1201 General Plan Sheet Information

1201.1 Introduction

The purpose of a set of construction plans is to delineate the proposed work with sufficient design details, supplemented with notes, calculations and summaries of quantities, in such a manner that it can be clearly and uniformly interpreted by engineers and contractors. Sufficient data must be provided to enable the contractor to make an intelligent bid and to perform the work as intended. Clarity, completeness and conciseness are essential so as to avoid misinterpretation. Unnecessary details should be avoided.

1201.2 Unit of Measure

Plans shall be prepared using the English system of units.

1201.3 Plan Sheet Materials and File Format

Plans may be submitted on mylars or as TIFF images. Information related to the creation, submission, minimum image properties, and file naming of TIFF images is available through the CADD Engineering website (http://www.dot.state.oh.us/cadd/TIFF/).

Some external agencies do not allow submission of TIFF images. For example, many county conveyance standards require submission of the Centerline Plat Sheet on a specific size of mylar paper. In instances where hard copy (i.e., paper or mylar) documents are required, the District Production Administrator will determine whether the hard copy document will be created by the District or by the consultant.

Mylars shall be a polyester film reproducible mylar, 4-mil thickness preferable (3-mil minimum), with a double or single (top side) matte. They shall be in good condition when submitted. The surface should not be highly reflective. All lettering and lines on final tracings shall be durable and permanent. Only black ink is permitted, except that cross section and profile grids may be colored ink.

Unacceptable originals include: negatives, sepias, vellums, damaged sheets, dark backgrounds, pencil drawings, zipatone, paste-ons, stick-ons or bond papers. Decals are not permitted.

In certain circumstances, a simplified plan format may be used (see **Section 1301.2**). Simplified plans may be submitted on either vellum or mylar.

1201.4 Plan Sheet Dimensions

All plan sheets, including plans prepared by sub-consultants (e.g., soil boring sheets), shall be the same size and format. TIFF images shall be formatted to be 22 inches by 34 inches [559 millimeters by 864 millimeters] and shall be capable of being bound and punched as shown in **Figure 1201-1**.

Simplified plans may be formatted using any one of the following sizes: letter (8 ½ inches by 11 inches) [(2316 millimeters by 280 millimeters)], legal (8 ½ inches by 14 inches) [(216 millimeters by 356 millimeters)] or quarter (11 inches by 17 inches) [(280 millimeters by 432 millimeters)].

1201.5 Title Block Information

1201.5.1 General

Figure 1201-1 shows the location of the border and title block for standard size (22 inches by 34 inches) [(559 millimeters by 864 millimeters)] plan sheets. An example title block is shown in **Figure 1201-2**. The Bridge Design Manual and Real Estate Policies and Procedures Manual show standard structures and right of way titles sheet blocks, respectively. All plan sheets shall display, as a minimum, the plan sheet number, the project designation and the sheet title. Additional items that may be required include: quantity validation initials, plan scales and a north arrow.

1201.5.2 Sheet Numbers

Sheet numbers are shown in the split circle in the lower right corner. The number at the top of the circle is the actual sheet number in consecutive order and the bottom number is the total number of sheets in the plan based on the last actual sheet number. Sheets that require supplemental sheet numbers (e.g., structure plans and right of way plans) may be grouped within the plan.

Occasionally, sheets may need to be inserted into a set of plans that has already been numbered. These sheets should be labeled with the number of the preceding sheet followed by consecutive letters (e.g., 26A, 26B…26Z) and then by consecutive double letters (e.g., 26AA, 26BB…26ZZ). This will permit the insertion of up to 52 additional sheets. The bottom number in the split circle will still be the number of the last sheet. The last sheet shall not be labeled with a number/letter combination. If a significant number of sheets need to be inserted or added to a set of plans, consideration should be given to renumbering the entire set.

1201.5.3 Project Designation

The project designation is normally the county code, route number and section number as shown in the plan title on the Title Sheet (**Section 1302**). When multiple section numbers are involved and space in the title block does not permit a complete listing, the county, all route numbers and the first section number followed by the words “and various” should be shown.

1201.5.4 Sheet Title

The sheet title should include: the general plan sheet description (e.g., Schematic Plan, General Summary, Plan and Profile, Cross Sections, etc.), the applicable roadway, if not obvious (e.g., U.S. 35, S.R. 315, Ramp A, Main Street, Connecting Road, etc.) and the applicable station limits.

1201.5.5 Quantity Validation

Where sheets include quantities, space should be provided for the date and initials of the individuals who calculated and checked the quantities.

1201.5.6 Plan Scales

A bar scale should be shown whenever a plan view is required. Bar scales are not normally required in the vertical dimension on profiles or for cross sections, since these should be adequately labeled. If the plan sheet requires more than one scale, bar scales should be shown on the plan and the words “See Details” shown in the title block.

1201.5.7 North Arrow

A north arrow should be shown as accurately as possible (usually +/- 5°) whenever a plan view is required. If the plan sheet contains more than one plan view, no north arrow should be shown in the title block.

1201.5.8 Additional Requirements

The Bridge Design Manual, Section 100 and the Real Estate Policies and Procedures Manual, Section 3100 contain additional requirements for bridge and right of way plan sheets, respectively.

1201.6 Title Sheet Title Block

1201.6.1 General

The title block on the Title Sheet is unlike the title block on other plan sheets in that it includes spaces for Railroad Involvement, the Construction Project Number, the Project Identification (PID) Number and the Federal Project Number.

1201.6.2 Railroad Involvement

The names of all railroads involved in the project must be entered in the space. If there is no railroad involvement, this should be indicated by entering the word “NONE” in this space.

1201.6.3 Construction Project Number

The construction project number is added to the tracing title sheet by the Office of Contracts prior to the letting date.

1201.6.4 PID Number

Each project is assigned a unique Project Identification (PID) Number when it is entered into Ellis. This number should be shown in the proper space on the title sheet. On occasion, this number may change during project development. The plan, file names and directory structure should always reflect the latest number, with former numbers noted on the Title Sheet.

1201.6.5 Federal Project Number

The Federal Project Number should be entered in the appropriate box. If the project has no federal participation the words “Non-Federal” should be entered in this space.

1202 Drafting

1202.1 Plan Scales

The designer should prepare plans keeping in mind that the 22 by 34 inch [559 by 864 millimeter] full size plan sheets will be reproduced to 11 by 17 inch [280 by 432 millimeter] prints prior to distribution.

It is recommended that plan sheet scales normally be limited to the following:

For English unit plan sheets: 1:1, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500 or 1:1000. These scales are in inches per foot. For example, 1:20 indicates 1 inch on the plan sheet equals 20 feet in the field.

[For metric unit plan sheets: 1:1, 1:20, 1:50, 1:100, 1:200 or 1:500. These scales are in dimensionless ratios. For example, 1:20 indicates 1 meter on the plan sheet equals 20 meters in the field.]

Scales that are multiples of ten of these scales may be used (e.g., 1:2000 is a multiple of 1:200).

Other scales may be used, if it is felt that a better product will result. The intent should always be to clearly and adequately show the work to be performed, keeping in mind that the plans used during construction are usually reduced to one-half the original scale (e.g., 1:20 full size prints become 1:40 quarter size prints).

1202.2 Lettering

Fancy lettering should not be used. Lettering should be oriented in such a manner that it can be read from either the bottom or right side of the plan sheet. The minimum text size is 0.14 inches [3.6 millimeters].

1202.3 Cross Section Grids

Acceptable grid systems for cross sections and profiles are shown in **Figure 1202-1**. Letters and lines should be bolder when they are superimposed over cross section grids.

1202.4 Drafting Conventions

The following sections present the preferred standard drafting guidelines for roadway construction plans. Standard drafting symbols are available from the CADD section of the ODOT website.

1202.4.1 Text Orientation

Text on inclined lines should be orientated as shown.

1202.4.2 Placement of Leaders from Notes

A leader line should originate from the first line on the left, the last line on the right or from a vertical bar on either side as shown. The leader should generally be an inclined straight line if possible, except for the short horizontal shoulder extending from mid-height of the lettering at the beginning or end of a note. Where space prohibits the use of straight leader lines, curved leaders may be used. Curves should be smooth and simple, beginning with a short horizontal shoulder extending from mid-height of the lettering.

1202.4.3 Placement of Leaders to or from a Circular Object

A leader to or from a circular object should extend radially, so that if extended it would pass through the center of the circle.

1202.4.4 Terminators

Leaders should terminate with an arrowhead when pointing to an object or to an edge, and should terminate as shown when pointing to a surface or layer.

1202.4.5 Placement of Balloons

Balloons on typical sections should be aligned as much as possible, rather than placed randomly around the section. The leader lines extending from the bubbles to pavement layers should be vertical where possible. Other items, such as guardrail and underdrains may be labeled with straight inclined leaders. All leaders should end with a terminator.

TRY TO AVOID THESE CONFIGURATIONS

1202.4.6 Sheet Notes, Charts, and Summary Sheets

Groups of sheet notes shall be left justified. Right justification is optional.

Text in charts should be placed slightly above the lines (never directly on the line) to improve readability. Leave an empty line at the beginning and end of the chart and between every fifth item to accommodate future additions.

ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION
				ROADWAY
606	13000	11650	FT	GUARDRAIL, TYPE 5
606	13050	175	FT	GUARDRAIL, TYPE 5A
606	25000	12	EACH	ANCHOR ASSEMBLY, TYPE A
606	22011	12	EACH	ANCHOR ASSEMBLY, TYPE E-98
606	26500	23	EACH	ANCHOR ASSEMBLY, TYPE T
606	35000	36	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 1
606	35100	4	EACH	BRIDGE TERMINAL ASSEMBLY, TYPE 2
606	60010	2	EACH	IMPACT ATTENUATOR, TYPE 1-98 (BIDIRECTIONAL)
622	24000	578	FT	CONCRETE BARRIER, TYPE D

Numbers with decimals in a chart should be aligned in columns along the decimal point. Integer values should be either right justified or centered in columns.

606.93		-0.19	-0.0156		33+92.16	
607.13		-0.16	-0.0133		34+00.00	
607.76		-0.05	-0.04		+25.00	
608.04		0.00	0.0		+37.09	
608.34		+0.05	+0.0042		+50.00	
608.88		+0.16	+0.013		+75.00	
609.02		+0.19	+0.0156		+82.02	
609.38		+0.27	+0.02		35+00.00	
609.84		+0.37	+0.33		+25.00	
610.26		+0.48	+0.4		+50.00	
610.63		+0.58	+0.48		+75.00	
610.97		+0.69	+0.575		36+00.00	

1202.4.7 Overdrafting

It is preferable to place dimensions outside areas which contain cross-hatching and other line work. Where this is not possible, the cross-hatching or line work should be broken around the text. Hatch lines should never cross through text, however, certain critical line work elements, such as centerlines may pass through text.

1202.4.8 Horizontal Curve Data

The curve data should be shown on the inside of the specified curve and between the PC and PT where possible. As shown, it is permissible to jog the lines for the PC and PT provided the initial portions of the lines extending from the curve are along the correct radius.

When space prohibits or when an alignment has a large number of horizontal curves, label each curve and tabulate the curve data. If it is necessary to tabulate curve data for a few curves along an alignment, then all curves should be tabulated to provide consistency.

CURVE #1 DATA	CURVE #2 DATA
P.I. STA. 41+61.02, ℄ CONST. TRUMP RD.	P.I. STA. 46+17.51, ℄ CONST. TRUMP RD.
Δ = 50° 48′ 16″ RT.	Δ = 89° 23′ 07″ LT.
D_C= 24° 54′ 40″	D_C= 24° 54′ 40″
R = 230.00′	R = 230.00′
T = 109.22′	T = 227.55′
L = 203.94′	L = 358.82′
E = 24.62′	E = 93.54′
e_{max}= 0.025	e_{max}= 0.025

1202.4.9 Dashed Lines

When needed for clarity, dashed lines should connect at all points of intersection and points of tangency. (You may need to subdivide certain CADD cells into individual elements in order to connect the lines properly.)

When needed for clarity, a gap should be shown at all locations where a visible edge becomes hidden by another surface as shown below.

1202.4.10 Direction of Cross-Hatch Lines

In general, draw cross-hatched lines at 45° with horizontal. If cross-hatch lines drawn at 45° with horizontal would be parallel or perpendicular (or nearly so) to a prominent visible outline, the angle should be modified.

1202.4.11 Placement of Dimension Text

Generally, text should be placed above a solid dimension line, oriented parallel to the line, as shown below. Horizontal text shall be read parallel to the bottom edge of the sheet. Vertical text shall be read parallel to the right edge of the sheet. Text in dimension strings should be placed at the same level.

Additional dimension text preferences are shown on the following page.

1202.4.12 Angular Dimensions

Angular dimensions should be placed with an arc drawn from the vertex of the angle.

1202.4.13 Dimension in Crowded Conditions

In crowded conditions, gaps in extension lines near arrowheads may be left as shown below, in order to clarify the dimensions.

1202.4.14 Dimensioning with a Dot

If the dimension cannot be placed on the dimension line, then a dot with a curved leader may be used as shown.

1202.4.15 Dimensioning at Angles

Dimension lines must always be drawn parallel to the edge being dimensioned. Extension lines are usually drawn at right angles to the edge being dimensioned: However, an exception may be made in the interest of clarity, as shown.

1202.4.16 Dimensioning an Object

Place shorter dimensions nearest to the object outline. As shown below, crossing the extension lines is acceptable. Dimension lines should not cross extension lines as a result of placing the shorter dimensions on the outside.

Extension lines should not be shortened. Also, a dimension line should never coincide with or form a continuation of any line of the drawing. If possible, dimensions should always be placed off the object.

1202.4.17 Crossing Dimension Lines

Extension lines should not be broken. In addition, lines should not be centered at object edges.

1202.4.18 Grouped Dimensions

Grouped dimensions should be in line, evenly spaced and off the object being dimensioned.

1202.4.19 Use of "Typical"

For symmetrical objects and repetitive dimensions, use the word "typical" to simplify dimensioning, as shown.

PREFERRED

AVOID DUPLICATING SYMMETRICAL DIMENSIONS

1202.5 Computer Aided Drafting and Design (CADD)

ODOT customizations and standards for MicroStation and GEOPAK software are available from the CADD Engineering Standards Manual. For example:

- Seed files
- Font libraries
- Cell libraries
- Standard symbology (i.e., level, weight, line style and color)
- Standard directory structure
- File naming conventions

1203 Standard Drawings

1203.1 Standard Construction Drawings

Standard Construction Drawings are an integral part of the contract plans. They are used to show repetitive details such as: manholes, curbs, guardrail and pavement joints. When referenced in the plans, these drawings and associated revision dates must be listed on the Title Sheet.

1203.2 Plan Insert Sheets

Plan Insert Sheets are similar to Standard Construction Drawings but differ in the manner in which they are included in the plans. They often cover the design of standard items that are in the development stage. Plan Insert Sheets are included with the original set of construction plans. When included in a set of construction plans, project specific information must be added to these sheets. Refer to the Design Reference Resource Center (DRRC) website (http://www.dot.state.oh.us/drrc/) for the most recent version of the Plan Insert Sheets.

1200 PLAN PREPARATION

List of Figures

Figure	Subject
1201-1	Plan Sheet Dimensions
1201-2	Title Block Examples for Roadway Plans
1202-1	Acceptable Grid Systems

PLAN SHEET DIMENSIONS

1201-1

REFERENCE SECTION
1201.4, 1201.5

TITLE BLOCK EXAMPLES FOR ROADWAY PLANS

1201-2

REFERENCE SECTION 1201.5

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TITLE SHEET

PLAN SHEET WITHOUT NORTH ARROW & SCALE

PLAN SHEET WITH NORTH ARROW & SCALE

All dimensions are in inches followed by the dimension in millemeters [in brackets].

Legend for metric unit projects:

A WYA-30-4.298

B STA. 5+180 to STA. 5+330

Structures and Right of Way Plan Title Block information may be found in the Bridge Design Manual and the Real Estate Policies and Procedures Manual, respectively.

ACCEPTABLE GRID SYSTEMS

1202-1

REFERENCE SECTION 1202.3

CROSS SECTIONS

*Equally subdivided, 10 parts each way.
(TYPICAL GRID LINES)

CROSS SECTIONS

(DITHERED GRID LINES)

PROFILES

The minimum allowable profile grid shall consist of the complete one-inch [20 mm] grid pattern with additional horizontal lines at 0.1 foot [0.1 meter] of elevation.

All dimensions are in inches followed by the dimension in millimeters [in brackets].