

Chapter Sixty-three
PLAN PREPARATION

BUREAU OF DESIGN AND ENVIRONMENT MANUAL

Chapter Sixty-three
PLAN PREPARATION

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Chapter Sixty-three

PLAN PREPARATION

Other parts of the *Bureau of Design and Environment Manual* (BDE Manual) provide the designer with uniform criteria and procedures for the design of a highway facility. Incorporate these designs into the roadway plans so that they can be clearly understood by contractors, material suppliers and Department personnel assigned to supervise and inspect the construction of the project. To ensure a consistent interpretation of the plans, individual sheets should have a standard format and content, and the sequence of plan assembly should generally be the same. To provide this consistency, this chapter provides guidelines for the uniform preparation of Phase II plans.

In addition to this chapter, the designer should review:

- Part I of the *BDE Manual* for information on the design process or steps that should be followed in preparing a set of plans,
- Chapter 64 for quantity computations,
- Chapter 65 for cost estimating, and
- Chapter 66 for the contract process.

If problems arise which are not covered in this *Manual*, the designer should consult with the Bureau of Design and Environment personnel as the project progresses to resolve these problems as soon as practical prior to plan completion.

63-1 GENERAL INFORMATION

63-1.01 Responsibilities

The highway designer is responsible for the preparation of Phase II plans. This includes:

- ensuring that the plans are in compliance with the Phase I report, commitments, and agreements;
- ensuring that the survey is properly drafted;
- preparing the plans in the correct format and sequence, and checking for errors and omissions;
- incorporating plan sheets, quantities, and special provisions from other sections/bureaus into the plans;

- calculating the quantities and recording them on the summary of quantities sheet;
- preparing the contract special provisions and supporting documents;
- incorporating appropriate review comments from various other units, bureaus, agencies, etc.;
- requesting the preparation of the construction cost estimate; and
- submitting the plans to the BDE for review, approval, and letting.

63-1.02 Plan Development Stages

The designer is responsible for preparing the plans so that they can be constructed in the field. To ensure the plans are correct and complete, the designer needs to review the Phase I report and the project commitment file. The plans will also be reviewed by others at the preliminary, pre-final, and/or final stages to ensure that they are free from errors and omissions. Chapters 2, 3, and 4 discuss the other activities that are typically involved during the project preparation. The following sections briefly discuss the key stages relative to plan preparation.

63-1.02(a) Phase II Initiation

To properly prepare the plans, the designer must have a well-defined scope of work. The Department's proposed scope of work for a project is defined in the appropriate Phase I report. Part II, Project Development, of the *BDE Manual* discusses how to prepare a Phase I report and what factors should be considered. Part III, Environmental Procedures, discusses the environmental issues that must be addressed.

In addition to the Phase I report, the designer is provided, at the beginning of Phase II, the project commitment file. This file should contain all commitments made to the public and other agencies during the location and environmental study stages of the project. These commitments may include:

- funding arrangements between the Department and local agencies and/or developers, which may include construction costs, signal maintenance, lighting agreements, etc.;
- notification requirements to public agencies, owners, local officials, etc., prior to construction;
- requests for verification of area to be disturbed by the project;
- commitments to owners, public agencies, and/or local officials for plant replacement, removal, or retainage (e.g., trees, shrubs, wetland plants);
- environmental commitments to public agencies, local officials, and/or other groups (e.g., wetland replacement, hazardous material removal);

- relocation, removal, or replacement agreements/requests for existing buildings;
- drainage agreements, including detention areas, culvert locations, ditch construction, etc.;
- relocation, rebuilding, addition, or removal agreements/requests for private and commercial entrances;
- special construction requests (e.g., timing of construction, type of construction, limits of construction);
- existing sign removal and replacement; and/or
- any other special agreements made between the Department and land owners during right-of-way negotiations.

The designer is responsible for maintaining this commitment file and ensuring that these commitments are incorporated into the final plans and agreements. The designer needs to carefully review all minutes of meetings, transcripts of public hearings, and the project study files to ensure all commitments have been listed. If there are any questions, the designer should contact the preparer of the Phase I report. During Phase II, the designer also adds to the file any commitments made to property owners or others affected by the project.

If it is discovered during plan preparation that a change is required to the approved Phase I report or a commitment cannot be met, the designer must immediately notify the Central Office and all appropriate district units so that appropriate action can be taken. Failure to provide the appropriate notification and review may result in project delays.

63-1.02(b) Preliminary Plan Review

This is the best design stage for various other bureaus, sections, agencies, etc., who may have a role in the project to conduct a major review of the plans. This may include a plan-in-hand field review, if deemed necessary. The preliminary plan review will occur after the designer has essentially completed the plans including the cover sheet, plan and profile sheets, detail sheets, cross section sheets, determination of pay items, special provisions, etc. This review may also incorporate the plan sheets from other applicable bureaus. During this stage, the designer should address any utility conflicts and determine if adjustments and/or agreements are necessary. The purpose of the preliminary plan review is to ensure the plans are compatible with the approved Phase I report, are in conformance with the Department's design criteria, and are appropriate for the site. All major content comments must be made during this review period. Incorporation of comments made after this review may require the approval of the Program Development Engineer.

All plan commitments of record should have been incorporated into the preliminary plans. All other bureaus that have made commitments on the project are required to review the preliminary plans to ensure that the plans comply with their commitments.

For major projects several reviews may be necessary to avoid having to make substantial changes late in the plan preparation process.

63-1.02(c) Pre-Final Plan Review

Pre-final plans are essentially the same as the final plans; i.e., if there are no preliminary review comments, these plans can then be finalized and forwarded to BDE for letting. Prior to this review, the designer should:

- incorporate and/or address all comments made during the preliminary plan review;
- set up a plan-in-hand field review, if necessary; and
- determine the cost participation arrangements (e.g., Federal, State, and local shares).

These cost breakdowns should be noted on the summary of quantities sheet.

Other bureaus and agencies should be given the opportunity to review the pre-final plans to ensure that:

- their comments from the preliminary plan review have been incorporated or addressed in the disposition memorandum,
- the changes to the preliminary draft do not conflict with the bureau's commitments, and
- the plans still conform to the Department's design criteria.

If changes are requested at this point that are desirable, but not mandatory, the Project Engineer determines if they should be incorporated. This will depend on other factors that may preclude them from being added to the plans. If another bureau determines the changes still should be incorporated, an appeal can be made to the Program Development Engineer for their incorporation.

63-1.02(d) Final Plan Review

The purpose of the final plan review is to ensure that reviewer comments from the pre-final plan review have been addressed. Revisions or changes should not be necessary. If changes are deemed necessary, the reviewer should contact the designer directly.

63-1.03 CADD Coordination

63-1.03(a) CADD Determination

The Program Development Engineer is ultimately responsible for determining when plans should be manually drafted or placed on CADD. Section 63-2 provides information about the Department's CADD system. In general, most projects should be drafted using CADD. In

determining whether or not to use CADD, the Program Development Engineer considers the following:

- the project complexity; for small, simple projects it may be easier to have plans manually drafted;
- whether or not Phase I was prepared using CADD; and
- the district CADD unit's time availability for the project.

If it is determined that CADD should be used, the designer is responsible for contacting the district CADD unit to discuss the level of work and scheduling requirements.

63-1.03(b) CADD Corrections

The designer is responsible for the information in the plans, whether the designer or the CADD operator is inputting information into the CADD system. This may include hand sketches, written notes, copies from similar projects, or tentative designs or sketches made by the designer using CADD. These markups may include plots from computer design packages such as GEOPAK.

After receiving the CADD plot, the designer should check the drawing to ensure that all markups and revisions have been incorporated. When checking the revised drawings, the designer should review the new plot against the old plot to ensure that not only the requested revisions were made, but that other changes made using CADD have not adversely affected the drawing. The CADD operator may need to adjust features on the sheets and, during this process, mistakes occasionally occur (e.g., accidental deletion of nearby topography, inappropriate movement of dimensions).

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63-2 COMPUTERIZED DESIGN

Computers have significantly changed the Department's mode of preparation for its highway plans. Computer-aided drafting and design packages have both simplified and complicated the designer's plan production procedures. Computers can do the tasks of drawing cross sections, calculating grading quantities, etc. They also allow the designer the freedom to ask "what if." On the other hand, they require the designer to be well versed in how to use complex hardware and software. This section briefly discusses the computer hardware and software IDOT uses to prepare contract plans.

63-2.01 Computer Hardware

All Department computer equipment (e.g., PCs, printers, file servers) have been networked or interconnected. This, along with the use of Bentley's ProjectWise, allows designers across the State to access the same information regardless of their location or which machine they are using. To accomplish this, all project files must be saved on the Central or district office file servers through ProjectWise. The designer is required to export or check-out the project files from the file server to their PC or workstation at the beginning of each work session. At the end of each work session, the designer is required to import or check-in all project files back to the Central or district office file servers. For instructions on how to acquire files, contact the district CADD Manager.

63-2.02 Computer Software

The Department is presently using and requires the use of Bentley Systems, Inc. software (i.e., MicroStation and GEOPAK) as its computer-aided drafting and design (CADD) package.

All users outside of the Department network should consult with the district project manager and/or CADD manager to determine which version(s) of the software programs are acceptable to the Department. All consultants submitting CADD plans to the Department must use versions that are compatible with the Department's, and meet the requirements presented in IDOT Policy "CADD Roadway and Structure Project Deliverables Policy."

63-2.02(a) MicroStation

IDOT has selected MicroStation and GEOPAK for its Department-wide computer-aided drafting and design software package, which is used to generate most contract plans. The *IDOT CADD Roadway Drafting Reference Guide* provides the Department's CADD criteria for plan development (e.g., cell libraries, levels, text sizes, fonts). Using MicroStation's levels and reference files allows various users within the Department to work on the same set of plans without interfering with each other's design work. By integrating or linking MicroStation with other software packages (e.g., GEOPAK, AutoTURN, databases), the designer can use the computer to perform the actual design and layout of a project and calculate the quantities.

63-2.02(b) GEOPAK

GEOPAK is a comprehensive, proprietary civil design package developed by the GEOPAK Corporation (now a part of Bentley Systems, Inc.) that works as an interactive program within MicroStation. GEOPAK allows the designer to lay out design centerlines and profiles, calculate superelevation, generate cross sections, compute quantities, complete plan labeling, etc. By providing GEOPAK with the minimum/maximum design criteria and other design control points, the designer can command the software to generate all line work for plan views, profiles, and cross sections. GEOPAK can also be used to produce 3D-model images of the design. Although GEOPAK can generate most roadway quantities, special care must be devoted to the design to ensure that the appropriate levels and cells are used. See Section 11-8 and the *IDOT CADD Roadway Drafting Reference Guide* for additional information on GEOPAK.

63-2.03 File Management

Each project is saved in its own project directory in the Department's ProjectWise database. Individual project documents including sheet files are saved within this directory. To allow others to determine the content of files without reviewing them, files should be named using the file naming criteria provided in the IDOT CADD Roadway and Structure Project Deliverables Policy. For more information, the designer should review the IDOT CADD Roadway and Structure Project Deliverables Policy and/or contact the district CADD manager.

63-3 DRAFTING GUIDELINES

Project drafting will typically be performed using CADD. The *IDOT CADD Roadway Drafting Reference Guide* provides information on the Department's CADD system. This section provides general information on the drafting criteria used by the Department.

63-3.01 General Guidelines

The following provides general guidelines for the plotting of survey data and design details on the plan sheets:

1. Dimensioning — US Customary Plans. When dimensioning plans, the following should be considered:
 - Show all dimensions in US Customary. Do not use dual units.
 - Note all survey information in feet and decimals of a foot (e.g., offsets, elevations). For items to be constructed, use feet, inches, and fractions of an inch (e.g., box culvert dimensions, pavement thickness).
 - Where all or most of the units are shown in one set of dimensions (e.g., 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". Removing the inch or foot symbol from the plans improves the sheet clarity.
 - Provide a space between the number and symbol (e.g., 12 ft).
 - Use a comma for numbers greater than three digits (e.g., 12,000 ft²).
2. Dimensioning — Metric Plans. When dimensioning plans, the following should be considered:
 - Show all dimensions in metric. Do not use dual units.
 - Note all measurements of one meter or larger in meters (m) and decimals of a meter. Note all measures smaller than one meter in millimeters (mm). However, if the large majority of the dimensions of a drawing or detail are either meters or millimeters, then show all dimensions using the same symbol unit.
 - Where all or most of the units are shown in one set of dimensions (e.g., mm or m), a footnote can be added to the sheet stating this fact. For example, "ALL DIMENSIONS ARE IN MILLIMETERS (mm) EXCEPT AS NOTED". Removing the mm or m symbol from the plans improves the sheet clarity.
 - Provide a space between the number and symbol (e.g., 3.6 m).

- Only use decimals to denote fractions. For values less than one, place a zero before the decimal marker (e.g., 0.75 m).
 - Use a comma for numbers greater than three digits (e.g., 12,000 m²).
3. Abbreviations. Desirably, word abbreviations should not be used (i.e., the word should be completely spelled out); however, this is not always practical. *The IDOT Highway Standards* present the common abbreviations that are used where it is necessary to abbreviate words. Spell out the words for those terms not listed in the above source.
 4. Symbols. Use the symbols available in the roadway cell library when preparing a set of plans. The *CADD Roadway Drafting Reference Guide* provides information for obtaining a copy of the roadway cell library.
 5. Capitalization. Capitalize all text shown in the roadway plans (i.e., use upper case). This is for clarity when the plans are reduced. However, for metric units, show all abbreviations in lower case except for liter (L) and those derived from proper names (e.g., newton (N)).
 6. Stationing. IDOT uses a US Customary stationing of 100 ft. Stationing is shown to two decimal places (e.g., 1 + 00.00). Metric stationing is in 1 km increments and is shown to three decimal places (e.g., 1 + 000.000).
 7. Superelevation. Show superelevation rates on the plans in percentages (e.g., 6.0%).
 8. Grades. Show vertical grades on the plans in percentages.
 9. Angles. Express angles in degrees, minutes, and seconds.
 10. North Arrow. Provide a uniform north arrow on the finished set of plans. The appropriate North arrow is available in the roadway cell library.
 11. Sheet Numbering. Number all sheets sequentially, with the sheet numbers in the lower right-hand corner. The cover sheet is numbered in the upper right-hand corner. However, do not number *IDOT Highway Standards*. Sheets that are added after the sheet numbers have been placed on the plans should be numbered A, B, C, etc., and noted in the index. The additional sheets are not included in the total number of sheets.
 12. Reduction. A full-sized set of reproducible plans is required for construction and contract letting. Section 63-3.03 discusses the sheet sizes that are used by the Department. Because the scales used for detailing the D-size sheets are no longer correct when the plans are reduced, graphic scales have been placed on the cover sheet cell.

63-3.02 Scales

The following presents the recommended drawing scales that should be used when developing a set of plans:

1. Cover Sheet. For the layout map, use a 1 in = 1 mile (1:60,000 metric) scale. Layout maps for urban areas may use a larger scale for better clarity.
2. Typical Sections. The scale for the typical section figures is generally at the designer's discretion. The scale also may vary from typical section to typical section. The vertical scale should be exaggerated to adequately show the pavement cross section.
3. Plan and Profile Sheets. Plan and profile sheets can be either shown on separate sheets or 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. Layout Maps. For those plans where it is determined that a layout map is required, use a 1 in = 200 ft (1:2500 metric) scale.
 - b. Plan View (Rural). For most projects, use a scale of 1 in = 50 ft (1:500 metric). However, for simple resurfacing projects, a 1 in = 100 ft (1:1000 metric) or 1 in = 200 ft (1:2500 metric) scale may be used.
 - c. Plan View (Urban). Depending upon the complexity of the location and work to be accomplished, a scale of 1 in = 20 ft (1:250 metric) is normally used.
 - d. Profile View (Horizontal). The horizontal profile scale generally will be same scale as the plan view.
 - e. Profile View (Vertical). The vertical profile scale is generally 1 in = 5 ft or 1 in = 10 ft (1:50 or 1:100 metric) depending on the complexity of the project.

Other scales, as necessary, may be used to provide better clarity or more practical layouts. Include a graphic bar scale on all plan sheets drawn to scale.

4. Detail Sheets. Detail sheets will vary according to the element shown. For special intersection or approach drawings, a plan view scale of 1 in = 20 ft (1:250 metric) is generally used.
5. Cross Sections. The horizontal cross section scale will typically be prepared using a 1 in = 5 ft or a 1 in = 10 ft (1:50 or a 1:100 metric) scale. A larger scale may be used where a greater cross section width or height is required. The vertical scale should be a 2:1 proportion of the horizontal scale (e.g., a horizontal scale of 1 in = 10 ft (1:100 metric) will have a 1 in = 5 ft (1:50 metric) vertical scale).

63-3.03 Working Sheets

The following sheet sizes are generally used during project development:

1. 34 in x 22 in (D). This sheet size is considered a full-size sheet. It should be used for design layouts on all major projects. A border around the sheet should be provided with

a 2 in left-binding margin, 0.5 in right margin, and 1 in top and bottom margins. This provides a working area of 31.5 in x 20 in.

2. 11 in x 17 in (B). For Department purposes, this sheet size is considered a quarter-size sheet.
3. 8.5 x 11 in (A). This sheet size is generally only used on projects that do not require a significant amount of detail (e.g., simple resurfacing projects). These types of projects typically contain only a plan view. This sheet should show centerline, culverts, entrances, side roads, utilities, and existing right-of-way. If a project contains significant other amounts of information, use one of the larger sheet sizes instead.

For the preliminary and pre-final design stages, and for the final plans, print all sheets on white paper. Prior to letting, the designer is responsible for providing one complete set of full-size plans on reproducible paper to the BDE.

63-3.04 Plan Sheet Organization

To provide consistency from project to project, the plan sheets should typically be assembled in the recommended sequence below. The designer should note that not all plans will have all sheets and that several sheets can be combined together. The recommended plan sequence is as follows:

1. Cover Sheet;
2. Index of Sheets, Listing of applicable Highway Standards, General Notes, Commitments;
3. Summary of Quantities;
4. Typical Sections;
5. Schedules of Quantities;
6. Alignment, Ties, and Benchmarks;
7. Plan and Profile Sheets;
8. Suggested Stages of Construction and Traffic Control;
9. Erosion and Sediment Control Details;
10. Drainage and Utilities Sheets;
11. Right-of-Way Sheets;
12. Intersection Details;
13. Pavement Marking Details;
14. Landscaping Details;
15. Traffic Signal Details;
16. Lighting Details;
17. Structural Sheets;
18. Wetland Details;
19. Culvert Details;
20. District Details;
21. Cross Sections; and
22. Highway Standards.

For CADD projects, borders and symbols are provided as cells in the Department's roadway cell library (see Section 63-3.05(b)).

63-3.05 Data Plotting

63-3.05(a) Survey Plotting

For surveys conducted by aerial survey or by data collectors, the Aerial Survey Section in the Central Office will be responsible for plotting the survey data. For field surveys, the designer or consultant will be responsible for ensuring the survey data is plotted. For CADD projects, the district survey unit provides the district CADD unit with the survey data to be plotted.

In addition to the field notes, the designer should obtain a copy of the as-built plans, if available. The as-built plans can be obtained at the district. As-built plans can be either in CADD or microfilm format depending on the drafting procedure used. If the as-built plans are more than five to ten years old, a new survey will usually be required.

63-3.05(b) CADD Drafting

The *CADD Roadway Drafting Reference Guide* provides the Department's criteria for plotting the survey data and designing the plans. The *CADD Roadway Drafting Reference Guide* addresses:

- MicroStation and GEOPAK configuration information,
- MicroStation and GEOPAK project files submittal requirements,
- file setup and naming conventions,
- required text font and sizes,
- roadway example plans,
- Photogrammetric Mapping Systems, and
- roadway cell library contents.

The *CADD Roadway Drafting Reference Guide* provides the location for obtaining a copy of the Department's roadway cell library.

63-3.05(c) Manual Drafting

For manually drafted projects, the designer/drafter should use the criteria presented in or referred to by the *CADD Roadway Drafting Reference Guide*. The criteria for line weights, topography symbols, plotting accuracy, etc., are also applicable to manual drafting.

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 size that should be used is 0.094 in (2.5 mm) high. Letters should always be open and formed with a dense but not wide line.

63-4 PLAN SHEET CONTENT

The designer should prepare the plans as simply as practical. The use of duplicated data and unnecessary cross references should be avoided. The following sections provide additional information on what should be included within each sheet. Section 63-3 provides criteria for drafting the information onto each sheet. Section 63-6 provides a checklist the designer may use when preparing a set of plans.

63-4.01 General

The designer should include the following information on every sheet, except for the *IDOT Highway Standards* included in the back of the plans:

1. Sheet Index Block. Title blocks are provided in the lower right corner (upper right for cover sheet) of sheet cells in the IDOT roadway cell library and contains the following information:
 - project route number(s);
 - section number(s);
 - county the project is located in;
 - total number of sheets for the project, including the cover sheet and excluding the highway standards sheets;
 - sheet number;
 - stationing shown on the sheet, if applicable; and
 - contract number
2. Project Numbers. Project numbers will be determined and placed on the plans by the Central Office.

63-4.02 Cover Sheet

A cover sheet is required for all plans. It identifies the project type, project location, and other pertinent project information, and it authenticates the plans by signatures of approval. A pre-drafted cover sheet is available as a cell in the roadway cell library. This pre-drafted sheet provides the State map, blocks for project approvals, design scales, and other related design information.

63-4.02(a) Sheet Content

The designer should include the following information on the cover sheet:

1. Index of Sheets. If the sheet index is not included as a separate sheet in the plans, locate the index of sheets in the upper left-hand corner of the sheet. If the sheet index is not included on the cover sheet, note the location of the index sheet within the plans in the upper left-hand corner of the sheet. Below the sheet index, list the *IDOT Highway Standards* used on the project. See Section 63-4.03 for more information on the format for listing the sheets and *IDOT Highway Standards*.
2. Title Information. Show the project title information in the top center of the sheet in the following order:

- the title:

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

- project route number and common name;
 - the section number (see Section 63-4.02(b));
 - Federal project number (to be added by the BDE);
 - location of improvement (optional);
 - type of improvement;
 - county of project location; and
 - construction job number.
3. Design Number. Show the design number, "D" number, below the sheet index block.
 4. State Map. Locate the Illinois State map along the right side of the border. A location symbol is used to show the general location of the project in the applicable county and the general direction of the project (i.e., north-south, east-west). The location symbol can be found in the roadway cell library. This project location map is not required on those projects using the 8.5 in x 11 in plan sheets.
 5. Scales. Show the graphic scales used for the plan and profile sheets, cross sections, and detail sheets in the lower left-hand side.
 6. Contract Number. Show the contract number in the lower left-hand corner of the cover sheet.
 7. Layout Map. The layout map is located at the bottom center of the cover sheet. Show only the area necessary to allow the reader to understand where the project is located. The standard scale for rural layout maps is 1 in = 1 mile (1:60,000 metric) and should be used wherever practical. Select a scale for urban areas that adequately shows the

features of the project. A layout map is not required where construction is taking place at several isolated locations (e.g., district wide patching projects).

The layout map should clearly show the following:

- the location of the project roadway in relation to true north, existing roads, cities, towns, major drainage features, railroads, buildings and, where appropriate, the range, township, and Principal Meridian;
 - the beginning and ending stations of the project, any station equations, and omissions to the nearest hundredth of a foot (e.g., 0 + 00.01) (thousandth of a meter (e.g., 0 + 000.001));
 - the project numbers and stations of as-built projects onto which the project is tied;
 - names of any special features (e.g., McHenry Interchange);
 - signed route numbers for US, State, and local highways;
 - a brief description for separation structures and bridges on the project over 20 ft (6 m). Use a single station number, based on mainline stationing, at the approximate center of each structure. Indicate the length of each structure, structure number, whether it is an overpass or underpass in relation to the main line, and whether it will be constructed under this contract; and
 - scale of layout map.
8. Project Length. Show the project gross and net lengths to the nearest thousandth of a mile (kilometer) immediately below the layout map. Show each length on a separate line unless they are the same. The gross length of the project is the length from beginning to end and is calculated as follows:
- For paving, widening, or shoulder projects, show the project termini where the full width begins or terminates.
 - For resurfacing projects, show the project termini where the full thickness of resurfacing begins or terminates. However, where two resurfacing projects have overlapping transitions in thickness, the second project should begin at the end station of the first project so that a section will not be shown as unimproved.
 - Show the length of a structural project as the centerline distance between the back-to-back of abutments. This length should be constituted as an omission from a paving project.
 - Grading sections will normally have the same limits as the paving section with the same basic section designation.

- Measure project lengths for divided highways or one-way facilities along the northbound or eastbound roadway.
- Only show the length for mainline. Do not include the length of improvement along an intersecting side road or street unless the side road improvement is a separate project. If it is a separate project, show separate gross and net lengths.

The net length of the project is the gross length minus any omissions.

9. Project Approval Block. Provide a project approval block in the mid to lower right-hand corner of the sheet. The approval box should include:
 - the approval signing date for each individual;
 - the Regional Engineer's signature;
 - the Engineer of Design and Environment's signature;
 - Director of Division of Highways' signature;
 - where appropriate, the FHWA Division Administrator's approval; and
 - where appropriate, the local officials' approvals.
10. Consultant Projects. For consultant design projects, provide the consultant's company name, professional engineer's signature, date of their license expiration, and their professional stamp in the lower right-hand corner of the sheet to the left of the State approval box.
11. Authority Note. At the very bottom of the lower right-hand corner, include the following statement, "PRINTED BY THE AUTHORITY OF THE STATE OF ILLINOIS."
12. Utility Information. Information for contacting J.U.L.I.E. is included in the lower left corner of the sheet.
13. Design Designation. For all highway projects involving construction of new pavements, full structural overlays of existing pavements, or structurally designed widenings, the design designation should be shown somewhere on the cover sheet. The design designation is a simple notation to indicate the geometric and structural requirements for the highway. The design designation consists of three basic factors, which is explained with the following example:

Design Designation — 2150(16) Arterial 5.50 (PCC-20)

 - a. 2150(16). The first four digits represent the design hourly volume (DHV) that is anticipated for 20 years from the proposed date of construction. The last two digits shown in the parentheses represent the design year (2016). For some minor-type highways, the average daily traffic (ADT) for the year of construction may be used in place of the DHV. In this case, show the construction year in parentheses.
 - b. Arterial. This is the highway functional classification.

- c. 5.50 (PCC-20). The first portion (5.50) is the structural design traffic factor (TF). The type of pavement and the structural design period, in years, are indicated in parentheses (PCC-20). The traffic factor represents the summation of equivalent 18 kip single-axle loads, in millions, used to convert mixed traffic to design traffic for the design year. The structural design period also should be included with flexible (HMA) pavement designation. For example, an HMA application would be designated as (FD-20) with the "FD" indicating a full-depth (HMA) pavement and the number 20 indicating a structural design period of 20 years.
14. Structural Pavement Design Information. Structural pavement design information generally should be included on the typical section sheet, but it may be included on the cover sheet. See Section 63-4.05 for information on the structural pavement design information block.
15. Miscellaneous Information. Include the names and phone numbers for the State project engineer, designer, etc., along the left side of the sheet.

63-4.02(b) Section Designation

Each highway improvement is identified by a section number which denotes the type of work being done and a numbering system indicating the continuity of the original work along the route. On Interstate routes, these numbers must proceed from west to east on even-numbered routes or from south to north on odd-numbered routes. Interstate routes are further typified by a number identifying the county in which the work is being done. In counties where the work will be done on the same route by two districts, the Regional Engineers should confer on section designation to avoid duplication. The section designation should always appear on the cover sheet of the plans and in the sheet index block in the lower right-hand corner of all other plan sheets. The section designation should not exceed 30 characters. Figure 63-4.A shows, alphabetically, the counties by code number, and Figure 63-4.B lists the suffixes used to denote the work type.

Where more than one section of a certain work type occurs within the limits of a basic section number, a second numerical suffix should be added to distinguish between the projects (e.g., 60-5HB-1, 60-5HB-2).

County Section	County	County Code	County Section	County	County Code
1	Adams	001	52	Lee	103
2	Alexander	003	53	Livingston	105
3	Bond	005	54	Logan	107
4	Boone	007	55	McDonough	109
5	Brown	009	56	McHenry	111
6	Bureau	011	57	McLean	113
7	Calhoun	013	58	Macon	115
8	Carroll	015	59	Macoupin	117
9	Cass	017	60	Madison	119
10	Champaign	019	61	Marion	121
11	Christian	021	62	Marshall	123
12	Clark	023	63	Mason	125
13	Clay	025	64	Massac	127
14	Clinton	027	65	Menard	129
15	Coles	029	66	Mercer	131
16	Cook	031	67	Monroe	133
17	Crawford	033	68	Montgomery	135
18	Cumberland	035	69	Morgan	137
19	DeKalb	037	70	Moultrie	139
20	DeWitt	039	71	Ogle	141
21	Douglas	041	72	Peoria	143
22	DuPage	043	73	Perry	145
23	Edgar	045	74	Piatt	147
24	Edwards	047	75	Pike	149
25	Effingham	049	76	Pope	151
26	Fayette	051	77	Pulaski	153
27	Ford	053	78	Putnam	155
28	Franklin	055	79	Randolph	157
29	Fulton	057	80	Richland	159
30	Gallatin	059	81	Rock Island	161
31	Greene	061	82	St. Clair	163
32	Grundy	063	83	Saline	165
33	Hamilton	065	84	Sangamon	167
34	Hancock	067	85	Schuyler	169
35	Hardin	069	86	Scott	171
36	Henderson	071	87	Shelby	173
37	Henry	073	88	Stark	175
38	Iroquois	075	89	Stephenson	177
39	Jackson	077	90	Tazewell	179
40	Jasper	079	91	Union	181
41	Jefferson	081	92	Vermilion	183
42	Jersey	083	93	Wabash	185
43	JoDaviess	085	94	Warren	187
44	Johnson	087	95	Washington	189
45	Kane	089	96	Wayne	191
46	Kankakee	091	97	White	193
47	Kendall	093	98	Whiteside	195
48	Knox	095	99	Will	197
49	Lake	097	X1	Williamson	199
50	LaSalle	099	X2	Winnebago	201
51	Lawrence	101	X3	Woodford	203
				Various	000

COUNTY SECTION AND CODE NUMBERS

Figure 63-4.A

A	Grading
AC	Access Control - Frontage Roads or other Features of Access Control except Bridges
B	Bridges (Complete Structures or Substructures only)
ACB	Bridges on Frontage Roads
BR	Bridge Reconstruction
BY	Bridge Widening
C	Culverts over 6 ft
D	Bridge Floors
DM	Building Demolition
E	Steel Erection
F	Steel Fabrication
G	Gravel or Crushed Stone
FL	Railroad Crossing Protection
HB	Highway Grade Separation Structures
HBK	Grade Separation or Interchange Complete with Structures
I	Miscellaneous
J	Guardrail
K	Grade Separation or Interchange Work except Structures
L	Lighting
LS	Landscaping
N	Intersection Improvements
P	Painting
Q	Seal Coat
R	Reconstruction
RS	Resurfacing
S	Subway Pavement
SB	Subway (Railroad)
SC	Soil Cement
SG	Signing
T	Storm Sewers or Deficient Drainage Correction
TS	Traffic Signals
V	Viaduct Paving
VB	Viaducts (Railroad)
W	Pavement Widening
X	Paving Gaps
Y	Widening Shoulders and Ditches
Z	City Pavement

No suffix will be used for pavement sections.

SUFFIXES FOR WORK TYPES

Figure 63-4.B

More than one suffix may be used for a single section designation; however, to facilitate the processing of work by the data processing equipment, the section designation must be held to a maximum of 30 characters. For example, where widening and resurfacing are done in one section, indicate it as: "Section (102, 103) (W, RS)." Where widening and resurfacing are separate sections, indicate it as: "Section (102, 103) W, RS."

Within the corporate limits of municipalities, use continuous or consecutive section designations, with the letter "Z" suffix at those locations where the original construction was completed and financed by a municipality or agency other than the State. In addition to the letter "Z" suffix, also add other standard suffix letters indicating the type of improvement.

HMA resurfacing projects by district designation should not contain a reference in the section designation to the type of patching (concrete or HMA) nor should the word "intermittent" be used. Show the section designation as "District (#) HMA Resurfacing (*year*) — 1, 2, 3" only if the work involved is located on more than three routes. Other special types of projects such as district-wide guardrail installation, weed spraying, etc., should use similar designations. For bridge repair projects involving multiple locations, use "Bridge Repair — (*year*)" instead of listing each section number.

In the Cook County metropolitan area, the established coordinate system of indicating sections will be acceptable.

63-4.03 Index of Sheets, Highway Standards, General Notes, and Commitments

For most projects, Sheet Two will provide a sheet index, list of *IDOT Highway Standards* used, the general notes, and a list of commitments for the project. The information should be clearly labeled "INDEX OF SHEETS, LIST OF ILLINOIS DOT HIGHWAY STANDARDS, GENERAL NOTES, COMMITMENTS," and placed in order from left to right on the sheet, respectively. For small projects, the sheet index and the *IDOT Highway Standards* list may be included on the cover sheet. The general notes and commitments may be shown elsewhere in the plans.

63-4.03(a) Index of Sheets

The index of sheets indicates the major groups of sheets and those subgroups necessary to facilitate locating each item in the plans. Section 63-3.04 provides the proper order for listing the plan sheets and the appropriate subject breakouts.

63-4.03(b) Highway Standards

Every *IDOT Highway Standard* will not be used on every project. Therefore, the plans should only list those standards that are included with the plans. The designer is not responsible for including the actual Highway Standards in the plan, but is responsible for listing the appropriate drawings that need to be included by BDE. The Highway Standards should be listed in

numerical order, including the appropriate revision number. The designer should not include the revision number when referencing the *IDOT Highway Standards* elsewhere in the plans.

63-4.03(c) General Notes

General notes provide the general information necessary for plan users to obtain a complete understanding of the plans. Notes should not be used where subjects are addressed in the *Standard Specifications*, *Supplemental Specifications*, or *Special Provisions*. Examples of information that general notes may address include:

- descriptions of items to be removed by non-contractor personnel;
- instructions for the contractor on items not to be disturbed, clearing and grubbing, and digout areas;
- descriptions of work items not paid for separately but included in the cost of other bid items;
- bases for plan quantities of surfacing materials; and
- instructions for interpreting the plans.

General notes that relate to specific details may be shown on the appropriate sheet (e.g., plan and profile sheet, drainage detail sheet). Section 63-4.03(d) provides a sample listing of notes that are commonly included within a set of plans.

63-4.03(d) Sample General Notes

The following are samples of general notes used by the Department:

1. 10 FOOT TRANSITIONS SHALL BE USED TO MATCH THE PROPOSED CURB & GUTTER TO THE EXISTING.
2. ALL GUTTER OUTLETS SHALL BE EXTENDED TO THE DITCH FLOW LINE.
3. ALL ELEVATIONS IN THE PLANS ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. THE EXISTING BUILDING AT STATION 3+00, 125' RT WILL BE REMOVED BY OTHERS.
5. THE REMOVAL OF EXISTING ENTRANCE CULVERTS SHALL BE INCLUDED IN THE COST OF EARTH EXCAVATION.
6. STORM SEWER WATER MAIN IS TO BE USED AT LOCATIONS WHERE LATERAL SEPARATION BETWEEN THE SEWER AND WATER MAIN IS LESS THAN 10 FEET AND THE WATER MAIN INVERT IS LESS THAN 1.5 FEET ABOVE THE TOP OF THE STORM SEWER.

7. AN HISTORIC STONE ARCH STRUCTURE IS LOCATED AT STATION 135+62. DURING RESURFACING OPERATIONS WITHIN 150 FEET OF THIS STRUCTURE, ALL ROLLERS SHALL BE OPERATED IN STATIC MODE. ALL DENSITY REQUIREMENTS SHALL STILL APPLY.
8. BEFORE ORDERING STORM SEWERS, CATCH BASINS, PIPE CULVERTS, PIPE DRAINS, AND MANHOLES, THE CONTRACTOR SHALL CONTACT THE ENGINEER AS TO THE EXACT LENGTH AND QUANTITY REQUIRED.
9. SPECIAL ATTENTION IS CALLED TO ARTICLE 107.12 REGARDING RAILROAD FLAGGERS. THE NAME AND TELEPHONE NUMBER OF THE RAILROAD ENGINEER IS _____.
10. THE BITUMINOUS MATERIAL PRIME COAT QUANTITIES HAVE BEEN DETERMINED USING AN APPLICATION RATE OF 0.10 GAL/SQ YD (0.5 L/SQ M).

63-4.03(e) Commitments

A commitment is a documented obligation or promise, made by a properly authorized representative of the Department, for carrying out a specific action or actions affecting the planning, design, land acquisition, construction, or operation of a highway project. A commitment involves special consideration and action(s) beyond what is routinely required for project development/implementation. Section 63-1.02(a) further describes these commitments. When commitments affect construction operations, the designer includes a brief note describing the commitment – e.g., “TREES RIGHT STATION 11 + 25 ARE TO BE LEFT IN PLACE.”

63-4.04 Summary of Quantities

63-4.04(a) General Layout

The Summary of Quantities (SOQ) sheets summarize all pay items necessary to construct the improvement. It also includes the applicable construction type codes, pay item code numbers, units of measure, total quantities, and quantity breakdown for each section. One or more SOQ sheets typically will be included in each set of plans. Do not show other data on the SOQ sheets (e.g., general notes).

The designer should arrange the pay items in the SOQ, estimates, and schedule of prices so that those with a straight numerical prefix precede those with an alphabetical prefix. It is often necessary to insert additional items after the plans have been prepared. For this reason, items in the summary of quantities and estimate should be double spaced to allow insertion of any further item without disrupting the numerical sequence.

Chapter 64 presents the guidelines for determining plan quantities. When preparing SOQ sheets, it is important that all quantities be calculated and broken down accordingly prior to completing the SOQ sheets. The designer should prepare the SOQ sheets according to the following guidelines:

1. Construction Type Codes. To properly identify the type of construction, the Department uses a coding system based on several elements. These elements are explained in Section 63-5. The applicable construction code should be shown with the appropriate quantity breakdown.
2. Pay Item Code Number. Every pay item has a unique assigned number for data processing. This code number is located in the *IDOT Coded Pay Items*, which is tied to the *IDOT Standard Specifications*. Section 63-4.04(b) describes the Department's coding procedures and how new items can be added. Do not place "dummy" numbers on the SOQ sheets.
3. Description. A descriptive title is applied to every code item. A complete listing of the appropriate titles can be found in the *IDOT Coded Pay Items*. Only these item descriptions should be used on the plans.
4. Unit. The appropriate pay unit should be placed on the sheet after the item description. The *IDOT Standard Specifications* provide the pay units that may be used for each item. Use abbreviations for the units. (Metric units are shown in lower case except for liter (L) and those derived from proper names, e.g., newton (N)).
5. Total Project Quantities. The first column is the total of all breakdown quantities or, for projects with only one construction type code, it may be the only column. For sheets prepared on the computer, the total column will be automatically calculated by the computer. Place all columns for project breakdowns to the right of the total quantity column.
6. Breakdown Quantities. Develop separate project quantities for each of the breakdowns listed in Section 63-4.04(c). If there is only one condition, then additional breakdown columns will not be necessary.
7. Rounding (Total Quantities). Chapter 64 provides the criteria for rounding quantities prior to their incorporation onto the SOQ sheet.
8. Rounding (Breakdown Quantities). Where quantities are expressed in whole units for the total project quantities, it is permissible to round the breakdown quantities to the nearest tenth of a unit (i.e., 0.1).
9. Specialty Items. Certain items of work require specialized knowledge, skills, or equipment that are typically outside the general contractor's expertise (e.g., electrical work, traffic signals, pavement markings on a paving contract, blasting on a bridge contract, paving work on an electrical contract, etc.). Clearly mark Specialty Items in the Summary of Quantities.

63-4.04(b) Construction Pay Items

To permit utilization of the data processing equipment when preparing the Engineer's and detailed estimates; schedule of price sheet for proposals; unit and weighted average prices; and

partial, semi-final, and final payment estimates; the designer should ensure that all pay items are number coded and titled appropriately. The appropriate codes and titles are provided in the *IDOT Standard Specifications* and the *IDOT Coded Pay Item Book*. The Specifications and/or special provisions must address the basis of payment for all contract pay items.

Non-standard pay items in the *IDOT Coded Pay Item Book* are noted with an asterisk (*) after the code number and are not covered by the *IDOT Standard Specifications*. Therefore, a special provision, plan note, or detail will be required for clarification. In most cases, it will be possible by writing a special provision to use an existing pay item and its corresponding code number. However, where it is necessary to include coded pay items for a type of work not related to any item in the coded pay item books, list the item last in the summary of quantities and write up a justification for the new item. The designer should then forward the request to the District Estimating Engineer, who reviews it to determine if another item can be used (e.g., by special provision). If not, the District Estimating Engineer requests a new item (and code number) from the Central Office. The Project Management Unit of the Bureau of Design and Environment will assign a new code number and item description.

The code number consists of eight digits (metric - the letter "M" and seven digits). The first three digits indicate the corresponding section in the *IDOT Standard Specifications*. For example, code number 35101500 (M3511500) corresponds to "Section 351. Aggregate Base Course" in the *IDOT Standard Specifications*. The remaining digits of the code number indicate the numerical sequence the number has in the *IDOT Coded Pay Item Book* section.

A number of pay items, contained in the coded pay item books, are identical except for the numerical codes. For example, "Bituminous Materials (Prime Coat)" has code numbers identifying it according to the type of work being done. The purpose of this is to make possible cost analyses of the various types of work. However, when the quantities are small, the pay items which are identical, except for the numerical code number, should be combined and identified by the code number of the type of work that requires the largest quantity.

63-4.04(c) Quantity Breakdowns

To present the data necessary for cost accounting, the designer must segregate and tabulate the plan quantities for various accounts. Quantity breakdowns will be made on the SOQ sheets in accordance with the following:

1. Construction Type Codes. If a project consists of two or more construction type codes, a breakdown will be required for each code. Section 63-5 describes these codes.
2. Projects. Two or more projects may be combined into one plan set. In this case, separate breakdown columns are required for each project.
3. Funding Appropriations. If the project consists of more than one funding appropriation (e.g., NHI-BRF-320-1()), the quantities will be segregated according to each appropriate funding type.

4. Urban/Rural. Where a Federal and/or State project crosses an urban boundary, provide separate breakdowns for both the urban and rural portions of the project. Urban boundary locations can be obtained from the district programming section.
5. Counties. Where a Federal and/or State project crosses county lines, provide separate breakdowns for the portions in each county. Project termini coincident with county lines should be shown entirely within one county. If the project is in more than three counties, show it as "various counties." For projects that involve bridges that are on the county line, show it in the county designated by the structure number.
6. Joint Agreements. Where there is local participation involved (e.g., city, village, county), breakdown the quantities according to the joint agreement and designate them in the SOQ sheet under a separate heading for each local agency.
7. Traffic Signal Improvements. Where there is one Federal-aid route at two or more locations and local participation is involved, it will be necessary to break down each location and the percentage of participation by each locality. In addition, break down the quantities according to the traffic signal work type.
8. Non-participating Work. Where non-Federal-aid work is included in a Federal-aid project, it should be segregated and identified as such. It is Department policy to consider all maintenance type work (e.g., cleaning storm sewers, cleaning drainage structures) as non-participating, and noted as such.
9. Bridge Approaches. Include bridge approach work with the applicable structure construction-type code.

63-4.04(d) Schedule of Quantities

A tabulation of the quantities may be included after the summary of quantities sheets. These tabulations are highly desirable because they simplify the checking of plans, help the contractor and resident engineer to locate quickly the items in the field, and aid in the determination of final quantities used in the improvement. The tabulations should show the location of the item by station and quantity at each location.

All items not included in the typical section should be considered for tabulation. However, judgment should be used in determining which quantities to tabulate based on continuity of the items or their appearance at relatively few locations. Always tabulate items that are scattered throughout the plans or are located at intermittent locations throughout the improvement (e.g., pipe culverts, structural concrete, reinforcement bars, drainage structures). For items in a schedule of quantities that are shown elsewhere in the plans, place a note to this effect in a conspicuous location near the tabulation. A bill of materials, such as is shown on bridge plans or culvert headwall standards, does not include pay items per se and should not be considered as a duplication in the schedule of quantities.

63-4.05 Typical Sections

One or more typical sections are included in the plans to show details and dimensions for roadway surfaces, bases, subbases, subgrade treatments, shoulders, gutters, curb and gutters, medians, sidewalks, ditches, backslopes, and ROW. When preparing the typical sections, the designer should consider the following:

1. Number of Typical Sections. Provide a separate typical section for each of the following conditions:
 - tangent sections;
 - superelevated sections, show the full superelevated section from PC to PT and note the superelevation transition stations;
 - where there are changes to the pavement structure;
 - where there are changes from a curbed section to a non-curbed section or vice versa;
 - changes in pavement widths, including transitions;
 - changes in pavement cross slopes;
 - cross section changes (e.g., shoulder additions, turn lanes, median changes);
 - driveways and side roads which have a significant length of reconstruction; and
 - specially constructed detours; show the proposed ultimate development by the use of dashed lines.
2. Orientation. Orient all typical sections horizontally (landscaped) on the sheet.
3. Scale. Draw the typical sections to a suitable scale to show all necessary details. The vertical dimension may use a larger scale for clarity.
4. Order. Show the mainline typical section first, followed by the other sections in the order they appear, in increasing stations, along the mainline.
5. Titles. Show the name of the road or street to which the typical section applies directly below the typical section number or letter. Alphabetize or number sequentially each typical section.
6. Station Limits. Always note the station limits for which the typical section applies directly below each typical section. Also include the station limits for back-to-back of abutments.
7. Cross Section. The typical section cross-section view should show the following elements:

- the grading template;
 - profile grade line reference, especially where the profile grade line is other than the centerline;
 - surfacing templates for immediate and future development;
 - top widths of surfacing shown to the nearest tenth of a foot (i.e., 0.1 ft) (hundredth of a meter (0.01 m));
 - types of surfacing and thicknesses shown to the nearest $\frac{1}{4}$ of an inch (millimeter); and
 - pavement cross slopes (inches/foot – US Customary, % – metric), dimensions, and slopes necessary to define the typical section.
8. Base Thickness. Show variations in base or subbase thickness due to soil conditions or other reasons in a tabular form, and include the station limits for each thickness. In such cases, the typical section only shows the varying thickness.
9. Notes. Include only the design and construction notes that are pertinent to the specific typical section on the typical section sheet. General notes should be shown on the general notes sheet.
10. Notations. Where appropriate for clarity, the various typical section elements (e.g., “P.C.C. SIDEWALK 4 in (100 mm)”) may be noted using numbers within circles. If this approach is used, provide a complete legend on each page. Use the same number for each item throughout the typical section sheets.
11. Quantities. Note the applicable material type on the typical section (e.g., “HMA SURFACE COURSE, MIX “D”, N90).
12. Structural Pavement Design Information. Include the structural pavement design information block on the appropriate typical section sheet to allow checking of the pavement design. For those projects that have two or more roadway segments with different design data, provide separate design information blocks for each segment. The project route design information block always should be shown first. For highway grade separations, provide separate design information blocks for each facility. Figure 63-4.C illustrates the recommended format for a structural pavement design information block.

STRUCTURAL DESIGN TRAFFIC:	Year _____
PV = _____	SU = _____ MU = _____
ROAD/STREET CLASSIFICATION:	Class _____
PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:	
P = _____	S = _____ M = _____
TRAFFIC FACTOR:	Actual TF = _____ AC Type = _____
	Minimum TF = _____
PG GRADE: Binder = _____	Surface = _____
SUBGRADE SUPPORT RATING:	
SSR = _____	(Sta. _____ to _____)
SSR = _____	(Sta. _____ to _____)

Notes: See Chapter 54 for information on how to determine the appropriate pavement values.
For non-mechanistic designs use IBR in place of SSR.

RECOMMENDED STRUCTURAL PAVEMENT DESIGN INFORMATION BLOCK

Figure 63-4.C

63-4.06 Alignment, Ties, and Benchmarks

For new pavement, reconstruction, or realignment of the existing pavement, an alignment, tie, and/or benchmark sheet will be required. These sheets are used to locate the construction control points during all phases of construction. In preparing these sheets, the designer should consider the following:

1. Alignment. On complex projects, a separate alignment sheet may be provided showing the existing and proposed horizontal alignment with the appropriate curve data and other pertinent information. For most projects, this information will typically be provided on the plan view sheet.
2. Reference Ties. Reference ties will generally be required on every project. They generally should be combined on one sheet. However, for simple projects, they may be included on the plan sheets. Figures illustrating the reference tie point locations may be

simple or detailed schematics with the appropriate dimensions and tie points identified, including the stationing and applicable control tie (e.g., POT, PI, PT, PC). Show reference ties having locations tied to the mainline first, by increasing station, followed by ties to other lines in the order they appear along the mainline. Clearly identify the feature to which the ties are referenced (e.g., iron pin 18 in (0.5 m) deep, corner of wall). Tie figures are generally not drawn to scale. If included within the plan view and if too congested with other topography, transfer the tie figure to an insert directly under the point involved. At least three reference ties are required to each point. Note the tie distances to the nearest 0.01 ft (5 mm). The reference ties should be to features that are not affected by construction.

3. **Benchmark Data.** Benchmark tabulations should show the station, location, description, and elevation of each benchmark. Show mainline benchmarks first, followed by benchmarks to other facilities in the order they appear along the mainline. Clearly identify the road or line to which a group of benchmarks is referenced. Show elevations in feet to two decimal places (i.e., 0.01 ft); show elevations in meters to three decimal places (i.e., 0.001 m). Provide a detailed description to locate the benchmark used for the level datum source. The description should include the benchmark location, elevation, number, and any other pertinent information.

63-4.07 Plan and Profile Sheets

The plan and profile sheets are the basic design sheets used by the designer to illustrate the horizontal and vertical alignments and to depict the construction items and the topography necessary for construction. Therefore, the designer must ensure that these sheets are drawn with clarity and are as simple as practical, but still provide the necessary information to construct the project.

63-4.07(a) General Guidelines

The following provides general guidelines for the preparation of the plan and profile sheets:

1. **Views.** For rural and simple urban projects, the Department's practice is to show the plan and profile views on the same sheet. The plan view is presented in the upper half of the sheet with the corresponding profile view presented directly below it. For most urban projects and complex rural projects (e.g., interchanges), the plan and profile views may be shown on separate sheets. Two or more profiles may be shown on the separate profile sheet. Unless necessary for clarity, the proposed improvement should be superimposed onto the existing topography (i.e., do not provide separate views for the existing and proposed improvement).
2. **Sequence of Sheets.** Show the plan and profile sheets for the mainline first in increasing stations. Project stationing progresses from South to North and West to East. Do not interrupt the mainline plan and profile sheets with sheets for other facilities (e.g., side roads, detour roads, frontage roads, railroads) or for other detail sheets (e.g., plan

quantities, general notes, drainage details). Insert and cross reference the plan and profile sheets for other facilities after the mainline sheets in the order they appear along the mainline. For those projects using separate sheets for the plan view and the profile view, place the profiles directly after all the plan view sheets. The profile views should appear in the same order as the plan view sheets.

3. Labeling. It is desirable, but optional, to label all plan and profile sheets in the lower right corner so that the plan user can readily determine what plan and/or profile is being shown (e.g., Route 34 — Stations 10 + 25 to 25 + 00).
4. Sheet Overlap. Use matchlines on each sheet (i.e., the plotting should not overlap the beginning and end of successive sheets).
5. Plotting Limits. In general, plot the survey 500 to 1000 ft (150 m to 300 m) beyond the proposed project limits. Where applicable, provide the station equation between the new and old stationing.
6. Note Orientation. Write all notes and dimensions horizontally from left to right, except for the following:
 - a. Plan Views. The following apply:
 - Dimensions may be written parallel or perpendicular to the element (e.g., property lines, lane widths).
 - Stationing, at 100 ft (50 m) intervals, is placed parallel with the centerline and noted directly beside the tick mark. Intermediate station callouts (e.g., taper termini) should be written perpendicular to the centerline.
 - Curve data is placed radially on the inside of the curve. However, show all curve control points, stationing equations and angles horizontally.
 - Names for specific items may be written parallel with the feature (e.g., street names, river names).
 - b. Profile Views. Elevations for the various features are shown vertically, including the elevation at the stationing intervals.
 - c. Special Considerations. Where limited space for notes and dimensions makes horizontal placement detrimental to the readability of the plans, they may be placed vertically.
7. Use of Notes. Keep notes on plan sheets brief, clear, and consistent. Installations and removals should be noted by station with a brief description. Include detailed descriptions on the general note sheet not on the plan and profile sheets.
8. Drafting Details. The *IDOT CADD Roadway Drafting Reference Guide* gives the location of the roadway cell library that contains the topography symbols and additional cells that

should be used in preparing plan and profile sheets. The *IDOT Highway Standards* provides the recommended abbreviations that should be used. Section 63-3 provides additional information on plotting details.

9. Key Maps. If the location of the plan section shown is confusing relative to the rest of the project or does not follow in a logical sequence, provide a “Key Map” or a schematic layout as a guide. Because the purpose of any layout or key map is to simplify otherwise confusing aspects of the plans, keep the level of detail to a minimum. One or more key maps may be required.
10. Bridges. On plans for highway grade separation structures, show the plan and profile views of both roadways.

63-4.07(b) Plan View

The following presents the recommended guidelines for preparing the plan view sheets:

1. Centerline. The following should be noted relative to the centerline:
 - Desirably, the survey line should be the centerline of the proposed facility. Where the two do not coincide, indicate their relationship at the beginning and end of the sheet and at all major control points.
 - On divided highways with independent alignments, the centerlines are generally treated as separate roadways. Note the relationship between the centerlines somewhere on each sheet.
 - Use “tick” marks along the centerline at 100 ft (50 m) intervals. Note the station beside the tick mark.
2. Centerline Layout. When laying out the centerline on the plan sheets, the designer should consider the following:
 - Where an alignment is on a tangent, the centerline or survey line should parallel the profile line and be centered vertically in the plan view.
 - Where the alignment is on a curve, angle the tangents to produce a reasonable balance. Desirably, show the entire curve on the same sheet, even if this requires starting a new sheet and leaving part of the preceding sheet blank. If practical, show the PI on the same sheet.
 - The stationing should progress from left to right (i.e., South to North, West to East).
 - Provide separate survey lines for interchange ramps and rest areas.

3. Scales. For rural facilities, typically use a scale of 1 in = 50 ft (1:500 metric). For urban facilities, depending upon the complexity of the location and work to be accomplished, use a scale of 1 in = 20 ft (1:250 metric). Other scales may be used to improve the clarity of the plans or for practical purposes.
4. Horizontal Alignment Data. Chapter 32 presents the criteria for horizontal alignment. The horizontal alignment data should be presented in the plans as follows:
 - a. Horizontal Curve Data. Place the horizontal curve data, including superelevation, on the plan sheet to which it applies. Figure 63-4.D presents the order and rounding accuracy that should be used to present the curve data.
 - b. Superelevation. Show the rate of superelevation on the plan sheets. In the transition portion of superelevated curves, provide superelevation data at 25 ft (10 m) intervals to facilitate construction staking. Elevations of the pavement edges and superelevation rates may be included in a separate table on the plan/profile sheets and/or in special detail sheets. Also, include detailed information and sketches for superelevation transition lengths in the detail sheets.

Simple Curve Data	Accuracy	
	US Customary	Metric
PI	0 + 00.01 (ft)	0 + 000.001 (m)
Δ	00° 00'01"	00° 00'01"
R (existing)	0.01 ft	0.001 m
R (new)	15 ft	5 m
T	0.01 ft	0.001 m
L	0.01 ft	0.001 m
E	0.01 ft	0.001 m
e	0.01%	0.01%
T. R.	1 ft	1 m
S. E. Run	1 ft	1 m
P.C. Sta.	0.01 ft	0.001 m
P.T. Sta.	0.01 ft	0.001 m

**HORIZONTAL CURVE DATA
(Plan Sheets)**

Figure 63-4.D

- c. Curve Points. For all curve control points, show perpendicular lines from the centerline on the inside of the curve. Indicate these control points with small circles, approximately 0.1 in (2.5 mm) in diameter. Indicate the curve notation (e.g., PC, PT, PI) and station to the nearest hundredth of a foot (i.e., 00 + 00.01)

- (thousandth of a kilometer (i.e., 0 + 000.001)) along the perpendicular line. Also show the coordinates of the control point if a coordinate system has been established for the project.
- d. Deflection Points. Where deflection points are used in place of a horizontal curve, show the deflection angle to the nearest second (i.e., 00° 00' 01"). Also include the coordinates, if available.
 - e. Equations. Equations are used to correct any stationing differences that may occur along the centerline. Show these stationing equations with a small circle on the centerline (0.1 in (2.5 mm) diameter). Place the station equation at a location on the sheet near the control point and where it can be easily read. Draw a line from the station notation to the point on the centerline.
5. Widths. Note all pavement widths at the beginning and end of each sheet and wherever there is a change in width (e.g., turn lanes, acceleration lanes, truck climbing lane) to the nearest tenth of a foot (meter) (i.e., 0.1 ft (0.1 m)). Individual lane locations are generally not shown on the plan view. They are generally shown on the pavement marking sheets.
 6. Topography. The *CADD Roadway Drafting Reference Guide* presents the topography features that should be shown on the plan sheet. This includes utility and drainage features, buildings, streams, railroads, wells, and other elements affected by the roadway improvement. Trees and other landscaped elements should be shown graphically. In general, show existing elements with light, dashed lines and proposed elements as darker, solid lines.
 7. North Arrow. Show the appropriate district North arrow on each plan sheet. The roadway cell library provides cells for each district North arrow.
 8. Items to be Removed. Show items within the right-of-way limits that will be removed with cross hatching. Clearly note those items that will be removed by others.
 9. Station Call Outs. Provide station call outs at the following locations:
 - beginning and ending points of the project;
 - match lines with other projects;
 - omissions from paving and station equations;
 - 100 ft (50 m) station increments;
 - horizontal curve points (e.g., PC, PI, PT);
 - beginning and ending points of tapers, including the distance and direction from the centerline;

- construction limit locations and right-of-way breaks, including distance and direction from the centerline for right-of-way breaks;
- curb returns for entrances and intersections, including distance and direction from the centerline;
- entrance locations, including the type, width, and surface material of the entrance;
- special or atypical construction applications that cannot be determined by other means (e.g., short sections of curb and gutter replacement, sidewalk replacement, termini for milling, sign removals);
- side street intersections;
- permanent survey and right-of-way markers, including the distance and direction from the centerline;
- section line ties, right-of-way takes, etc., including the distance and direction from the centerline; and
- other locations where appropriate.

Show all distances from the centerline to the nearest one-half foot (i.e., 0.5 ft) (tenth of a meter (i.e., 0.1 m)) unless greater accuracy is required (e.g., horizontal curve data, right-of-way takes).

10. Utilities and Drainage. In general, separate plan and profile sheets should be provided for all proposed drainage and utilities improvements. These sheets are discussed in Section 63-4.09. Where the drainage or utilities features affect construction, these features may be shown on the plan view (e.g., removal of existing culvert, patching for new utility lines). For these situations, note the type and size of the drainage or utility feature (e.g., 1 ft (300 mm) gas line).
11. Right-of-Way. Where right-of-way acquisition is necessary, consider using separate right-of-way sheets to show this information (see Section 63-4.10). Existing and proposed right-of-way limits, however, are always shown on the plan view. Where separate right-of-way plans are not included, note the following on the plan view:
 - the dimensions of the property to be acquired;
 - station ties to property lines;
 - property ownership lines, parcel numbers, and property owners names;
 - breaks in the right-of-way alignments, including the station and distance from the centerline;

- all temporary and permanent easements necessary to accommodate intersecting roads and streets, access roads, temporary runarounds, detours, drainage areas, material storage areas, slope widenings, utilities, railroads, or other special uses;
 - where the control of access limits do not coincide with the right-of-way limits;
 - location of right-of-way markers; and
 - any pertinent data affecting the cost of the right-of-way (e.g., structures, businesses, access roads, improvements, fences).
12. Access Lines. On projects where the access rights have been or will be acquired, show all approved points of entry to or exit from the traffic lanes. List each approved point of access, other than those by a ramp at an interchange, by entrance centerline station in a tabular form and by symbol at the appropriate point. Show both the control of access line and the right-of-way line even where such lines are coincident. If control of access is accomplished by constructing a frontage road, it will not be necessary to draw in detail the entrances to the frontage road from the property abutting the highway right-of-way. In these cases, show the control of access line between the frontage road and the mainline facility. Show any access points between the frontage road and the mainline facility in detail. If an approved point of access is a temporary measure under stage development, identify it with an appropriate note as to how it will be eliminated in the future.
13. Guardrail. Show the locations for new and existing guardrail on the plan view.
14. Side Roads and Entrances. When showing side roads and entrances on the plan view, the following apply:
- Use light, dashed lines to present existing public roads and entrances.
 - For public facilities, note the route number or street name on the side facility. Label private entrances "Private" or "PE," field entrances "Field" or "FE," and commercial entrances "Commercial" or "CE."
 - Outline commercial entrances in detail with dashed lines to show current usage.
 - Note the type of existing surface material.
 - For intersections with public roads, show the angle of intersection from side road centerline to the mainline centerline.
 - Provide the width of the intersecting facility.
 - Indicate the direction of flow in the drainage ditch with an arrow.

15. Special Details. Where special details are required (e.g., steps, retaining walls, pavement joint repair), note the sheet where the detail can be found. In general, do not include the detail on the plan sheet.
16. Miscellaneous. All features, not listed above, should be labeled and, where necessary, the applicable station called. Also, note the distance and direction from the centerline. Some of these elements may include:
 - sidewalks (e.g., “6 ft (1.8 m) PCC SW, HANDICAPPED RAMP”);
 - curb and gutter (e.g., “COMB. CONC. CURB & GUTTER, TY-B”);
 - special paving instructions (e.g., “CLASS B PVMT PATCH”);
 - special instructions (e.g., “DO NOT REPLACE EXISTING SIDEWALK”);
 - construction done by others (e.g., relocation of utilities); and/or
 - fencing (include size and type).

63-4.07(c) Profile View

The profile should present the existing survey gradeline and proposed improvement profile. The following presents the recommended guidelines for the profile view:

1. Location. The profile typically represents the vertical plane intersecting the finished surface of the pavement wearing course or the top of the subgrade along the centerline of the proposed improvement. Add a note on each profile view to indicate whether the profile grade line represents the pavement surface or the top of the subgrade. Where the profile does not represent the centerline, note its actual location on each profile view.
2. Scales. The profile horizontal scale should use the same scale as the plan view. The vertical profile scale is generally 1" = 5' (1:60) or 1" = 10' (1:120).
3. Existing Ground Line. Plot the existing ground line with a dashed line to the nearest 0.1 ft (0.01 m) and existing pavement surfaces to the nearest 0.01 ft (0.001 m). If the centerline is not on the existing pavement but the existing pavement is nearby, plot the profile of the existing pavement, but do not record the elevations.
4. Vertical Alignment Data. Chapter 33 presents the criteria for vertical alignment. The vertical alignment data should be shown in the plans as follows:
 - a. Vertical Curve Notations. Depict the VPC and VPT on the profile grade line with small circles (approximately 0.1 in (2.5 mm) in diameter). Use a small triangle for the VPI with short segments of the vertical tangents. VPI notes should provide the VPI station (to the nearest hundredth of a foot — 00 + 00.01 (thousandth of a meter — 0 + 00.001)), the elevation (to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001 m)), the vertical curve length (see Comment b. below), and “E” distance — the vertical distance (offset) between the VPI and proposed roadway surface (to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001m)). Do not include other vertical curve

information (e.g., K-values, passing sight distances). Place the VPI notes horizontally above the profile for crest curves and below the profile for sag curves. The VPC and VPT stations and notations are generally not recorded.

- b. Vertical Curve Lengths. Round the vertical curve calculations from Chapter 33 to the next highest 50 ft (10 m) increment. The existing vertical curve distance may be shown to the nearest one-half foot (i.e., 0.5 ft) (tenth of a meter (i.e., 0.1 m)).
 - c. Tangent Grades. Show tangent grades along the profile grade line to the hundredth of a percent (i.e., 0.01%). Positive grades should be shown with the “+” prefix and negative grades with the “-” prefix. A “+” prefix indicates that the grade is ascending from left to right.
5. Benchmarks. Show benchmark identifications and elevations along the top of the profile sheet at the approximate location they appear along the centerline (to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001 m)). The benchmark number and location should be fully described so that it can be easily located in the field (e.g., “BM #2 — ON NE BOLT OF FH ON NW CORNER OF 1ST AVE AND MAIN ST”).
 6. Elevation Labeling. Note the full stationing along the bottom of the profile sheet at 100 ft (50 m) stations. Show the survey elevations and proposed centerline elevations at 100 ft (25 m) intervals for rural projects and at 50 ft (10 m) intervals for urban projects. For vertical curves, use a closer interval. Show the elevations vertically along the station ordinate line to the nearest hundredth of a foot (i.e., 0.01 ft) (thousandth of a meter (i.e., 0.001 m)). The survey line elevation is to the left of the station ordinate line, and the proposed centerline elevation is to the right of the station ordinate line.
 7. Pavement Edge Profiles. For drainage purposes and other reasons (e.g., superelevation), it may be desirable to also show the left and right pavement edges. Use a different line type to indicate these profiles (e.g., series of dashes and dots). Clearly label each profile line (e.g., “LEFT AND RIGHT PAVEMENT EDGE”).
 8. Undercutting. Only show undercutting on the profile where unsuitable material is being removed. Show this area with crosshatching. Note that the undercutting should only be shown to the top of the subgrade and not to the profile grade line. For each undercut location, note the station locations and the depth of excavation.
 9. Drainage/Utilities Structures. In general, show the drainage and underground utility locations on the drainage profile sheets. However, for small projects with minimal drainage and underground utilities, these items may be shown on the mainline profile. Section 63-4.09 provides the information that should be incorporated.
 10. Ditch Profile Sheets. If no drainage profile sheets are provided, supplemental profile sheets may be provided after the plan and profile sheets to illustrate special ditches and paved ditches. Note the gradient percentage, stationing, beginning and ending elevations, and elevations at all gradient changes. For rural projects, the ditch profiles can be shown on the mainline plan and profile sheets.

11. Bridges. At bridge locations, whether existing or proposed, the profile should include an elevation sketch (to scale) showing the elevations for the abutments, piers, the low vertical clearance point, high water level, and the stream bed.
12. Side Roads. Profiles for side roads may be provided on separate profile sheets or on the cross sections. If separate profile sheets are used, they should be provided after the mainline profile sheets and placed in the order they appear along the mainline. Clearly identify each profile view as to what street or side road the profile view applies. Entrance profiles are typically plotted on the cross sections.
13. Miscellaneous Profiles. Under special circumstances, it may be desirable to provide profiles for tops of curbing, sidewalks, detours, etc. Where these profiles are provided, use a different line type and clearly identify the profile.

63-4.07(d) Surplus Excavation Disposal

The contractor is to dispose of excess waste material, which results from construction operations, off the project right-of-way unless permission is received from the Engineer to place it within the project limits. In many cases it is acceptable to waste this material on the right-of-way when the placement does not adversely affect environmentally sensitive areas, safety, drainage, or aesthetics. When the designer knows that the construction operations will result in excess excavation, find locations within the project limits to place this material.

Consider the following factors when selecting locations:

1. Environmental. The area should not contain wetlands or other environmentally sensitive areas.
2. Drainage. The designer should be certain that drainage will not be adversely affected by any excavation placed on the project.
3. Safety. The wasted material should not create sight distance problems or mounds that could affect a vehicle that has left the roadway.

Areas where it may be permissible to waste this material include flattening front slopes, filling in depressions, interchange infields and in general the area between the top of the back slope and the R.O.W.

The designer should show the areas on the plans and include a schedule showing Station to Station, offset, thickness allowed, and quantity of material that can be wasted. The designer should also include the quantity of material that still needs to be wasted off of the project.

63-4.08 Stages of Construction and Traffic Control Sheets

The strategy for maintaining traffic during the roadway improvement will be described in the Phase I report. For minor projects (e.g., resurfacing, minor widening), the control of traffic can

typically be addressed by referencing the applicable *IDOT Highway Standards*. For major projects (e.g., major widening, extensive replacement of storm sewers), the designer must develop a more detailed set of traffic control plans, often with stage construction. The designer also must develop traffic control plans for projects with detours, runarounds, or other roadways specifically constructed for traffic control.

Where traffic control plans are required, the designer should use the existing topography plans to lay out the staging. A brief description of each construction stage should be provided. The traffic control sheets should include:

- the temporary roadway horizontal alignment;
- the temporary roadway profile gradeline;
- the temporary pavement needed to maintain traffic;
- the proposed area of construction for each stage;
- the temporary traffic lanes;
- signing for the work zone;
- temporary pavement markings;
- temporary roadside safety layouts;
- typical sections for each construction stage;
- a breakdown of work that should be performed during each stage;
- traffic control standards for each stage; and
- general notes for time frames, closures, etc.

63-4.09 Erosion and Sediment Control Details

Projects, which expose areas of soil to potential displacement by storm events, require erosion and sediment control details to be included in the plans. For minor projects (e.g., resurfacing, minor widening), sediment control can typically be addressed by referencing the applicable *IDOT Highway Standards* and by specifying the items in schedules. For major projects (e.g., major widening, extensive earthwork, extensive replacement of storm sewers), the designer must develop a more detailed set of erosion and sediment control plans, including stage construction plans where applicable. The designer should refer to Chapter 41 for details on erosion and sediment control.

63-4.10 Drainage and Utilities Sheets

Drainage and utilities plan details are generally required for all jobs where drainage and/or utilities are involved. This includes constructing new drainage systems, expanding existing drainage systems, or adjusting existing drainage structures. Where the existing drainage and utilities are not affected by construction, then separate drainage and utility sheets will not be required.

63-4.10(a) Existing Information

If a Phase I report was completed, the existing drainage and utility information should have already been incorporated onto the existing topography plans and plotted using CADD. If the project does not have a Phase I report, then the information must be added to the plans during plan preparation. Information on the existing drainage can be found in the project survey books. Additional information can be obtained from copies of old plans. To determine existing utility locations, the designer must submit existing and proposed plans to the district utility coordinator. The district utility coordinator forwards the plans to the utility companies impacted by the project to obtain information on the utility locations. This submittal should occur as soon as practical during plan preparation because of the lengthy time frame to obtain utility information from the utility companies. Chapter 6 provides information on coordination with utility companies.

To incorporate the existing drainage information using CADD, provide the survey data to the district CADD unit. The plans marked by the utility companies can also be provided to the district CADD unit for plotting. If the project is not being drafted using CADD, then the information must be plotted manually. Typical symbols have been established for showing drainage and utility information and should be met when preparing the plans. These symbols are provided in the roadway cell library.

63-4.10(b) Proposed Design

Information on drainage design is included in Chapter 40 of the *BDE Manual*, the *IDOT Drainage Manual*, and the *IDOT Drainage Tables for Inlet Spacing*.

The designer should also review the information in the Phase I report. This report provides the locations of drainage outfalls for storm water, and notes any drainage problems and the need for permits.

Permits may be required from the Metropolitan Water Reclamation District of Greater Chicago (District 1), the Division of Natural Resources, the Environmental Protection Agency, and the Army Corps of Engineers. The need for a permit is usually based on who has jurisdiction for the drainage outfall and the impact of the improvement on possible flooding and the environment. The designer must always assess the need for a permit for a project even though the Phase I report may not have specified a need. Chapter 28 provides additional information on permits.

63-4.10(c) General

Once the mainline plan and profile sheets have been prepared, the designer should use these sheets to plot the drainage and utility information. If the mainline plan and profiles are provided on separate sheets, then the drainage plan and profile sheets should also be provided on separate sheets. Only the information necessary to construct the drainage and utility items should remain on these sheets. The designer should ensure that the levels of all other superfluous information be turned off.

63-4.10(d) Plan View

The following information should be shown on the drainage plan view sheets:

1. **Symbols.** The roadway cell library provides the symbols that are used to denote the various utility and drainage lines on the plan view. Provide a legend of these symbols on the first drainage sheet. Legends should also be provided on every sheet if it does not hinder the sheet's clarity. Only use the appropriate abbreviations as presented in the *IDOT Highway Standards*.
2. **Culverts.** For culverts or cross drains, note the following on the plan view:
 - station locations for the ends, including direction and distance from the centerline;
 - culvert type;
 - pipe size and length;
 - flow direction;
 - skew angle;
 - upstream and downstream flow elevations (to the nearest tenth of a foot — 0.1 ft (hundredth of a meter — 0.01 m));
 - end section or headwall type and size; and
 - for existing culverts, the pipe size, material type, and any instructions to the contractor (e.g., "TO REMAIN IN PLACE," "EXTEND EXISTING CULVERT").
3. **Structures.** Structures are shown on the plan sheet with the general details provided in the profile view. Detailed design information will be provided in the structure plans.
4. **Storm Systems.** Show storm drainage systems or closed drainage systems on the plan view as follows:
 - a. **Storm Sewer Pipes.** Note each run of pipe between manholes, inlets, catch basins, etc., according to its diameter, length (to the nearest tenth of a foot — 0.1 ft) (hundredth of a meter — 0.01 m), and gradient (to the nearest hundredth of a percent — 0.01%) (e.g., "24 in SS x 20.5 ft @ +1.52%" ("600 mm SS x 6.28 m @ + 1.52%")).
 - b. **Manholes, Catch Basins, Inlets.** Provide the following information for these devices:
 - station location and direction and distance from the centerline;

- the device type;
- top of grate elevations (to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001 m)); and
- invert elevations for all pipes (to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001 m)).

As an option, the designer may provide a numerical symbol for each of the above devices and list the information in a tabular format on the sheet.

- c. End Sections. Note the type, size, and location offset from centerline for the end section on the plans.
 - d. Existing Facilities. Note the proposed disposition of all existing facilities directly next to the facility or as a general note in the plans (e.g., “MANHOLE TO REMAIN”, “REMOVE OR ABANDON ALL EXISTING CATCH BASINS, INLETS AND MANHOLES”).
5. Ditches. Note special ditch locations with invert elevations at 100 ft (25 m) intervals on the earthwork cross sections and not on the drainage plan sheets.
 6. Utilities. Note utility locations on the plan view as follows:
 - a. Overhead. Where overhead utilities cross the centerline, note the centerline station where the utility crosses and the type of utility (e.g., telephone, electrical).
 - b. Underground. Where underground utilities are within the right-of-way limits, indicate the applicable centerline station, the type of utility, and the size and depth of the utility. All valve boxes, utilities manholes, etc., constructed by the contractor should be noted similarly as discussed for catch basins, manholes, and inlets in Comment 4 above.

63-4.10(e) Profile View

The following provides the procedures for presenting the drainage and utility information on the profile view:

1. Profiles. Use the centerline profile where the plan and profile views are provided on the same page. However, where separate profile sheets are provided, provide separate profile views where two or more systems are located longitudinally along the project.
2. Profile and Elevation Labeling. The criteria for labeling the profile and elevations along the profile as presented in Section 63-4.07(c) also apply to drainage profiles.
3. Storm Systems. Show storm drainage systems or closed drainage systems on the profile view as follows:

- a. Storm Sewer Pipes. Note each run of pipe according to its diameter, type, length (to the nearest tenth of a foot — 0.1 ft (hundredth of a meter — 0.01 m)); and gradient (to the nearest hundredth of a percent — 0.01%) (e.g., “24 in SS TY-2 85.5 ft @ -0.75%” (“600 mm SS TY-2 26.15 m @ - 0.75%”). The pipe length is determined where all the above information is the same for the pipe. This pipe length may pass through manholes, catch basins, and inlets. If one of the above pieces of information changes, then provide a separate note for the pipe (e.g., where the gradient changes).
 - b. Manholes, Catch Basins, Inlets. The following information should be provided for these devices:
 - station location and direction from the centerline;
 - the device type and size;
 - invert elevations for all pipes leading into and out of the device (to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001 m)); and
 - top of casting elevation.List this information vertically along the station ordinate.
 - c. End Sections. All end sections should be shown with the following information:
 - station location and direction from the centerline,
 - the device type and size, and
 - outflow elevation at the bottom of the pipe.
4. Utilities. The following apply to utilities:
 - a. Work Conducted by IDOT. Underground utilities being moved or constructed by the Department’s contractor should be noted on plan sheets similarly as discussed for storm drainage systems in Comment 3.
 - b. Work Conducted by Others. Show only those utilities that are affected by the improvement. Clearly label the affected utility according to its type and size (e.g., 1 in (25 mm) water main, 3 in (75 mm) gas line).
 5. Ditches. Note the gradient percentage, stationing, beginning and ending elevations, and elevations at all gradient changes.

63-4.11 Right-of-Way Plan Sheets

Where additional right-of-way is required on the project, the designer should consider including the right-of-way plan sheets(or plat of highways sheets) within the plans. These drawings allow

the designer to remove the right-of-way dimensioning from the mainline plan and profile sheets, thereby improving their clarity.

63-4.12 Intersection Details

The designer may be required to provide special plan views of large or complex intersections where the general plan and profile sheets cannot adequately illustrate the horizontal alignment details and elevation controls. Only the necessary information for the geometric layout should be provided (e.g., no topography should be shown). Intersection details generally use a 1-in = 20-ft (1:250 metric) scale. Some of the elements shown on the intersection detail may include:

- pavement elevations to determine cross road profiles, drainage characteristics, etc.;
- lane widths;
- curb or edge of pavement radii;
- curb ramps for the disabled;
- turning radii for the left-turning design vehicle;
- location of median noses and islands;
- location of traffic signs (e.g., stop, keep right, one-way);
- location of traffic signal poles, mast-arms, loop detectors, etc.;
- pavement markings; and
- construction joint layout.

Clearly show the name of the intersection on the right side of the detail.

63-4.13 Pavement Marking Details

Pavement marking plans are required for all projects where work on the roadway will disrupt the existing pavement markings and where more detail is required than that shown in the *IDOT Highway Standards*.

It is the designer's responsibility to provide the plan view to the appropriate unit as soon as practical during plan development. The Bureau of Operations may or may not develop the pavement marking details depending on the project type, time constraints, and workload. If the Bureau of Operations does not develop the pavement marking details, the designer will be responsible for developing these details. If the designer develops the details, the pavement marking plans still must be reviewed by the Bureau of Operations.

Copies of the general plan sheets will be used to show the pavement markings. However, only show the proposed improvement. The existing topography, right-of-way, drainage information, etc., should not be shown. This allows the pavement markings to clearly stand out. In developing the pavement markings sheet, the designer should consider the following:

1. Labeling. Pavement markings that are not covered by the *IDOT Highway Standards* must be specified and labeled on the pavement marking sheet.

2. Dimensioning. Provide dimensions for lane and median widths. Show stations for all break points in the pavement markings, or use dimension lines to locate and show the lengths of pavement marking lines.
3. Raised Reflectors. In addition to pavement markings, raised reflective pavement markers may be specified on a project. They are normally included on all projects where there is no lighting. Contact the Bureau of Operations to determine where they should be used. Raised reflector locations will not be shown on the pavement marking sheets unless they deviate from the *IDOT Highway Standards*.
4. Large Projects. On very large projects with continuous markings, it only may be necessary to show a typical detail of the pavement markings on each sheet.
5. Chicago Projects. District 1 must obtain the details for pavement markings for projects within the City of Chicago. The City of Chicago must review all pavement marking plans within the City.

63-4.14 Special Plans

There are several other bureaus that are responsible for preparing specific details for plans. They are discussed in the following section. The designer will be responsible for providing the plan details to the appropriate bureau. It is important that this information be provided as early as practical to the responsible bureau during plan development to allow time to complete the details and submit them back to the designer for project letting.

63-4.14(a) Landscaping Details

The Phase I report generally includes a statement on landscaping. Whether there is a Phase I report or not, it is the designer's responsibility to ensure landscaping has been considered for a project and that landscaping plans, if required, are included.

Landscaping plans are prepared by the Bureau of Operations. The Bureau provides the designer with landscaping plans, special provisions, pay items, and quantities for incorporation into the final contract. Include schedules of landscaping pay items with other schedules of quantities as discussed in Section 63-4.04(d) along with their botanical and common names clearly shown.

Landscaping details must be coordinated with municipalities, and their input should be considered when preparing the final details. In some cases, local officials may wish to incorporate their own landscaping details into the Department's contract. This can be done by agreement to establish cost participation.

63-4.14(b) Traffic Signal Plans

Traffic signal plans are required on all projects where the project includes new signals, modernization of existing signals, interconnecting signals, or milling the HMA surface at signalized intersections. Milling the HMA surface may damage the existing detector loops in the pavement.

The Bureau of Operations prepares the traffic signal plans and provides the designer with the final plans, special provisions, pay items, and quantities. It is the designer's responsibility to incorporate the traffic signal plans into the final contract.

The designer must provide the Bureau of Operations with the proposed roadway information so the Bureau can prepare its plans in a timely manner. This consist of preparing a 1 in = 20 ft (1:250 metric) scale intersection plan for all signalized intersections requiring work within the project. The designer should also submit the traffic signal information form to the Bureau of Operations.

63-4.14(c) Lighting Plans

The Phase I report generally includes a statement on lighting. Whether there is a Phase I report or not, it is the designer's responsibility to ensure lighting has been considered for a project and that lighting plans, if required, are included in the final plans. Wherever there is existing lighting on a project, some involvement with proposed lighting work is almost certain.

For all districts except District 1, lighting plans are prepared by the Bureau of Design and Environment Preliminary Engineering Section. In District 1, plans are prepared by the District 1 Bureau of Electrical Operations. The designer will be required to provide the plan view of the project and location of power source as early as practical to the applicable unit to complete its plans, special provisions, pay items, and quantities. The designer incorporates this information into the final contract.

Lighting on a project may be a municipally maintained system. In this case, the municipality must be contacted to determine the disposition of the lighting after completion of the project. There are two possibilities for preparing municipal lighting plans:

- the municipality performs its own lighting improvements coincident with the roadway work or after the project is completed; or
- the municipality may have IDOT perform the lighting design as part of its project. The Department bills the municipality accordingly by agreement.

If a municipality prepares the lighting plans, these must be submitted for review to the appropriate district for review and approval. The district submits the plans to the appropriate lighting unit. After the plans are approved, the municipality will be responsible for providing IDOT with the final lighting plans, special provisions, pay items, and quantities for incorporation into the final contract.

63-4.14(d) Structure Plans

Structure plans are required for all designs with structural elements including new bridges, bridge replacement, bridge repairs, retaining walls, box culverts (new or extensions to existing), junction chambers, and noise abatement walls.

Most major structure plans are prepared by consultants. The Bureau of Bridges and Structures in the Central Office will be responsible for reviewing and/or preparing the structure plans. The designer must provide the proposed roadway information to whomever is preparing the structural design. It is important to include information on the proposed construction staging in this submittal.

The structural engineer's final plan submittal includes the final plans, special provisions, pay items, and quantities for the designer to incorporate into the final contract plans.

For bridge repairs involving nonstructural work (e.g., repairs to such items as the existing deck, parapets, and deck joints), plan details are typically prepared by the district. A "Bridge Condition Report — Deck Repair" is prepared in the district Bureau of Program Development and it includes recommendations for the type of work that should be performed. Plans for bridge repairs must be submitted to the Bureau of Bridges and Structures at least three months prior to the submittal of the plans for letting in order to allow time for their review.

63-4.14(e) Wetland Plans

For projects that involve restoring or creating wetlands as a part of the environmental mitigation commitments, the designer will be responsible for ensuring the plans and special provisions include appropriate details regarding the wetlands work. This information must address the work necessary to provide the elevations, contours, hydrology, soils, and plants for the type, size, and location of wetlands to be provided. The type, size, and location of the wetlands will have been agreed upon through consultation with regulatory and natural resource agencies and documented in a written conceptual mitigation plan prepared and approved during Phase I. The plan information should include the overall schedule for the wetlands work, including the relationship to other aspects of project construction. The information should also include a description of any special measures to be implemented during construction to avoid and minimize unnecessary construction-stage impacts to existing wetlands (e.g., placement of geotextile fabric to prevent permanent compaction of wetlands soils) and to correct temporary impacts (e.g., restoration of preconstruction contours, replanting, or reseeded areas where wetlands vegetation is disturbed or destroyed).

Show the information concerning any manipulation of soils and hydrology that may be necessary for establishing the wetlands on the plan sheets for grading work. Also, show planting information on plan sheets and in the appropriate specifications. Show the schedule of quantities in the same manner as for other pay items.

63-4.15 Special Details

Detail sheets are used for those items that require more specific information than can be adequately described on either the plan or the profile views of the plan and profile sheets. Detail sheets are used to present:

1. Drainage Drawings. Special details are required for those drainage features not provided in the *IDOT Highway Standards*. This may include all special storm sewer layouts, culverts, inlets, catch basins, manholes, and any other drainage appurtenances. The detail sheets should show lengths, sizes, flow line elevations at ends of drainage structures, changes in flow line grade, and/or any other pertinent drainage details.
2. District Details. These are details that have been developed by each district and are generally only applicable to that district. These sheets are in addition to the *IDOT Highway Standards*. The designer should review these sheets prior to developing any new special details. These details are generally already on CADD.
3. Interchange Details. These are the contour maps around an interchange required for computation of the earthwork quantities. These details are in addition to those provided in the plan and profile sheets. They generally do not include any dimensions. Existing contours are shown as dashed lines, and proposed contours as solid lines.
4. Transitions. Details should be provided showing transitions in surface or base course widths. In addition, show the beginning and ending stations and the distance left or right of the centerline to the controlling points, and any other curve data required to construct the transitions.
5. Signing. Signing plans may or may not be included in roadway contracts. The designer is responsible for preparing the signing plans, special provisions, pay items, and quantities for incorporation into the final contract. To determine sign layout and location, use the criteria in the Bureau of Operations' *Traffic Policies and Procedures Manual*. For sign support design, use the criteria in the Bureau of Bridges and Structures' *Sign Structures Manual*.
6. Special Designs. Additional details may be necessary as plan preparation progresses, which must be developed by the designer (e.g., pavement joint details, superelevation, special guardrail designs, highway/railroad grade crossings). It is important to include sufficient information on these details so that it is clear and understandable for the contractor to accurately bid on the work and for the resident engineer to construct it. However, do not include the code numbers for specific pay items on these sheets.

Clearly label each detail sheet in the sheet description block in the lower right corner of the sheet. The sheet description block should show the name of the detail and the station(s) to which it applies.

63-4.16 Cross Sections

Cross sections provide a graphical representation of the proposed roadway as compared to the existing ground line. Cross sections are generally required on all projects, except those involving resurfacing and/or projects with no earthwork. The following sections present the general guidelines for developing cross section sheets.

63-4.16(a) Procedure

If a Phase I report was prepared, the existing cross sections should have already been developed and may have been plotted using CADD. If the cross sections have not yet been plotted, the designer will be responsible for plotting or having the cross sections plotted. For small projects, the designer may plot the cross sections manually. However, for most projects, the cross sections should be generated using GEOPAK. The designer should review the users' manual for GEOPAK to determine what information can be plotted with this software package.

63-4.16(b) Layout

When laying out cross sections, the following guidelines should be considered:

1. Orientation. Preferably, draw the cross section horizontally (landscaped) on the sheet. If more practical, the cross sections may be drawn vertically (portrait). Draw the cross sections from the bottom of the page to the top in increasing stations.
2. Spacing. Ensure that the spacing between cross sections is such that there is no overlap of the individual cross section figures, especially in areas of large cuts or fills.
3. Intervals. In rural areas, plot the cross sections at 100 ft (25 m) intervals and in urban areas at 50 ft (10 m) intervals. Plot additional cross sections at major grade breaks, culvert crossings, side streets, entrances, and other locations as necessary. Show the appropriate station for each cross section directly below or to the right of the cross section. For intermediate sections, the cross section may only need to be drawn to the centerline or the profile grade line.
4. Order. Provide the mainline cross sections first, in increasing stations. Individual cross sections for minor approaches generally will be shown as half sections at the station they occur along the mainline. Where major construction is conducted for a significant distance along side roads, frontage roads, ramps, etc., place the cross sections for these facilities after the mainline cross section in the order they appear along the mainline. Clearly label each special cross section sheet to allow the user to identify the actual location of the cross section.
5. Scales. The horizontal scale will typically be 1 in = 5 ft (1:50 metric) or 1 in = 10 ft (1:100 metric). A larger scale may be used where a greater cross section or height is desired. The vertical scale should always be a 2:1 proportion of the horizontal scale. Show the

scales used in the lower right-hand corner of each cross section sheet if not otherwise labeled.

6. Axis Labeling. Along the horizontal axis, "0" is placed at the centerline or profile grade line of the existing facility. Label other horizontal axis points left and right of the "0" in at least 10 ft (3 m) increments. For the vertical axis, the axis lines are labeled in 5 ft (1 m) increments. Show at least two elevation lines. Note the scaling between the horizontal and vertical (i.e., 2:1 proportion).

63-4.16(c) Plotting Details

Generally, plot the cross section slightly beyond the right-of-way line, or slightly beyond the slope intersection of the proposed improvement with the existing ground line. The distance plotted will be determined based on what is beyond the right-of-way or slope limits. Cross sections should be typically plotted using the following guidelines:

1. Existing Information. Show all appropriate existing information on the cross section including existing pavement structures. Show these elements with a light, dashed line. The existing roadway centerline is typically centered on the sheet. Some of the existing information that should be shown includes:
 - ground line;
 - pavement structure;
 - drainage structures;
 - all below-ground and major above-ground utilities including sanitary sewers, water lines, electrical lines, gas lines, utility poles, etc.;
 - bridges, buildings, retaining walls, or other structures;
 - right-of-way and temporary easement lines; and
 - bodies of water near the right-of-way limits.
2. Proposed Sections. Overlay the proposed cross section template on top of the existing cross section. Show the proposed improvements as dark, solid lines. Some of the proposed cross section elements shown include:
 - the centerline, or the profile grade line, if different from the centerline;
 - proposed pavement improvements;
 - pavement structures;
 - all side road and entrance approach adjustments;
 - curb and gutter;
 - sidewalk location and depth;

- proposed sideslope;
 - special fill material location and depth; and/or
 - other special features (e.g., steps, ramps, retaining walls).
3. Drainage Structures. Plot all drainage structures to scale including inlets, catch basins, and manholes. Label each structure with the following information:
- the station at which the structure is located;
 - the distance from the centerline to the nearest tenth of a foot — 0.1 ft (hundredth of a meter 0.01 m) and direction from the centerline;
 - description and size of the structure; and
 - top and flow line elevations, to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter — 0.001 m).
4. Storm Sewers. Show all storm sewers to the appropriate scale on each cross section. Label the pipe diameter on the first and last cross section of each sheet.
5. Culverts. Where necessary, include culvert profiles at the appropriate station of the cross sections or on separate cross section sheets. Show both the existing ground line and culvert flow lines. Flow line elevations are shown at the ends of the culvert and at changes in grade. Culvert extensions should show the existing culvert flow line in the same line weight as the original ground.
- Show dimensions from the centerline to box culvert or pipe culvert ends to the nearest calculated tenth of a foot (i.e., 0.1 ft) (hundredth of a meter (i.e., 0.01 m)). These distances are measured at right angles from the roadway centerline to the ends of the culvert or to breaks in the flow lines. Round culvert lengths to 2 ft (0.5 m) increments. These dimensions should agree with those shown on the plan sheets.
- Culvert profiles are not required for culverts under entrances and minor side roads where the flow line of the culvert is the same as the flow line of the mainline ditch.
6. Ditches. Special ditches should also be noted and the flow line elevation shown to the nearest 0.1 ft (0.01 m) on each cross section. Also, show the direction of flow.
7. Utilities. Plot underground and major overhead utilities on the cross section where the utility is located longitudinally within the construction limits or where the utility crosses the existing or new centerline and is located within the construction limits. Some of the utilities that should be shown include water lines, sanitary sewers, gas lines, and major transmission lines. Label the size and type of each utility (e.g., 2 in (50 mm) gas line) on each cross section.
8. Grading Notes. Show all undercuts for subgrade and unsuitable material (e.g., topsoil, peat) on the cross section. Porous granular material for backfill is also shown as a

shaded area. Note the cut and fill amounts, in square yards (square meters), below or next to each cross section. These areas are based on the end areas. Additional grading notes may be added to the cross sections to provide direction to the contractor (e.g., "GRADE TO DRAIN"). Also, show all earthwork for temporary pavements on the cross section.

9. Approaches. Show all approaches (e.g., side roads, streets, entrances) with a separate cross section at the appropriate station. This cross section may only consist of a half section to the centerline or the profile gradeline. Note the approach type, direction from centerline, and station next to the cross section (e.g., "PROFILE P.E. LT. STA. 101 + 44.32" ("PROFILE STA. 267 + 40.32 SOUTH ST")). Label the approach type according to the entrance type (e.g., residential, private, commercial) or street name. Show the approach slope as a percent.
10. Structures. Show all buildings, bridges, or other structures affected by construction on the cross section sheets.
11. Right-of-Way. In general, incorporate all permanent right-of-way lines onto the cross section. Also show temporary right-of-way and easement lines on the cross sections.
12. Labeling. In addition to the above, the cross sections should provide the following information:
 - a. Pavement Elevations. Show the final pavement surface elevation at the profile gradeline to the nearest hundredth of a foot — 0.01 ft (thousandth of a meter, 0.001 m). This elevation should be placed vertically. Other surface elevations as appropriate may be provided (e.g., high and low elevation points for superelevated sections).
 - b. Side Slopes. Label side slopes on each cross section of each sheet. Side slopes are labeled vertical to horizontal as a ratio (e.g., 1V:4H).
 - c. Stations. List the cross section stations shown on the sheet in the lower right corner of each sheet. In addition, if cross sections are provided for more than one facility, note the applicable facility name directly with the station listing (e.g., Route 34, Pine St.). Desirably, place this information outside of the cross section grid.
13. Earthwork. Show the earthwork end areas for cuts and fills, above or beside the cross section. For complex projects involving stage construction, list the end areas by stages.

63-4.17 Highway Standard Drawings

The *IDOT Highway Standards* will be the last sheets added to the project. For all projects, except those using the 8.5 in x 11 in sheet size, the Bureau of Design and Environment will be responsible for adding these sheets to the plans. The sheets added will be based on the listing provided in the Index of Sheets.

63-5 CONSTRUCTION TYPE CODES

Section 63-4.04 discusses the requirements the designer must follow to break down the quantities on the summary of quantities sheet. One of these breakdowns is based on the type of construction. Figure 63-5.A provides the coding system the Department uses for these construction breakdowns.

Code	Type of Construction
0001	Roadway, New Construction
0003	Roadway Reconstruction, Capacity Added (through lanes only)
0004	Roadway Reconstruction, No Capacity Added (full depth, rubblizing, 3R)
0005	Roadway, System Preservation & Resurfacing (SMART, 3P, surface treatments, patching, crack sealing)
0008	Bridge, New Construction
0010	Bridge Replacement, Capacity Added (through lanes only)
0011	Bridge Replacement, No Capacity Added
0013	Bridge Rehabilitation, Capacity Added (through lanes only)
0014	Bridge Rehabilitation, No Capacity Added (deck sealing, washing)
0020	Environmental Only (wetland mitigation, erosion control)
0021	Safety (traffic signals, lighting, sidewalks, EVPs, shoulders, rumble strips, guardrails, pavement markings, signage)
0028	Facilities for Bicycle/Pedestrian Trails
0031	Landscaping & Other Scenic Beautification (weed spraying, tree removal)
0040	Special Bridge (structures < 20', retaining walls, overhead sign structures, pump stations, storm sewers, noise barriers)
0042	Trainees
0043	Utilities
0044	Other (building demolition, drainage improvements, weigh stations)

CONSTRUCTION TYPE CODES**Figure 63-5.A**

63-6 SUGGESTED PLAN PREPARATION CHECKLIST

Date Completed _____ Route _____
Designer _____ Section _____
County/City _____

Cross off each item as checked and place this form in the project file.

ALL SHEETS

- 1. Complete sheet index block in the lower right-hand corner with the project section number, route number, county, contract number, and sheet numbers.
- 2. Use appropriate symbols, cell library, and abbreviations from the *IDOT CADD Roadway Drafting Reference Guide* and *IDOT Highway Standards*.

COVER SHEET

- 1. Indicate the location of the index of sheets, if not included on the cover sheet.
- 2. Show title information in the top center of the sheet and include:
 - project route number and common name,
 - section designation number,
 - location of improvement,
 - type of improvement,
 - county, and
 - construction job number.
- 3. Below the sheet index block, note the design number.
- 4. Locate the Illinois State map along the right side of the sheet. Also, indicate the project location on the map.
- 5. Show the graphic scales used on plans, profiles, and cross sections in the lower left-hand side of the sheet.
- 6. Provide the contract number in the lower left-hand corner of the sheet.
- 7. Provide a project layout map at bottom center of the sheet. Include on the map:
 - location of project, and north arrow,
 - beginning and end stations,
 - all important intermediate stations,

- prominent features,
 - names for special features,
 - route and street names,
 - description of all structures over 20 ft (6 m),
 - scale of location map,
 - township and range numbers, and
 - equation stations.
8. Provide the project gross and net lengths immediately below the layout map. Only include the mainline distances. Do not include length of intersection improvements.
9. Include the project approval block in lower right-hand corner of the sheet and check to ensure the signatures and dates for the following are included:
- Regional Engineer,
 - Engineer of Design and Environment,
 - Director of Division of Highways,
 - FHWA Division Administrator, where applicable, and
 - local officials, where applicable.
10. On consultant-designed projects, ensure that the consultant's company name, and the professional engineer's signature, date of their license expiration, and professional stamp are shown beside the State approval box.
11. Ensure that the note "PRINTED BY THE AUTHORITY OF THE STATE OF ILLINOIS" has been included in the lower right-hand corner.
12. Show the information for "JULIE" or C.U.A.N. somewhere on the cover sheet.
13. Include the design designation notation somewhere on the cover sheet.
14. Include district project engineer/squad leader name in left margin.

INDEX OF SHEETS, HIGHWAY STANDARDS, PLANS NOTES, COMMITMENT
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- 1. Completely fill out the sheet index.
- 2. Provide a list of all *IDOT Highway Standards* necessary to construct the project. Also, include the revision number.
- 3. Include all applicable general plan notes.
- 4. Include all applicable commitments.

SUMMARY OF QUANTITIES SHEET

- 1. Show the appropriate quantity breakdowns based on the construction and safety work type, project location, funding source, etc.
- 2. Provide the correct pay item code number and description (see Section 63-4.04(b)).
- 3. Use the appropriate pay unit; see *IDOT Standard Specifications* for the appropriate metric pay units.
- 4. Fill out the total quantities column.
- 5. Round all quantities in accordance with Chapter 64.
- 6. Provide separate schedule of quantities sheet for as many pay items as practical.

TYPICAL SECTION SHEET

- 1. Ensure that all applicable typical sections are provided.
- 2. Provide the mainline typical sections first, followed by other typical sections as they appear along the mainline.
- 3. Note the title of the typical section and applicable stations directly below the typical section.
- 4. Ensure the following have been included on the typical section:
 - horizontal dimensions rounded to nearest 0.1 ft (0.01 m);
 - vertical dimensions rounded to nearest $\frac{1}{4}$ in or $\frac{1}{8}$ in (5 mm or 1 mm) for resurfacing lifts;
 - the profile grade line reference, if different from the centerline;
 - types and depths of surface, base, and subbase courses;
 - side slopes expressed as a ratio of vertical to horizontal distances;
 - cross slopes expressed in inches/foot (US Customary) or percent (metric);
 - percent of superelevation; and
 - all other applicable notations.

- 5. Provide a table of base thickness where the base and subbase depths vary and include the applicable station limits.
- 6. Include all notes applicable to the typical sections.
- 7. Note all applicable pay items on the typical section.
- 8. Include the structural pavement design information.

ALIGNMENT, TIE, AND BENCHMARK SHEET

- 1. Where necessary for complex projects, include a geometric alignment figure. Also, include a coordinate layout sheet for all alignments, sideroads, radius returns, and parking lots.
- 2. Show schematics for reference tie locations that include:
 - the applicable centerline station,
 - the applicable control tie, and
 - the complete description of the features used to determine the tie location.
- 3. Show all mainline reference ties first, followed by those for other facilities.
- 4. Round all reference tie dimensions to the nearest 0.01 ft (5 mm).
- 5. Provide the benchmark data on this sheet and include the following information:
 - centerline station,
 - distance and direction from the centerline,
 - description of location, and
 - benchmark elevation.

PLAN/PROFILE SHEET

PLAN AND PROFILE VIEWS

- 1. Provide the mainline plan and profile sheets first, followed by other plan and profile sheets as they appear along the centerline.
- 2. Plot existing facilities with a light, dashed line and the proposed facilities with a solid, dark line.
- 3. Keep all notes brief, clear, and consistent.

- 4. Desirably, label the applicable stations in the lower right corner on each sheet.

PLAN VIEW

- 5. Show mainline stationing increasing from left to right. Note where the centerline line is not coincident with the survey line.
- 6. Provide tick marks along the centerline at 100 ft (50 m) intervals and note the station.
- 7. Use matchlines on sheet.
- 8. On projects where a coordinate system has been set up, show the coordinates for all control points.
- 9. For rural facilities, use a plan view scale of 1 in = 50 ft (1:500 metric). For urban facilities, use a plan view scale of 1 in = 20 ft (1:250 metric).
- 10. For all control points along the centerline, provide a 0.1 in (2.5 mm) diameter circle on the centerline.
- 11. Place the horizontal curve data on the inside of the curve to which it applies. Present the curve data in accordance with the format and accuracy presented in Figure 63-4.D.
- 12. Include the pavement edge elevations and superelevation rates for superelevated sections.
- 13. Show perpendicular lines from the centerline to the inside of the curve at all curve control points. Indicate the curve control point and station.
- 14. Where deflection angles are used, show the angle to nearest second of a degree. Include coordinates, if available.
- 15. Note all pavement widths at the beginning and end of each sheet and wherever there is a change in pavement width.
- 16. Provide the correct district North arrow on each sheet.
- 17. Ensure station call outs are provided at:
 - beginning and end points of the project,
 - matchlines with other projects,
 - omissions from paving and station equations,
 - 100 ft (50 m) station increments,
 - horizontal curve points,
 - beginning and ending points of tapers,
 - construction limit locations,
 - right-of-way alignment breaks,

- curb returns for entrances and intersections,
 - entrance centerlines,
 - special construction applications,
 - side street intersections,
 - permanent survey and right-of-way markers,
 - section lines, and
 - other necessary locations.
18. In general, do not show utility and drainage information on the plan and profile sheets. Provide this information on the drainage plan and profile sheets.
19. If separate right-of-way sheets are included with the plans, show the existing and proposed right-of-way limits on the plans. If the right-of-way plans are not included with the plans, also incorporate the following:
- dimensions of the properties to be acquired,
 - station ties to property lines,
 - property ownership lines,
 - parcel numbers,
 - property owner names,
 - station locations of right-of-way alignment breaks,
 - temporary and permanent easement locations,
 - points where the control of access does not coincide with the right-of-way line,
 - location of right-of-way markers, and
 - any pertinent data that affects right-of-way costs.
20. Show all approved points of entry or exits across control of access lines.
21. Show the locations for all new and existing guardrail installations.
22. For entrances and side road intersections, show the following:
- the facility with the applicable street name, route number, or entrance type;
 - the existing surface material type;
 - the width of the intersecting facility;
 - for intersections with public roads, the angle of intersection from the side road centerline to the mainline centerline; and
 - direction of ditch drainage.
23. Properly label all additional constructed improvements.

PROFILE VIEW

- 24. Show the profile of the finished surface or top of the subgrade along the centerline for the proposed facility.
- 25. Use the same horizontal scale as shown for the plan view. The vertical scale is typically 1 in = 5 ft (1:50 metric) or 1 in = 10 ft (1:100 metric).
- 26. Show the existing ground line to the nearest 0.1 ft (30 mm) and existing pavement surfaces to the nearest 0.01 ft (5 mm).
- 27. Show the vertical curve data above the profile line for crest curves and below the profile line for sag curves. Include the following vertical data for each curve:
 - small triangle at the VPI,
 - small circles (0.1 in (2.5 mm) diameter) at all other vertical curve control points,
 - the VPI station, including short segments of vertical tangents,
 - the vertical curve length,
 - the elevation at the VPI, and
 - the "M" distance between the VPI and roadway surface.
- 28. Show tangent grades to the nearest hundredth of a percent (i.e., 0.01%). Use a "+" prefix for positive grades and "-" prefix for negative grades.
- 29. If not shown on the benchmark sheet, show the benchmark information on the top portion of the profile view.
- 30. Show the elevations for the survey line and proposed centerline vertically every 100 ft (25 m) for rural projects and every 50 ft (10 m) for urban projects. For vertical curves, use a closer interval. The survey elevation is shown to the left of the station ordinate line and proposed centerline elevation to the right.
- 31. Provide additional profiles, where necessary, for:
 - pavement edges,
 - drainage structures,
 - special ditches,
 - side roads, and
 - other situations.
- 32. Show locations of all undercutting for unsuitable materials with cross hatching and show this excavation to the top of subgrade. Note the applicable stations and depth of excavation on the profile sheet.
- 33. For bridges within the project, show elevations for:

- abutments,
- piers,
- low vertical clearance points,
- the high water level, and
- stream bed.

STAGES OF CONSTRUCTION AND TRAFFIC CONTROL SHEETS

- 1. Determine which *IDOT Highway Standards* are applicable for the traffic control on the project.
- 2. Where necessary, provide plan view sheets showing:
 - temporary roadway horizontal alignment,
 - temporary pavement widths,
 - temporary traffic lanes,
 - proposed construction staging,
 - location of signing for work zones,
 - temporary pavement markings,
 - roadside safety layouts, and
 - general notes for construction, closures, time frames, etc.
- 3. Where necessary, provide the temporary roadway profile grade line on the profile sheet.

EROSION AND SEDIMENT CONTROL DETAILS

- 1. Determine which *IDOT Highway Standards* are applicable for erosion and sediment control on the project.
- 2. Where necessary, provide any commitments or General Notes that relate to erosion and sediment control.
- 3. Where necessary, provide plan view sheets showing:
 - proposed construction staging,
 - location of environmentally sensitive areas,
 - location of erosion and sediment control items, and
 - general notes for construction, pay items, etc.

DRAINAGE AND UTILITIES SHEETS

1. For culverts, note the following on the drainage plan view sheet:
- centerline station for the ends,
 - direction and distance of the ends from the centerline,
 - culvert type,
 - pipe size and length,
 - flow direction,
 - skew angle,
 - upstream and downstream flow elevations,
 - end section or headwall type and size, and
 - all applicable construction notes.

2. For storm drainage pipes, show the following:

Plan View

- each run of pipe between manholes, catch basins, and inlets;
- pipe diameter and length; and
- gradient.

Profile View

- diameter of pipe,
- type of pipe,
- length, and
- gradient.

3. For manholes, catch basins, and inlets, show the following:

Plan View

- centerline station,
- direction and distance from centerline,
- top of grate elevation, and
- invert elevations for all pipes.

Profile View

- centerline station,
- direction from centerline,
- device type and size,

- invert elevations for all pipes, and
 - top of casting elevation.
4. For end sections, show the following:
- Plan View
- centerline station and offset,
 - type, and
 - size.
- Profile View
- centerline station,
 - direction from centerline,
 - device type and size, and
 - outflow elevation at the bottom of pipe.
5. Note special ditch locations with invert elevations at 100 ft (25 m) intervals on the cross sections. On the profile view note:
- gradient percentage,
 - centerline station,
 - beginning and ending elevations, and
 - elevations at gradient changes.
6. Note all overhead utilities where they cross the centerline and the type of utility.
7. Note all underground utilities within the right-of-way limits affected by the construction with the following:
- Plan View
- centerline station,
 - direction and distance from the centerline, and
 - all applicable elevations.
- Profile View
- type and size.

PLANS FROM OTHER UNITS, SECTIONS, AND BUREAUS
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Where necessary, the following plan sheets are provided to the designer from other units, sections, and bureaus to be incorporated into the plans:

- 1. Right-of-way plans from the Bureau of Land Acquisition.
- 2. Pavement marking details from the Bureau of Operations. If the Bureau of Operations does not prepare the plans, then the designer should develop the pavement marking details.
- 3. Landscaping details from the Bureau of Operations.
- 4. Traffic signal plans from the Bureau of Operations.
- 5. Lighting plans from the BDE Preliminary Engineering Section or, in District 1, the Bureau of Electrical Operations.
- 6. Structural plans from the Bureau of Bridges and Structures.
- 7. The *IDOT Highway Standards* listed in the sheet index will be incorporated into the plans by the Bureau of Design and Environment for project letting.

DETAIL SHEETS

Where necessary, the following details may be included:

- 1. Intersection details which may include:
 - pavement elevations,
 - lane widths,
 - curb or edge of pavement radii,
 - curb ramps,
 - turning radii for left-turning vehicles,
 - location of median noses and islands,
 - location of traffic signal equipment,
 - location of traffic signs,
 - pavement markings, and
 - construction joint layout.
- 2. Special drainage details that are not covered in the *IDOT Highway Standards* or on the drainage plan and profile sheets.
- 3. District detail sheets.
- 4. Earthwork details for interchanges requiring significant earthwork.
- 5. Transition details where there is a change in the roadway surface or base course width. These details should include:

- beginning and end stations,
 - distances and direction from the centerline, and
 - all necessary curve data.
6. Signing plans, where applicable.
7. Wetland plans, where required.
8. Any special designs not covered in the *IDOT Highway Standards* or elsewhere in the plans.

CROSS SECTION SHEETS

- 1. Plot rural cross sections at 100 ft (25 m) intervals and urban cross sections at 50 ft (10 m) intervals.
- 2. Plot intermediate cross sections at all major grade breaks, pipe crossings, side streets, entrances, and other locations as necessary.
- 3. Ensure the spacings between cross sections do not overlap.
- 4. The mainline cross sections are placed first, by increasing stations, from the bottom of the sheet to top of the sheet. Provide the cross sections for other facilities after the mainline cross section in the order they appear along the mainline.
- 5. Note the stations of the cross section shown on the bottom of the sheet. Also note the name of the facility to which the cross sections apply.
- 6. Use a horizontal scale of 1 in = 5 ft (1:50 metric) or 1 in = 10 ft (1:100 metric). The vertical scale is a 2:1 proportion of the horizontal scale. Show the scales used in the lower right corner of each sheet.
- 7. Plot the existing cross section using a light, dashed line and show the existing:
 - ground line,
 - pavement structure,
 - drainage structures,
 - major utilities,
 - all affected structures,
 - existing and proposed right-of-way and easement lines, and
 - bodies of water near the right-of-way limits.

- 8. Plot the proposed cross section using a dark, solid line and show:
 - centerline (and the profile grade line, if different);
 - proposed pavement structure;
 - all side road and entrances;
 - curb and gutter;
 - sidewalk locations and depth;
 - proposed side slopes;
 - special fill materials;
 - all new drainage structures, include the following:
 - centerline station,
 - distance and direction from centerline,
 - description and size of structure,
 - top and flow line elevations;
 - all underground utilities affected by the construction;
 - special ditch elevations and drainage direction;
 - proposed right-of-way and easement lines; and
 - any other special features.
- 9. Provide the proposed centerline pavement surface elevation vertically on each cross section.
- 10. Label the side slope on the first and last cross section of each sheet and where there are changes in the slope. Show the side slope using a vertical to horizontal ratio, e.g., 1V:3H.
- 11. Show the end area cut and fill amounts, in square feet (square meters), above or beside each cross section.
- 12. Show all undercutting for subgrade and unsuitable material.
- 13. Show all earthwork for temporary pavements.
- 14. Provide separate cross sections for all approaches including side roads and entrances, and note the approach type, direction from centerline, and station next to the cross section.

