliminary field check should occur at some point before development of preliminary plans. The preliminary field check should be scheduled with the district sections 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.

Persons who typically should attend the preliminary field check are as follows:

1. District Personnel.

    a. Head design engineer;
    b. construction area engineer;
    c. operations support field engineer;
    d. subdistrict manager and/or unit foreman;
    e. designer;
    f. traffic engineer; and
    g. utilities/railroads engineer.

2. Other Personnel.

    a. Local government agencies if applicable;
    b. local utilities if applicable; and
    c. INDOT pavement design engineer, if AADT ≥ 5000 or trucks percentage ≥ 10%.

14-2.08(04) Right of Way

Right-of-way acquisition is not normally required for a partial 3R project. 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.

14-2.08(05) Public Hearing

Public involvement is not normally required for a partial 3R project. If it is, the designer should see Chapter Eight.

14-2.08(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 close contact with the district utilities/railroads coordinator to ensure that existing utilities are relocated to avoid delays in the project development. To accomplish this, the district utilities/railroads coordinator should have final check prints as early as possible.

If one or more railroad crossings are within the project limits, the district utilities/railroads coordinator should be advised. See Chapters Eleven and Forty-seven.

14-2.08(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.

14-2.08(08) Returned Correspondence

Once input from the district maintenance/operations, construction, and traffic sections 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 14-2.08(02) for the personnel list who should attend this field check.

14-2.08(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 Materials and Tests Division's pavement design engineer. If the AADT $<$ 5,000 or the trucks percentage $<$ 10%, the designer performs the final pavement design.

14-2.08(10) Final Check Prints

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. counties;
    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 (approved signatures and stamps).

4. Contract Requirements Worksheet. The designer should place project identification information on this sheet, then transmit it to either the Contracts and Construction Division's Contracts Section or the district construction engineer. The Contracts Section will then transmit it to the district construction engineer. The district construction engineer will determine the other information as required, then return it to the designer. The identification information should be that as follows:

    a. contract number;
    b. letting date;
    c. district;
    d. project number;
    e. route number;
    f. description, including work type;
    g. location;
    h. counties; and
    i. effective dates of Supplemental Specifications and List of Approved Materials.

5. Table of Contents. This sheet should indicate the documents to be identified as follows:

   a. contract number;
   b. Official Detour Map;
   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.

14-2.08(11) Review of Final Check Prints

After the designer has assembled the final check prints, a copy may be circulated among the other design engineers for review and comment. The final check prints are then forwarded to the district head design engineer for additional review and comments. Upon completion, the designer will make the appropriate revisions.

A copy of the final check prints is to be sent to the appropriate district program development, construction, maintenance/operations, or traffic section as required. They are expected to review and return the copy to the district development section within one to two weeks. A cover letter should be sent with the copy indicating what is expected and when it should be returned.

1. Program Development Review. A copy of the contract documents is supplied for their 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 fills in 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. Maintenance/Operations Review. The maintenance/operations section reviews the contract documents and suggests additional changes or corrections. The areas of review

usually pertain to small drainage structures/pipes, wedge and level, patching, guardrail, and ditch work.

4. Traffic Review. The traffic section reviews the contract documents and suggests additional changes or corrections pertaining to traffic maintenance and traffic safety. They also verify and coordinate the locations and impacts to signal loops, detector housings, no-passing zones, pavement markings, etc.

5. Discussion With Head Design Engineer. After the other sections have reviewed the contract documents and have offered suggested changes, the designer is to meet with the head design engineer to discuss the changes and suggestions. The head design engineer will then decide which corrections are to be made. The designer will then make the appropriate changes.

6. Development Engineer Review. After all changes are made, a copy of the contract documents is sent to the district development engineer for final review. The development engineer may suggest more changes.

7. Materials Engineer Review. The materials engineer may suggest changes to the Plant Laboratory recurring special provision.

14-2.08(12) Shelf-Ready Project

The final check prints are considered shelf-ready after they have been reviewed by the development engineer. The documents, now final plans, are to be kept on file until funds are appropriated and a letting date has been established.

14-2.08(13) Signatures and Stamps

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 stamped and/or signed by the appropriate individuals as shown in Section 14-1.02(03).

14-2.08(14) Contract Documents Package

Upon receipt of the approved final plans by the development engineer, they are ready to be transmitted as contract documents to the Contracts and Construction Division's Contracts Section for processing. The package should consist of the following.

1. Plans.

   a. 8½" x 11" Plan Sheets Format. The original construction plans and cross sections with one photocopied set should be transmitted. If the cross sections are in the 24" x 36" format, only the originals of the cross sections should be sent.

   b. 24" x 36" 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 shall consist of a floppy 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 floppy diskette containing the unique special provisions shall be provided.

4. Detour Maps. The Official Detour Map and unofficial local detour map, if required, with the approved unofficial local detour documents should be transmitted.

The approved package should be sent to the Contracts and Construction Division's Contracts Section 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.

14-2.08(15) Review Process

1. Pre-Letting. The Contracts and Construction Division 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 any questions.

14-2.09 Bridge Plans Complementary to Road Work

Plans for each bridge which are complementary to plans for road work must be developed as described below. Each structure which is assigned a structure file number must also be assigned a Des number.

14-2.09(01) INDOT Route Project

1. 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.

2. New or Replacement Three-Sided, Box, or Pipe Structure. These may be incorporated into the road plans. The structure file numbers and Des numbers for all such structures included in the road plans should be shown on the title sheet.

   A separate set of plans with just one title sheet may be developed for one or more of these structures.

3. Bridge Rehabilitation. Multiple bridge rehabilitations 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.

14-2.09(02) Local Public Agency Project

Plans may be developed in any manner the local public agency desires. However, the structure file numbers and Des numbers for all structures should be shown on the title sheet.

14-3.0 DRAFTING GUIDELINES

14-3.01 Drafting Methods

All project drafting will typically be performed using Microstation. Section 14-4.0 and the *INDOT CADD System User Guide* provide information on the Department's Microstation system. For a consultant not using INDOT's Microstation system, Chapter Sixteen provides the Department's criteria for translating these CADD files to the Department's system.

The Department's preferred practice is to only use 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 still use the criteria presented in Chapter Fifteen and

the *INDOT CADD System User Guide* for line weights, topography symbols, plotting accuracy, etc.

In general, where manual plotting is used, the drafter must consider line weights and text sizes to ensure that, when the plans are reduced, they will be readable. The minimum text should be at least 2.5 mm high. Letters should always 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.

When plotting survey data, the following accuracies should be used to show elements on the construction plan sheets:

1. Show horizontal alignment data (e.g., curve information, equations, reference point tie-ins, section corner tie-ins to the nearest 0.01 ft.

2. Show existing roadway elevations used for pavement tie-ins and vertical clearance computations to the nearest 0.1 ft. Show benchmark elevations to the nearest 0.01 ft.

3. All horizontal pluses, offsets, physical feature dimensions, and locations, etc., may be shown to either the nearest 0.05 ft or 0.01 ft. The nearest 0.01 ft accuracy is preferred.

4. Desirably, the survey should be plotted 300 ft beyond the project limits. At a minimum, the survey should be plotted 150 ft beyond the project limits.

14-3.03 Working Sheets

The sheet sizes generally used for plans development are as follows:

1. 33 in. x 23 in. (A1). This sheet size is considered a full-size sheet and should be used for the design layout for each major project. A border around the sheet should be provided with a 2 in. left-binding margin, ¼ in. right margin, and 5/8 in. top and bottom margins. This provides a working area of 30 ¾ in. x 21 ¾ in..

2. 17 in. x 11 in.. This sheet size is approximately half the scale of the A1 sheet described in Item 1 above. This size corresponds to the ledger size shown on most photocopiers. It is used for construction plan reviews, bid advertising, construction, and project archives.

3. 11 in. x 8 ½ in.. This sheet size corresponds to the letter size shown on photocopiers. It is generally only used for a project that does not require a significant amount of detail (e.g., partial 3R project). This type of project typically includes only a plan view with no profile view. If more-significant information is required to be shown, the A1 sheet size should be used instead.

All submittals, except for the Final Tracings Submission and the final plans submission for a project using 11 in. x 8 ½ in. size sheets, will be printed on white paper. Section 14-1.02(03) discusses the Final Tracings Submission requirements.

14-3.04 General Guidelines

The following sections provide general guidelines for plotting survey data and design details on the plan sheets.

14-3.04(01) Dimensions

When dimensioning, the following should be considered.

1. Measurement Units. Show all dimensions in English measure. Do not use dual English and metric units.

2. Bridge Plans. Show all bridge plan 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 and inches.

3. Road Plans. Road plan sheets will typically be prepared using feet and decimals of a foot.

4. Traffic Plans. Traffic plan 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 either in feet and inches, or feet and decimals of a foot, then show all dimensions using the large majority's symbol units.

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 can be added to the sheet stating this fact. For example, *"All dimensions are in inches (in.) except as noted."* Remove the ft or in. symbol from the plans to improve the sheet clarity.

6. Spaces. Provide a space between the number and symbol (e.g., 3 in.).

7. Decimals. Only use decimals to denote fractions. For values less than one, place a zero before the decimal marker (e.g., 0.75 in.).

8. Large Numbers. Generally, for numbers greater than four digits use a comma to separate blocks of three digits (e.g., 12,000 ft^2) and for numbers with four or less digits, do not use a comma (e.g., 3600 ft). 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 presents the Department's electronic-drafting symbol library. These symbols should be used in the preparation of all manually and electronically drafted construction plans. To obtain a copy of this library, the designer should contact the Graphics Engineering Section.

Figure 14-3A, Recommended Plans Legends, presents the legends that may be used on construction plans. For traffic symbols and legends that should be used within a set of plans, see Chapter Fifteen. Circles with either a letter or number may be used to indicate various construction items or materials. Where additional items are similar but with different thicknesses, layers, weights, etc., note them with 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 presents 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 the text for notations in the plan view should be the same size and weight. However, the text for the summary table may use a different text size. Note that the font type should be uniform throughout the plans.

Desirably, words should not be abbreviated so should therefore be completely spelled out. However, this is not always practical. Figure 14-3B, Plans Abbreviations, presents 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.

For english units, all symbols should be shown in lower case, and not followed by a period, except for in. and gal.

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 boring 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. bench mark 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*, Supplemental Specifications, Special Provisions or Recurring Special Provisions. Chapter Nineteen provides guidance on the use and preparation of these specifications.

14-3.04(05) Miscellaneous

The following presents several guidelines the designer should consider when preparing a set of construction plans:

1. <u>Stationing</u>. INDOT uses a stationing of 100 ft per station which is shown to two, or sometimes three decimal places (e.g., 100 + 00.00). Show "tic" marks at 100-ft intervals. These tic marks are shown on the survey left side of the centerline. A tie mark on both sides of the centerline is shown at every 500-ft interval. For an example, see *INDOT Typical Plan Sheets.*

2. Cross Section Intervals. Desirably, 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 when the plans are reduced. When the plans are reduced, readability of the plans may become critical. Chapter Fifteen and the *INDOT CADD System User Guide* present the minimum text sizes that should be used.

6. Limits. The limits of plan coverage on a typical road project plan sheet will vary according to the plan and profile scale selected and type of plan sheet selected. Section 14-3.05 discusses the various scales that should be used.

7. Plan Sheets. The Department's typical plan 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. Desirably, keep an entire curve on the same sheet.

9. Soil Boring Logs. When 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 Blocks. 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 published separately from this *Manual*. In general, the following information, from left to right, should be included in the project block.

a. Design Information. In the lower left-hand corner of the plan and profile sheets, include the horizontal alignment references. For most other sheets, this area will be left blank.

b. Engineer's Stamp. The engineer's stamp is required on all design sheets along with the signature of the engineer and date signed. Note that the stamp may vary within the plans depending on the engineer who 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, note the scales used on the drawing in the lower right-hand corner.

f. File Numbers. Note all applicable file and references including contract number, bridge file, des number, survey book, etc., in the lower right-hand corner.

g. Sheet Number. Provide the sheet number and the total number of sheets for the project in the lower right-hand corner of the sheet. Number all sheets sequentially including the Title Sheet. Sheets that are added after the sheet numbers have been placed on the plans should be designated with A, B, C, etc., following the last numbered sheet and noted in the index. For example, a sheet to be inserted between sheets 17 and 18 would be numbered 17A. These additional sheets are not included in the total number of sheets. In general, the sheet numbering should be the last thing the designer does prior to submitting the Final Tracings to the Records Unit.

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 Information Block

The information block on the title sheet should conform to the format shown in Figure 14-3C. Part V contains geometric design tables which reflect the scope of project construction. The applicable design criteria in such tables is 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. Anyone looking at the plans will immediately know which geometric design table and what design criteria were

used in the project development.

14-3.05 Scales

The following Sections present the recommended drawing scales that should be used when developing a set of construction plans. The selected scales should be noted in the project block on every sheet. Where no scales are used, this should be noted 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 generally 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 for the right-of-way sheets will depend on the plat sheet used. The following will apply.

    a. Route Survey Plats. 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 typically be shown together on one sheet (i.e., the plan view on top and profile view on the bottom). The following scales are typically used on plan and profile sheets.

    a. Plan View (Rural). A scale of 1”=50’ should most often 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’ will normally be used.

c. Profile View (Horizontal). The horizontal profile scale 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. Typically, a 1”=10’ scale will be used with a plan view scale of 1”=100’, and a 1”=5’ scale will be used with plan view scales of 1”=50’ and 1”=20’.

Other scales, as necessary, may be used to provide better clarity or more practical layouts. If a detail can not be adequately viewed in the selected scale, show the element on a Detail Sheet.

5. Superelevation Transition Sheets. The selected scale for superelevation sheets will generally be left to the designer's discretion. Select a scale which will adequately show the necessary features.

6. Detail Sheets. The selected scale will vary based on the complexity of the detail and room available on the sheet. The following provide the typical scales that are commonly used on detail sheets.

a. Construction Details. Use a plan view scale of 1” = 20’.

b. Intersection or approach drawings. Use a plan view scale of 1”=20’.

c. Spot Elevation Sheets. Use a plan view scale of 1”=20’.

d. Signing Sheets. The plan view scale for sign location sheets will be1”=50’ for an urban area and 1”=100’ for a rural area.

e. Signal Sheets. The plan view scale will usually 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 any of the above details based on the complexity of the detail and room available on the sheet. For those details not listed, the designer will determine the scale on a detail-by-detail basis.

7. Cross Sections. The horizontal and vertical cross section scales will typically 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, R/W Plat Sheets, 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 room 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. Typically, 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 to develop the construction plans.

1. Title Sheet. For the location map, a 1”=2000’ scale is most often 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. Plan Sheets. The selected scale will depend upon the type of project selected:

    a. Traffic-Signs Sheets. The plan view scale for sign location sheets will typically 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 signals at an intersection will usually 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 for lighting location sheets will typically 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. The selected scales for traffic-plans details 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 typically be 1”=10’. A larger scale may be used where a greater cross section width or height is required.

14-3.06 Plan Sheet Accuracies

The accuracy of plan dimensions should be consistent with data upon which they are based. Accuracy for dimensions to be shown on plans is provided in the following sections.

14-3.06(01) Road and Traffic Plans

The following accuracies typically should be observed when preparing the construction plans.

1. Stationing. Show all stationing to the nearest hundredth of a foot (i.e., 100 + 00.01). This will include PVI, PC, PI, PT, equation stations, etc.

2. Angles. All angles and bearings used in the plans 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, presents the order and rounding accuracy that should be used to present curve data.

4. Vertical Profile Data. The following vertical alignment accuracies should be used.

    a. P.V.I. Stationing. Show P.V.I.s at even stations.

    b. Vertical Curve Length. Show the length in 10 ft increments.

    c. P.V.I. Elevation. Show the elevation to the nearest 0.01 ft.

    d. Grades. Show each vertical grade to the nearest 0.001%.

    e. Vertical Clearance. Show each vertical clearance to the nearest 0.01 ft.

5. Elevations. The following elevation accuracies should be used.

a. Bench Mark. Show the elevation to the nearest 0.01 ft.

b. Flow Line Elevation. Show each elevation to the nearest 0.1 ft.

c. Pavement Elevation. For existing pavement, show each elevation to the nearest 0.1 ft.

d. Ground Line. Show the existing ground line to the nearest 0.1 ft.

e. Other. Show all other vertical elevations, breaks in ditch grades, pipe invert elevations, etc., to the nearest 0.1 ft.

6. Contour Intervals. Contour intervals will typically be in 1- foot increments. Each fifth contour representing an even 5-foot elevation should be emphasized and annotated. Intermediate contours will not be noted 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 nearest tenth of a foot (i.e., 0.01 ft), where practical.

8. Typical Cross Section Elements. The following will apply.

a. Widths. Show all typical cross-section elements in increments of 1-foot. This includes lane and shoulder widths, ditch widths, bench widths, median widths, sidewalks, etc.

b. Cross Slopes. Show cross slopes to the nearest 0.1% including superelevation rates.

c. Pavement Depths. HMA pavement course density should be shown to the nearest 10 lb/syd. Show all other pavement elements (e.g., concrete pavement thickness, aggregate and subbase depth, special subgrade treatment depth, underdrain dimensions, etc.) to the nearest inch.

8. Cross Section Elements. Show the profile grade elevation to the nearest 0.01 ft.

9. Miscellaneous Features. For the following features, show the dimensions to nearest increment indicated as follows:

a. drive location to the nearest 1.0 ft;
b. culvert location to the nearest 1.0 ft;

c. guardrail to the nearest 0.5 ft; and
d. ditch grade break to the nearest 1.0 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. Many bridge elements can be shown in increments of 3 in. (e.g., footing lengths, span lengths, beam spacings, pier heights, 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 straight bars to the nearest 3 in. and bent bars to the nearest 1 in. total length. Show spacing of reinforcing bars to the nearest 1 in.

3. Dimensions. Use the following accuracy for dimensions in bridge plans:

   a. Concrete Details. Many concrete details can be shown in increments of ½ in. (e.g., slab decks, columns, wall thicknesses, cap dimensions, footing widths, pile spacings, etc.). Where increments of ½ in. are not practical, use ¼ in. or 1/8 in. increments.

   b. Camber and Deflection Details. Show camber and dead load deflections to the nearest 0.01 ft increment.

   c. Structural Steel Details. For designations, dimensions, and properties of structural shapes, see ASTM A6 and the AISC English shape tables. Other dimensions on steel detail sheets (e.g., plate widths, plate lengths, splice details, hole spacings, steel shoe assemblies, etc.) should be dimensioned to the nearest 1/8 in. Plate thickness can be shown to the nearest 1/16 in. increment.

   d. Precast Prestressed Concrete Members. Show all cross-section dimensions for these elements to the nearest 1/16 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 nearest 0.01 ft.

4. Elevations. Show structure elevations, including top of bearing plate elevations, to the nearest 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 nearest 0.1 ft. Where superstructure beams are attached to the piling, show the top of pile elevation to the nearest 0.01 ft.

   b. Existing Structure. Show existing structure elevations and concrete removal line elevations to the nearest 0.1 ft.

   c. Ground Elevations. Show all ground elevations (e.g., berm elevations, channel clearing, upper limit of wet excavation, etc.) to the nearest 0.1 ft.

5. Bridge Quantities. Chapter Seventeen presents the rounding criteria for bridge quantities that are also shown on bridge plans.

14-3.07 Plan Sheet Organization

To provide consistency from project to project, the construction plan sheets should be assembled in the sequence listed in the following sections for the applicable project type. The designer should note that not all plans will have all sheets and that several sheets can be combined together (e.g., Detail Sheets). In general, for a project type not listed below, the sequence presented for a road project should be used.

14-3.07(01) Road Project

The recommended plan 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 may be included in the Contract Information book;

7. Plan and Profile;

8. Superelevation Transition Diagrams

9. Detail Sheets, in the order as follows:

    a. Construction Details;
    b. Intersection Detail;
    c. Spot Elevation Detail;
    d. Channel Detail;
    e. Geometric Detail;
    f. Right-of-Way Detail;
    g. Grading Plan;
    h. Drainage Detail;
    i. Erosion Control Detail (plan view);
    j. Retaining Wall Details;
    k. Wetland Mitigation Details;

10. Traffic Details, in the order as follows:

    a. Signs (where separate traffic-sign plans are not required);
    b. Signals;
    c. Lighting (where separate lighting plans are not required);
    d. Pavement Markings;

11. miscellaneous tables;

12. Approach Table;

13. Underdrain Table;

14. Guardrail Summary Table;

15. Structure Data Table;

16. Pipe Material Sheet; and

17. cross sections.

14-3.07(02) Bridge Project

The recommended plan 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 may be included in the Contract Information book;

4. Road Plan and Profile Sheets;

5. Superelevation Transition Diagrams;

6. Roadway Details, in the order as follows:

    a. Construction Details;
    b. Intersection Detail;
    c. Spot Elevation Detail;
    d. Geometric Detail;
    e. Right-of-Way Detail;
    f. Grading Plan;
    g. Drainage Detail;
    h. Erosion Control Detail (plan view);

7. Traffic Details, in the order as follows:

    a. Signs (where separate traffic-sign plans are not required);
    b. Signals;
    c. Lighting (where separate lighting plans are not required);
    d. Pavement Markings;

8. Soil Borings;

9. Channel Change Layout;

10. Layout;

11. General Plan;

12. structure detail 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/Precast 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;
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 Material Sheet; and

21. cross sections.

14-3.07(03) Traffic-Sign Project

The recommended plan 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 plan 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 plan sheets sequence is as follows:

1. Title Sheet;
2. Index and General Notes;
3. Lighting Plan; and
4. Cross Sections.