

PREPARATION OF PLANS GUIDANCE

INTRODUCTION

The preparation of construction plans involves preparing a set of drawings with sufficient details on location, geometric configuration, quantities and specifications of work on a project. To ensure a consistent interpretation of the plans, each sheet should have a standard format and content, and the sheets should be assembled in the same sequence. This guidance presents guidelines for plan preparation to ensure that construction plans will be clearly and uniformly prepared, and will be correctly interpreted by field staff and contractors.

GENERAL

Drawing Scale

See [Drawing Scales and Fonts](#) for the correct scale for each type of sheet.

Sheet Sizes

The standard full-size sheet for all final construction plans should be able to be plotted on 36 inch wide paper.

Cut plan sheets should have 100' overlaps for scales of 1" = 50' and 50' overlaps for scales of 1" = 25'

Plan Sequence and Numbering

The number and type of sheets in the final construction plans are dependent on the project scope of work. Sheets in the plan set should be numbered in sequence. The typical assembled sequence for a complete set of construction plans will be (as required):

- Title Sheet
- Typical Sections
- Estimated Quantities
- Drainage Sheets
- Drainage Plans
- General Notes
- Construction Notes
- Special Details
- Geotechnical Plans
- Traffic Signal Plan
- Temporary Detour Plan

Bridge Plans
Bridge Details
Lighting Plans
Signing Plans
Striping and Marking Plans
Grading Plans
Geometric Plans
Plan/Profile Sheets
Special Profiles – Drainage, Side Roads etc. (if used)
Cross Sections
Special Cross Sections – Drainage, Side Roads etc. (if used)
Right of Way Maps
Stand-Alone Plans or Details (e.g. utility plans, landscaping plans)

Where the plan and profile are on separate sheets, plan sheets should be placed before the profile sheets in the assembled sequence.

Standard Abbreviations and Symbols

Standard abbreviations and symbols are presented in [Standard Abbreviations](#) and [Standard Symbols](#). Adhere to the established abbreviations and symbols in the preparation of plans to achieve uniformity from project to project.

Instructions for All Sheets

The following information will apply to all construction plan sheets:

1. Complete title bar information to the right of each page. This may be able to be done using design software.
2. Town and highway system number, program, project manager, designer, consultant (if applicable), also noted in right-hand title bar.
3. See [Drawing Scales and Fonts](#) for the proper font type for each sheet in the plan package. Typically, all proposed text using design software shall be italicized uppercase. If embedded spreadsheets are used, the text shall be a readable font with similar dimensions to the proposed text in the CAD software.

TITLE SHEET

The title sheet is always Sheet No. 1, and it serves as the cover sheet for the remainder of the plans. It provides a considerable amount of information and serves as a general index and reference sheet for the project. See the [Sample Title Sheet](#) for an example.

The following information should be included on all title sheets for construction plans:

1. Edit electronically (via MaineDOT customization) or manually the town(s) name, county name, route number and or street name, federal or state project number and project length to the nearest hundredth (0.00) mile in the center of the sheet.
2. Complete the lower right corner box with Project Location, Program Area, and Scope of Work.
Project Location: Fill in with the location description from ProjEx. Verify the completeness and accuracy of the location description and adjust if necessary.

Program Area: This would be either the Highway Program, the Bridge Program, or the Multimodal Program.

Scope of Work: This consists of a brief description of the type of work as determined by the project's design and the project team.
3. Edit the Index of Sheets (indicate side road plans and cross sections, layout sheets, special details, grading plans, etc.) located in upper right portion of the sheet. Include all applicable sheet types and their corresponding sheet numbers ordered as indicated earlier in [Plan Sequencing and Numbering](#).
4. Any additional text that is added for notation purposes shall have an italicized upper case font. See [Drawing Scales and Fonts](#) for the proper font types.
5. Edit Traffic Data: *(Enter multiple columns for projects with data for different segments)*
 - a. Current AADT (indicate construction year).
 - b. Future AADT (indicate design year).
 - c. DHV - % of AADT
 - d. DHV: Design Hour Volume
 - e. % Heavy Trucks (AADT)
 - f. Directional Distribution (DHV): Percent of directional traffic volume during the DHV.
 - g. Design Speed (mph): Typically the posted speed
 - h. Functional Class
 - i. Corridor Priority
6. Check the following signatures and dates in the title block:
 - a. Commissioner and Chief Engineer
 - b. Consultant Engineer (if applicable)

7. Check for seal of:
 - a. Engineer of Record (engineer responsible for stamping plans)
 - b. Consultant Engineer (if applicable)
8. Edit the text in the right-hand title bar with name of city/town, route number and WIN. Edit the border information to show the sheet number. Edit the Project information section in title block with the pertinent information.
9. Check Layout Plan (not required on Federal-aid light resurfacing and railroad/highway grade crossing projects) to make sure it includes the following:
 - a. Roadway blacked in for project length
 - b. The beginning and ending stations of the project should be labeled along with the project number.
 - c. Stations listed at increments of even multiples of 100' along project, as determined by the length of the project and space constraints
 - d. Show plan sheet boundaries along with sheet numbers that correspond to the same sheet numbering in the Index of Sheets.
 - e. North arrow shown
 - f. Graphic scale should be in even stations.
 - g. Station equations shown (if applicable).
 - h. Prominent features such as side roads, waterways, railroads, etc., shown and labeled.
 - i. Side roads shown with leader line noting road name.
 - j. Direction to major towns or cities shown at each end of the project.
 - k. Town lines with towns labeled as well as the station where the town line crosses the design centerline
10. Add the location map:
 - a. Maps are provided via CAD software or by other electronic means.

- b. Extra heavy line used to show the roadway project length with a circle drawn surrounding the project area for short projects
- c. A leader line should be used to denote the beginning and ending of the project along with station and project number.
- d. North arrow shown oriented up the sheet.
- e. At bottom of Location Map show the graphic scale.
- f. Town, city and county lines shown.

TYPICAL SECTION SHEET(S)

The typical section sheet(s) will follow the title sheet in a complete set of construction plans. Typical sections are prepared based on the cross section elements (see [Cross Section Elements](#)). Depending on the complexity of the project, one or more typical section sheets may be required. See the [Sample Typical Sections](#) for examples.

The following information should be provided on all typical section sheets:

1. Edit text in right-hand title bar.
2. Standard proposed text shall be italicized upper case. See Drawing Scale and Fonts for proper font types and sizes.
3. Typical sections checked for:
 - a. Dimensions should be shown in decimal feet to the nearest hundredth of a foot and rounded to the nearest 0.05 feet horizontal and vertical. Layer thicknesses should be designated in decimal inches with the total section thickness rounded to the nearest half inch, except for overlays.
 - c. Aggregate subbase volumes for travelway and shoulder areas should be recorded separately below each typical section. Subbase volumes should be calculated in cubic yards per 100 linear feet to the nearest tenth (0.0) of a cubic yard.
 - d. Types and depths of base and subbase courses noted. Total pavement depth should also be shown.
 - e. Side slopes expressed as a ratio of horizontal distance to vertical distance.
 - f. Cross slopes expressed in percent (%).

- a. Offset and vertical drop from centerline profile grade to the subgrade-sideslope intercept in normal sections or from the edge of travelway in superelevated sections to the subgrade side slope intercept
 - b. Offset and vertical drop from centerline profile grade to the finished ditchline in normal sections or from the edge of travelway in superelevated sections to the finished ditchline
 - c. Widths of travel lanes and shoulders
 - d. Width of subbase gravel extending beyond the edge of shoulder surface in box sections
12. Where slopes and dimensions are variable, label as such.

ESTIMATED QUANTITIES SHEET

All construction plans require an estimate of quantities summarized by pay item. The quantities should be recorded on a quantity sheet. See the [Sample Estimated Quantities Sheet](#) for an example.

The following information should be included on the quantity sheet:

1. Complete right-hand title box.
2. Estimated quantities listed in order by item number.
3. Asterisk before all items that are undetermined location and note at bottom.
4. Typically, the Earthwork Summary is located here. Sometimes the sheet is too full and it needs to be put on a second quantity sheet. The Earthwork Summary shall be created by embedding the [Earthwork Computation Worksheet](#) on the Estimated Quantities sheet in CAD.
5. When more than one project is included in a contract, the following items may be noted to be a percentage of the total contract cost:
 - a. Field office
 - b. Test facility items
 - c. Mobilization, and all lump sum items that are included in more than one project
6. Follow the Rules for Rounding in the [Estimating Guidance](#).

7. Use italicized uppercase font for the Estimated Quantity text. See [Drawing Scales and Fonts](#) for the proper font types.
8. If a lump sum item is quantifiable, the quantity should be shown next to the lump sum item quantity on the Quantity Sheet.

DRAINAGE SHEETS

All projects requiring drainage work should include a drainage sheet in the construction plans. The location and quantity of each drainage item should be recorded on a drainage sheet. General notes are often included on the drainage summary sheet when space is available. See the [Sample Drainage Sheet](#) for an example.

The following information should be included on the drainage summary sheet:

1. Complete right-hand title box.
2. All drainage system components separated into major subdivisions (i.e., roadway drainage culverts, driveway culverts, catch basins, underdrains, etc.) and listed in station order.
3. Under culvert pipe Option III item and Type C underdrain items, all pipes shall be sized using smoothlined pipe. Comparable corrugated sizes shall be shown on the Drainage Summary Sheet unless smoothlined pipe is required.
4. Drainage summary text shall be italicized uppercase always. See [Drawing Scales and Fonts](#) for the proper font types.

An embedded spreadsheet may be used in place of the spreadsheet provided in CAD. Fonts shall be readable with similar dimensions to the proposed text in the CAD software.

GENERAL NOTES

A list of general notes shall be included in the construction plans providing overall information applicable to the project. The notes provided are not intended to be a complete set covering all problems that may arise on a project, but they do cover many recurring situations. General notes may vary from project to project and, if special conditions or requirements exist, notes should be modified or added accordingly.

The following information should be included on the sheet:

1. Complete right-hand title box.
2. Text for general notes in this section shall be italicized uppercase font. See [Drawing Scales and Fonts](#) for the proper font types.
3. Geotechnical Notes may be added if applicable. These notes are typically provided by the Geotechnical Team Member.

Always use the most current version of the [General Notes](#) that are found in the General – Preparation of Contract Documents section of the Highway Program Website.

See the [Sample General Notes Sheet](#) for an example.

CONSTRUCTION NOTES

Construction notes are required to identify specific details of construction for a given project design. A minimum number of notes should be used, although a clear indication of the intent of the plans is necessary.

Generally, all construction notes (excluding drainage notes) are provided on a separate sheet(s) for full construction/rehabilitation projects and for overlay projects when referring to the record plans. Construction notes may also be provided on the plan/profile sheets instead if a separate sheet(s) is not desired and the notes would not make the plans difficult to read. See the [Sample Construction Notes Sheet](#) for an example.

Construction notes should be identified by the item number and item description, if applicable, followed by the station locations. Ascertain that all work shown is covered by a direct payment item or that payment is included indirectly in another item. If work is not so covered, the supplemental specifications or general notes should be explicit on the compensation intended.

Construction notes should always be put in numerical order in case of computerized changes. Text for notes on this sheet shall be mono-spaced uppercase font. See [Drawing Scales and Fonts](#) for the proper font types.

If embedded spreadsheets are used, fonts shall be readable with similar dimensions to the text in the CAD software.

Superelevations and shoulder slopes should be shown to the nearest tenth of a percent in table form on a construction notes sheet.

See the [Construction Notes Guidance](#) for the typical types of construction notes and where they should be shown on the plans.

SPECIAL DETAILS

Some design details that are not covered in the [Standard Details](#) or typical sections may require a special detail sheet as determined on a project specific basis.

Special details may be needed for design components such as:

- Retaining walls
- Truck aprons
- Non-standard culvert connections
- Box culvert extensions
- Special guardrail details not covered in the [Standard Details](#)

Each special detail sheet should be listed separately in the Index of Sheets on the title sheet.

GRADING PLANS

Grading plans may be necessary for complicated intersections that may not be able to be constructed using the typical and cross sections provided.

The plans shall include the following:

1. Major contours shown and labeled to the nearest 0.5 of a foot and minor contours shown to the nearest 0.1 of a foot.
2. Grading control alignments
3. Cross slopes and widths labeled at each template change with station location
4. Elevations of points on grading control alignments shown to the nearest 0.01 of a foot
5. Curve and tangent data shown for grading control alignments

See the [Sample Grading Plans](#) for examples.

GEOMETRIC PLANS

Plans may be necessary to define the geometric layout of an intersection, islands and/or curbing. The need for geometric plans will be determined on a project by project basis and will depend on the amount of varying geometry and space needs to document it.

If only a few geometric point locations are necessary for layout, a separate geometric sheet may not be necessary. Instead the key geometric points could be labeled on the plan sheet keyed to a chart with stations and offsets to those points.

To ensure consistent preparation of the geometric layout sheets, show the following:

1. North arrow
2. Street name/route number
3. CB/MH symbols
4. Roadway centerlines and gutter line alignments should be labeled and referenced with station and offset listings to key geometric points
5. Center of curve points for radii and should be shown and the station/offsets and coordinates provided
6. Curb symbols
7. Key Geometric points labeled with circle and point number
 - Terminal curb points
 - Catch basin header points
 - Wheel chair ramp opening
 - Drive/entrance openings
 - Curbed islands
 - Angle points in gutter line – if any
 - PC/PT points in gutter line
8. Geometric reports for gutter line alignments shown with coordinates (Roadway centerline geometric reports not necessary because they are already shown on plan sheets)
9. Station and offset reports with coordinates keyed to point numbers shown on gutter line/Geometric features

See the [Sample Geometric Plans](#) for examples.

PLAN/PROFILE SHEETS

The plan/profile sheets present the vertical and horizontal alignments, topography, right-of-way and other details necessary for the construction of the project. See the [Sample Plan/Profile Sheets](#) to see examples typically used by the Department. Projects involving complex intersections and/or interchanges may require a separate plan sheet, profile sheet and/or grading plan to clearly indicate construction details.

The corresponding profile is placed on the same sheet below the plan view. If there is too much detail or physical constraints such as steep hills or sharp curves, the profile could be placed on a separate sheet. Profile information is plotted from a combination of reports and graphical output from design software. When combining plan and profile sheets, align the centerline stations of the plan and the profile starting at the center of the sheet and proceeding toward the edges to account for curvilinear horizontal alignments.

To ensure consistent preparation of the plan/profile sheets, follow these guidelines below. When the plan sheet and profile sheet are separate, use the applicable notes for each sheet.

PLAN

1. Minimum of 50 feet of existing center line shown on each end of project regardless of scale if possible.
2. Refer to the [Standard Abbreviations](#) and the [Standard Symbols](#) for proper labeling and [Drawing Scales and Fonts](#) for proper font types.
3. Complete right-hand title bar.
4. Stationing of the highway mainline should be shown increasing from left to right on the plan.
5. Show the north arrow.
6. Show the location of temporary and proposed utility structures (i.e. poles, manholes, mains etc.)
7. Station of town, county, compact, compact-urban or urban lines shown.
8. Information should be shown for the construction of approaches and tapers from the match point limit of work to the project beginning and ending points. Pavement taper widths and gravel transition taper widths shall be noted.
9. Radii, center of curve points and width of pavement should be shown on all approach roads and paved intersections. Curve radii at non-standard driveways should be indicated on the plans.
10. Locations of channel diversions, inlet and outlet ditches shown.
11. Show and label proposed drainage structures.
12. Locations of bridges shown and reference note made to bridge plans.

13. All construction slope lines shown.
14. Clearing limit lines shown for all clearing, selective clearing and thinning areas.
15. Proposed guardrail shown.
16. Show property owner names and property lines along with existing right of way and existing easements. Also show proposed right of way and proposed easements. When applicable, other right of way information should be shown, such as reserved area limits and control of access lines. See the [Right of Way Display Guidance](#).
17. Equations and angles shown on all side road alignments on plans.
18. Construction notes outlining work and bid items to accomplish the work shall be shown on plans, construction notes sheet, or cross-sections. See the [Construction Notes Guidance](#).
19. Show edge of travelway and edge of shoulder on plans.
20. Show bridge and railroad clearance diagrams in the profiles.
21. Ditch drainage lines and arrows shown, indicating direction of flow.
22. Limit of work shown on all side roads and on mainline if different from beginning and end of project limits.
23. Proposed text shall be italicized uppercase. See [Drawing Scale and Fonts](#) for proper font types. If embedded spreadsheets are used, fonts shall be readable with similar dimensions to the text in the CAD software
24. Label project number; begin/end stations and limits of work.
25. Label all highways with applicable route numbers and roadway names.
26. Town and highway numbers noted on all sheets in the right-hand title bar
27. Note existing drainage structures to be removed.
28. All single trees and stumps, regardless of size, as well as bushes and shrubs outside clearing or selective clearing and thinning areas, should be noted to be removed. Do not note removal of single trees within a clearing area.
29. Note existing buildings to be removed.

30. Loam salvage areas noted as needed.
31. Note the removal of existing pavement areas outside of construction limits. Pavement that is to be removed in areas outside of the construction limits shown on the plans should be cross-hatched and labeled "Excavate, loam and seed."
32. Plans and cross sections cross-checked to ensure correctness.
33. Roadway and shoulder widths should be indicated on the plans at the beginning and end of each plan sheet and at any change in the width.
34. Horizontal curve data should be recorded on the plan for the construction centerline. Horizontal curve data should always be recorded on the inside of the curve, if possible. When a curve runs on successive plan sheets, the curve data should appear on both sheets. The curve data and degree of accuracy required for each horizontal curve within the project limits is provided below:
 - a. PI -- two decimals
 - b. Δ -- nearest tenth second
 - c. D -- nearest tenth second
 - d. T -- two decimals
 - e. L -- two decimals
 - f. R -- two decimals
 - g. E -- two decimals

Controlling stations (including the PC, PT, station equations and angle points) should be recorded on a line drawn perpendicular to the construction centerline toward the inside of the curve. Stations should be recorded to the nearest hundredths (0+00.00) station. A triangle should be provided on the plans to indicate angle points, and a circle should be provided to indicate all other controlling stations.

35. Alignment bearings on tangents should be noted to the nearest tenth of a second.
36. Center of curve points for radii and should be shown and the station/offsets and coordinates provided unless that point falls with a physically unattainable area such as a building.
37. On complex projects, separate layout sheets may be required in the construction plans to define special details not provided on the plan sheets. The need for special details will be determined on a project-by-project basis.
38. Geotechnical exploration information should be shown.

PROFILE

1. Limit of work shown on all side roads and on mainline if different from beginning and end of project limits.
2. High-water elevation and year of occurrence shown for projects near flood areas when relevant.
3. Dashed lines and symbols should be used to indicate existing profile elements, and solid lines and symbols shall be used to indicate proposed profile elements.
4. Complete right-hand title bar.
5. Label project number; begin/end stations and limits of work.
6. Refer to the [Standard Abbreviations](#) and the [Standard Symbols](#) for proper labeling.
7. Closed drainage systems may be plotted on the profile when necessary.
8. Standard text shall be italicized uppercase. See [Drawing Scale and Fonts](#) for proper font types.
9. Vertical curve data should be provided on the profile for each vertical curve on the construction centerline. Curve data should be recorded beneath crest vertical curves and above sag vertical curves on a horizontal line drawn from the PVC to the PVT. When a vertical curve runs on successive profile sheets, the curve data should appear on both sheets. The curve data and degree of accuracy required for each vertical curve within the project limits is provided below: PVI Station / elevation below a sag curve, above a crest curve.

L	--	no decimal
SSD/HLSD	--	no decimal
E	--	three decimals (.001)
10. Station and elevation at PVC, PVI and PVT location. All data shall be shown to the nearest hundredth decimal
11. High and low points in the proposed profile should be marked with a leader arrow, station and elevation.
12. Grade line checked for the following:
 - Percent grades recorded to the nearest hundredth (0.00) percent denoted with a plus or minus for direction of grade.

- PI elevation recorded to the nearest hundredth (0.00) foot, denoted by a triangle pointing to the inside of the curve.
 - Rural finish grades every 50', recorded to the hundredth (0.00) of a foot.
 - Urban finish grades every 25', recorded to the nearest hundredth (0.00) of a foot.
14. Additional profiles may be required for side roads, driveways and curb lines that are affected by the mainline construction. The additional profiles should be indicated off the mainline on the profile sheet or a separate profile sheet may be used if necessary.

CROSS SECTION SHEETS

The cross section sheets represent the transverse sections of the existing ground line and the proposed design at various points along the design centerline. Cross sections should be cut when possible for features such as entrances, culverts and catch basins. Cross sections should be generally be drawn at 25' intervals for urban projects and at 50' intervals for rural projects and should be drawn on a sheet provided by the CAD package with a grid pattern at a scale of 1" = 5' horizontally and vertically. See the [Sample Cross Sections](#) for examples.

Cross sections should be plotted in a landscape orientation to minimize "foldbacks" and provide a better fit. If it proves necessary to utilize a smaller scale to allow for a better fit of topography, care should be taken to ensure readability when plans are printed half size.

Follow these guidelines in the preparation of cross section sheets:

1. Dashed lines and symbols shall be used to indicate existing cross section elements, and solid lines and symbols shall be used to indicate proposed cross section elements.
2. Individual cross sections are typically oriented from bottom to top of each cross section sheet in order of increasing station.
3. Edit text in the right-hand title bar including the following: appropriate "record" boxes on left of sheet completed to denote who checked it and when, who revised it and when, the designer/detailer, and any field changes that were made. The town and highway system number should be noted in the lower right-hand corner. Station range should also be noted for each sheet.
4. Label station and project number of beginning and ending of proposed project
5. Volumes for earthwork items such as earth excavation (cut), fill, rock excavation, muck excavation, waste storage, grubbing in fill, loam salvage and variable depth gravel should be calculated between individual cross sections and noted at even intervals on the sections. Volumes shown should be rounded to the nearest tenth of a cubic yard.

6. Volumes calculated in cubic yards, totaled and tabulated on the [Earthwork Computation Worksheet](#) and should be noted in the Earthwork Summary on the Estimated Quantities sheet.
8. Show design cross slopes on each cross section.
9. On cross sections adjacent to side roads that have separate alignments and cross sections, a match line should be shown and the side road labeled.
10. Show intended driveway slopes and transitions including widths and slopes.
11. When available the locations of rock and muck should be plotted
12. Elevations and offsets of all non-standard ditches shown.
13. Elevations of all underdrain shown.
14. Ditch elevations and gutter grades checked for proper slope through superelevation transitions and long vertical curves.
15. Grubbing in fill noted and shown in applicable areas.
16. All existing drainage information should be plotted.
16. Proposed drainage information should be plotted. The type of structure should be provided, and the length, size, direction of flow, inlet and outlet flowline elevations, type of material, thickness (if necessary), skew angle (if any) and end treatment should be shown for all pipe culverts and underdrain.
17. The station and offset of the center of catch basins should be shown along with the rim elevation taken from the gutter line grade or the center of the catch basin grate.
18. Proposed slopes steeper than 3:1 noted and plotted to be benched.
19. Sideslopes should be expressed as a ratio of horizontal distance to vertical distance (Y:X)
19. Existing and proposed utilities shown with proper symbols.
20. Plot existing trees, stumps, building sills, utility poles, and proposed utility poles on sections.
21. Plot existing and proposed underground utilities.
22. Ditch grades checked for required erosion protection.

23. Place ditch arrows showing direction of flow.
24. Pavement and subbase depths noted for side roads and approaches if typical sections not drawn.
22. Individual cross sections should provide the proposed profile grade elevation directly above the centerline. Elevations should be recorded to the nearest hundredth (0.00) of a foot. Offsets from the alternate centerline to the construction centerline should be provided if not coincident with the alternate centerline. Offsets should be recorded to the nearest tenth (0.0) of a foot.
23. Station-to-station of box sections noted if not constant throughout project.
24. See the [Construction Notes Guidance](#) for notes that would typically be placed on the cross sections.
25. Geotechnical exploration information should be shown.