

WFLHD SUPPLEMENT 9.6.5-1

9.6.5 STANDARD FORMAT FOR PLANS

Prepare project plans in WFLHD using the guidance provided in this section and the PDDM. Following this guidance produces plan sheets that are accurate, neat, presentable, and that will reproduce legibly. The following sections detail the standard format, drafting standards, and organization of the plan sheets of a PS&E package in WFLHD.

Revise the following sections of [PDDM Section 9.6.5](#):

9.6.5.1 Format

It is FLH standard practice to prepare all plan sheets using an approved CADD system. MicroStation from Bentley Systems, Inc. is the current FLH standard CADD system. Rare exceptions (e.g., conceptual drawing, architectural renditions, emergency projects) may be necessary to accommodate special needs of internal sections or cooperating agencies. When manual drafting becomes necessary, it should be accomplished in a manner that duplicates the appearance of CADD drafting to the extent possible.

The standard size of plan sheets should be approximately 11 in by 17 in [279 mm by 432 mm]. The standard size plan sheets should provide approximately a 1.4 in [35 mm] margin for the binding on the left edge, a 0.3 in [7 mm] margin on the right edge and a 0.3 in [7 mm] margin on the top and the bottom. This accommodates an effective sheet size of approximately 10.4 in by 15.3 in [265 mm by 390 mm]. For plotting purposes, the useable sheet dimensions may be slightly reduced (e.g., 10.7 in by 16.7 in [271 mm by 423 mm] with 1.1 in [27 mm] left margin and 0.2 in [5 mm] margins on the right, top and bottom). Margins may be reversed for double-sided (duplex) printing.

When applicable, “book size” plan sheets as small as 8.5 in by 11 in [216 mm by 279 mm] may be used provided they give sufficient information to describe and construct the project. Consider abbreviated plans for very low complexity projects such as minor emergency relief, safety improvements, and RRR.

See the [WFLHD Sample Plans](#) for plan sheets prepared using the guidance in this section. Shaded boxes show the recommended text styles or fonts (FT), text sizes (TX), line spacing (LS), level, line style (LC), weights (WT), and color (CO) to be used in the preparation of the plans.

9.6.5.2 Drafting Standards

The use of applicable drafting standards establishes uniformity and quality in the drafting of contract plans. Use care in laying out details and locating text on a plan sheet. Ensure that the relationship between the text and graphic elements is clear.

Provide sufficient notes on plan drawings to clarify the drawing and provide necessary information for a complete understanding of the work. Make notes clear, concise,

descriptive and as brief as possible to convey the message. Do not present duplicate information in the contract documents (plans and specifications) to avoid potential conflicts and ambiguities, especially if changes are made later to only one of the documents. Do not highlight (repeat) requirements of the specifications on the plans, or repeat the requirements of the FP within the SCRs. Such highlighting may unintentionally diminish the importance of other contract requirements.

Place text with the correct style and at the size specified. Proper spacing between figures, symbols and words assures clarity, improves neatness and increases accuracy.

Deviations from these guidelines are acceptable provided basic drafting practices are followed and the deviation will improve the drawings. There are situations where the size and weights should be adjusted to emphasize or clarify specific information on a plan sheet. For example, centerline stationing along the plan alignment may require a heavier weight for clarity where culture or other background data tends to clutter the drawing.

9.6.5.2.1 Scales

Set the drawing scale to best display the desired information. Even in case where the scale is not needed on the final plan sheet, it is best practice to draw elements at the actual size. This allows the plan sheet preparer to make full use of automatic dimensioning.

The drawing scale is set in the design model using the annotation scale. Several default annotation scales are available in MicroStation. [Figure A](#) shows typical scales used for plan sheets:

Figure A – Annotation Scales

Scale	Typical Usage	True Scale	Metric Equivalent
1"=200'	Plan sheet, 3000' [700 m]/sheet	1:2400	1:2000
1"=100'	Default US Customary sheet Plan sheet, 1500' [350 m]/sheet	1:1200	1:1000
1"=60'	Plan sheets (less used)	1:720	
1"=50'		1:600	
1"=40'	Plan sheet, 600' [175 m]/sheet	1:480	1:500
1"=10'	Typical sections (scale not shown)	1:120	1:100
1"=5'		1:60	1:50
1/16"=1'-0"	Structural drawings	1:192	1:200
1/8"=1'-0"	Structural drawings	1:96	1:100
3/16"=1'-0"	Structural drawings	1:64	
1/4"=1'-0"	Structural drawings	1:48	1:50
3/8"=1'-0"	Structural drawings	1:32	
1/2"=1'-0"	Structural drawings	1:24	1:25
3/4"=1'-0"	Structural drawings	1:16	1:20
1"=1'-0"	Structural drawings	1:12	1:10

Scale	Typical Usage	True Scale	Metric Equivalent
1 1/2"=1'-0"	Structural drawings	1:8	
3"=1'-0"	Structural drawings	1:4	1:5
6"=1'-0"	Structural drawings	1:2	1:2
Full Size 1=1	Default sheets, Structural drawings	1:1	1:1

9.6.5.2.2 Line Work

Use line weights to accent the proposed construction work. Select the correct level, line style and weight and use them in the correct relationship to other lines on the plans. Make a good, clear delineation of all lines so the proposed work will stand out in contrast to existing features.

Do not draw hidden contours under a structure with the long dash line style (LC=3). Use the medium dash line style (LC=2) instead. Show hidden lines of structures with the same style.

Do not place lines, hatching, or patterning through words or figures. Place hatching at approximately 45-degree angle to the object being hatched.

See [FLH CADD Level Library](#) for standard (By-Level) line weights, styles, and colors.

9.6.5.2.3 Lettering

When placing text on plan sheets, do not crowd other information. Carefully choose locations for text labels that are as close as possible to the point of application. In general, show text labels identifying proposed work one line weight heavier than the text for existing features. Place text in a manner such that it is not upside down. Text is to be legible when the plan set is oriented either 1) with the binding on the left side of the plan set or 2) with the binding on the top of the plan set (rotated 90 degrees clockwise). Text orientation should be consistent on individual sheets.

Do not use the letters "I," "O," "N," or "Z" as cross-section indicators. I and O resemble symbols shown on drawings and N and Z are the same shape, but oriented 90 degrees. When you reach the end of the alphabet, use AA, BB, etc. Place the section letters at the end of the section arrow, not on one side.

Use commas to separate thousands and millions (i.e. 99,999 rather than 99999 or 99 9999).

Use abbreviations on plan sheets only where there is not enough space to spell out the word. In instances where the meaning of an abbreviation appears doubtful, the word should be spelled out. Do not capitalize abbreviations unless the word or words represented are ordinarily capitalized, or unless the abbreviation itself has become established as a capital letter, such as N for north. A period usually follows each part of an abbreviation that represents a single word. This aids in quick interpretation of an abbreviation, such as

"a.m.", not "am". The exception to a period following an abbreviation is with units of measure where periods are not used. The abbreviations shown on the "Plan Symbols and Abbreviations" sheet in Figure I have been adopted for use on plan sheets. Other abbreviations may be used as long as they are in common usage (e.g. units of measure, misc., i.e., etc. ...) or defined in the contract.

Use the FLH text and dimension styles for typical text. These styles automatically set the text properties for text and dimensions commonly used in plan sets. Place text labels with a leader line and filled arrowhead by using the built-in "Place Note" function. This increases drafting speed and maintains uniformity. See the [FLH Text and Dimension Styles](#) for more information.

Use a "Footnote" to supplement labels where insufficient space is available at the label location. Use a "Note" for general information that is relevant to the entire sheet. Do not use the term "General Notes". When possible, place Notes and Footnotes on the right hand side of the sheet with Notes placed above Footnotes.

9.6.5.2.4 Color

Color may be used to clarify complex plan and profile sheets. Color plan and profile sheets should be considered for complex projects. When used, color plan sheets should be distributed for plan reviews and construction sets. Color plans will not normally be distributed to bidders. Shades of gray may also be used to clarify plan sheets. See [Figure B](#) for standard colors to be used for colored plan and profile sheets. By default, color plotters will plot colors as they appear in the CADD drawing. Special pen tables are available that will plot drawings using the standard colors. These pen tables are set to "fade" and/or turn "gray" the existing features (levels E_*).

Figure B – Standard Colors

CADD Color	Plotted Color	Feature
CO = 0	Black	Information not listed below
CO = 1	Blue	Water (river and streams) (LV = E_HYD_)
CO = 2	Green	Trees (LV = E_VEG_)
CO = 3	Red	Proposed centerline (LV = P_HAL_), construction cut and fill limits (LV = P_RDW_Slope_Stake_Limits), and profile grade (LV = P_VAL_)
CO = 79	Purple	Proposed ROW (LV = P_RW_)
CO = 0	Gray	Existing features (LV = E_, selected)
CO = 137	Brown	Major contours (LV = E_GEO_Index_Contours)
CO = 6	Orange	Minor contours (LV = E_GEO_Intermediate_Contours)

9.6.5.2.5 Levels

Specific levels have been set up for various functions and roadway elements as shown in below. Place elements on the levels that best describe the element's purpose. See [FLH Level Library](#) for a complete listing of all levels.

Figure C – Level Library Summary

Level	Description
D_Details	Geometry for general details
D_Dimensions	Notes, labels, and dimensions. Dimension elements are automatically placed on this level when using the Dimension Styles.
D_Tables	Tables
D_Sheet	Level for sheet borders.
E_	Existing Features
E_CR_	Cultural Resources
E_GEO_	Existing ground features
E_HYD_	Existing hydraulic features
E_MAP_	Existing mapping
E_NR_	Existing wetlands and vegetation
E_PLM_	Existing planimetrics
E_RDW_	Existing roadway edges
E_ROW_	Existing right-of-way and property lines
E_SUR_	Surveying information
E_VEG_	Existing vegetation
E_UT_	Existing utilities
P_BRG_	Proposed bridges
P_EC_	Erosion control
P_EOP_	Proposed roadway edges
P_GPK_	Geopak elements
P_HAL_	Proposed horizontal alignments
P_HYD_	Proposed hydraulics and culverts
P_LA_	Proposed landscaping
P_MISC_	Proposed miscellaneous features
P_NR_	Proposed wet land mitigation
P_RDW_	Proposed roadway appurtenances
P_SMD_	
P_STR_	Proposed minor structures
P_TC_	Proposed traffic control

Level	Description
P_UT_	Proposed utilities
P_VAL_	Proposed vertical alignments
X_	GEOPAK criteria levels
AUX_	Auxiliary levels for elements not otherwise categorized

9.6.5.2.6 Stationing

Do not use "Station" or "Sta" as a prefix to station numbers. Any numbering including a plus sign (for example 2+959 or 30+00) is understood to be a station number.

9.6.5.2.7 CADD Filenames

Create unique CADD filenames; each containing a reference to the project followed by either a roadway design file type or a sheet type designator. Always use the default DGN extension for MicroStation design files.

< unique project designator > + < design or sheet file type > + .dgn

Use the unique project designator found in the [Active Project File Prefix Listing](#) as well as the utility to generate sample file names. For more information including the current design and sheet file type suffixes, refer to the [WFLHD File Naming Convention](#).

9.6.5.2.8 Cell Libraries

Graphics that are used on a consistent basis such as plan sheet borders, key maps, and symbols are located in cell libraries. Cell libraries are located on the WFLHD network and on the [WFLHD Cell Library](#) pages.

9.6.5.3 Organization of Plans

Organize plan sheets to show a logical progression of the project work. Group plan sheets according to their type and give each section a sequential letter. Fill in the margin block containing the designer's name, checker's name, filename, and date on each project specific plan sheet.

Follow the section order shown in [Figure D](#). On most projects reserve Sections A, B, C, and D for the categories shown. Use the remaining sections as necessary to fit the specific project requirements. Other sections may be added as necessary.

Decide on an arrangement within the guidelines that best fits the project needs. For instance, on a project that consists only of scattered work sites it may be advantageous to use a section for each site.

Number plan sheets consecutively within each section. Place tabulation of quantity sheets at the beginning of the section that shows the work item except as noted. The following discussion describes the content of the major sections.

Figure D – Plan Sheet Sections in Typical Order

<p>A. GENERAL INFORMATION</p> <ul style="list-style-type: none"> – Title Sheet including Index to Sheets (All projects) – Plan Symbols and Abbreviations (All projects) – Vicinity Map (as applicable)
<p>B. SUMMARY OF QUANTITIES</p> <ul style="list-style-type: none"> – Include on all projects
<p>C. TYPICAL SECTION (Most projects)</p> <ul style="list-style-type: none"> – Place tabulations and typical sections. On small projects these may be on the same sheet
<p>D. PLAN-PROFILE (Most projects)</p> <ul style="list-style-type: none"> – Place tabulations followed by mainline plan/profile sheets – May be renamed “LINE GRAPH” or other applicable plan sheet type
<p>APPROACH ROADS AND PARKING AREAS (Use next letter for included sections)</p> <ul style="list-style-type: none"> – Place tabulations followed by approach plan sheets (including profiles as appropriate) and/or parking area details – As appropriate split into multiple sections or include with the Plan-Profile section
<p>SOIL EROSION AND SEDIMENT CONTROL</p> <ul style="list-style-type: none"> – Tabulation of Soil Erosion and Sediment Control Quantities – Soil Erosion and Sediment Control Plans – FLH Standards, WFLHD Details, and project specific sheets
<p>MATERIALS SOURCES</p> <ul style="list-style-type: none"> – Plans and details pertaining to the material sources
<p>DRAINAGE</p> <ul style="list-style-type: none"> – Tabulation of Drainage Quantities – Drainage Cross-Sections – Applicable FLH Standards, WFLHD Details, and other project specific sheets
<p>SAFETY FEATURES</p> <ul style="list-style-type: none"> – Applicable FLH Standards, WFLHD Details, and other project specific sheets – Normally include quantity tabulations with the section where it is shown on a plan sheet
<p>FENCES, GATES, AND CATTLE GUARDS</p> <ul style="list-style-type: none"> – Applicable FLH Standards, WFLHD Details, and other project specific sheets – Normally include quantity tabulations with the section where it is shown on a plan sheet
<p>MISCELLANEOUS</p> <ul style="list-style-type: none"> – If needed, drawings that fit nowhere else
<p>WETLAND MITIGATION</p> <ul style="list-style-type: none"> – Tabulation of Wetland Mitigation Quantities followed by plans and details
<p>LANDSCAPING AND REVEGETATION</p> <ul style="list-style-type: none"> – Tabulation of Landscaping Quantities followed by plans and details

<p>TEMPORARY TRAFFIC CONTROL</p> <ul style="list-style-type: none"> – Tabulation of Temporary Traffic Control Quantities – Temporary Signing and Detour Plans – Section 635 FLH Standard Drawings, WFLHD Details, and other project specific sheets
<p>PERMANENT TRAFFIC CONTROL</p> <ul style="list-style-type: none"> – Tabulation of Permanent Traffic Control Quantities – Signing and Striping Plans – Section 633 & 634 FLH Standard Drawings, WFLHD Details, and other project specific sheets
<p>BRIDGE CONSTRUCTION DETAILS</p> <ul style="list-style-type: none"> – Drawings obtained from Bridge

9.6.5.3.1 Title Sheet

The *Title Sheet* serves to identify the location and limits of the project so bidders can find it in the field. Descriptive terms appearing on the title sheet should be readily identifiable by the topography, culture, or by use of State highway maps. Details that help to clarify the limits of the work or provide data needed to conveniently bid the work are encouraged. The following items should be included on the title sheet:

- Title and project designation (matching information in scheduling system)
- Project length
- State, county, city/town, National Forest/Park, etc.
- Key map of the State showing project location
- Index of sheets with all sheet descriptions matching the sheet's title block. If the entire index will not fit on the title sheet provide a section index.
- Design classifications such as the current Average Daily Traffic (ADT), design year ADT, directional distribution (D) when available, percent trucks (T) when available, design speed (V) and maximum superelevation rate (e)
- Design consultant logo (if applicable). Place logo in lower left corner and ensure that the logo is not larger than two-thirds the size of the logo in the sheet heading. Do not show an address or phone number on the logo.
- Consultant PE stamp (if applicable)
- Provisions for dates and signatures of the appropriate approving officials (see [Supplement 9.6.4.4-1](#)).
- Standard specifications to be used on the project
- Project Location Map (See below for more details)
- World Heritage Site logo (if applicable, see [list](#)). National Parks on the list include Glacier, Glacier Bay, Olympic, Wrangell-St Elias, and Yellowstone.

Prepare the project vicinity map using a scale ratio of 1:100,000 or larger. Show the project area, the nearest towns appearing on a State highway map, other roads, railroads, major streams, etc. In instances where sufficient information cannot be placed on the project vicinity map to adequately identify the project work, prepare additional vicinity maps on separate sheets. Additional details that help to clarify the limits of the work or provide data needed to conveniently bid the work are encouraged.

In addition to the above information, show the following on the project vicinity map:

- Distance from the project to nearest cities and towns linked to project termini

- North Arrow
- Location Map scale bar
- Beginning and ending stations or termini
- Schedule boundaries (when applicable)
- Material sources (when applicable)
- Disposal sites, stockpile sites, and storage areas (when applicable)
- Staging Areas (when applicable)
- Water sources (when applicable)
- Offsite Mitigation (when applicable)

9.6.5.3.2 Plan Symbols & Abbreviations

The Plan Symbols & Abbreviations sheet details all of the standard plan symbols and abbreviations currently in use by the WFLHD. This sheet is designated as Detail (M)W101-1. The symbols sheet was developed using the cells from the WFLHD cell libraries. Scale and cell name may be determined using MicroStation's command "element information" on symbols in this sheet.

When a special symbol is required that is not included on this sheet, show it in a legend on either the first plan sheet where the symbol appears or on the left side of the first plan-profile sheet. Abbreviations not shown may be placed on the plans similar to the way symbols are placed or may be added to the contract as a special contract requirement under Subsection 101.03 Abbreviations.

The symbols and abbreviations should not be changed on a project-to-project basis. When a change is required in the Plan Symbols & Abbreviations sheet to satisfy WFLHD's needs, change the master file so all future projects will have the same symbols and abbreviations. This prevents the need to check all the data on the sheet for every project. This documentation supporting the design exception decision should be prepared at the earliest possible point in the design process and must become a part of the PS&E package presented to the owner agency.

9.6.5.3.3 Summary of Quantities

The Summary of Quantities tabulates, combines, and summarizes the contract quantities for all pay items. This summary informs prospective bidders where to locate work within the plan sheets, the allowances if any, and expands on contract bid schedule information. It also serves as a helpful checklist to the designer to ensure that all elements of the design receive consideration.

This is generally one of the last plan sheets prepared in final form. The contents of this sheet are automatically generated using the Engineer's Estimate program. All the pay items are listed in numerical order and identified by appropriate descriptions. The bid schedule quantities duplicate those in the contract. Show any pertinent information by the use of the remarks column. Items of work paid for under the contract quantity provision of Section 109 should be identified when preparing the engineer's estimate.

In the preparation of the Summary of Quantities Sheet or the Tabulation of Quantities Sheets, always spell out the pay unit the way it is shown in the FLH master pay item list. Symbols for pay units are expressed without periods (e.g., m [ft], m² [SQFT], kg [lb], etc). Conformity with the information shown on the Plan Symbols and Abbreviations Sheet will improve the consistency of a set of plans.

9.6.5.3.4 Typical Sections

The Typical Section shows the shape of the finished cross-section with the construction limits, and represents the appearance of the completed project. It must be specific enough to describe the proposed work, its location, and material needs. Identify all functional elements of the typical section to a relative scale. Show widths in meters [feet] and show thickness or depth in millimeters [inches].

Use standard terminology matching the FLH Standard Drawings and the FP for features and pay items. Identify the following on the typical section:

- Indicate the location of the "Travel Way" and "Shoulder" on all sections where applicable
- Identify the typical section as "Mainline", the roadway name, or a specific approach road, along with the applicable stations (if more than one section), or companion site name by including a subtitle with each typical section.
- Use a "bubble" detail to clarify complex pavement structures.
- Use the full bid schedule item name to call out pavement structure features.
- Where an additional section uses the same pavement structure as the mainline, reference the mainline typical for surfacing depths (e.g. See Mainline Typical). This will reduce errors should the typical sections change during the development of the design.
- Include a curve widening table on the typical section if applicable. No slope ratio table is required.

Provide a slope rounding detail separate from the main line typical section. Show details for both the cut and fill slope rounding (if used). Separate details eliminate the need to duplicate these details on each typical section. Generic typical sections may be used to show different pavement structures and/or lane width/shoulder dimensions in one section to reduce the number of typical sections. Generic sections should be identified by TYPE (e.g. "Type 1" and "Type 2") using a table to describe the approach road station, type, class, roadway width, radiuses, etc.

Include the following notes as applicable:

- Superelevate roadway on curves at the rate 'e' as indicated on the Plan and Profile curve data.
- Construct slopes as shown in the Staking Report (see FAR 52.236-4).
- For cut heights less than the behind slope rounding distance (B), reduce the B dimension to the cut height dimension and reduce the front slope rounding distance proportionally.
- Apply [half of curve widening equally to both traveled ways] OR [full curve widening to inside travel way]. Curve widening is reflected in the field notes.

Place the tabulation of pavement structure quantities either on the typical section sheet or on the first sheet of this section. Show the estimating values (i.e. t/m³, lb/ft³) in the table for each item. (Refer to the Project Development Manual Section 9.4.10 for the appropriate significant figures.) See Plan-Profile Tabulation of Plan Quantities section for more information on tables.

9.6.5.3.5 Plan-Profile

Under this subject area, the designer may incorporate plan and profile sheets, plan sheets, line graphs, or other descriptive sheets that describe the proposed work.

Tabulation of Plan Quantities. Place quantity tabulations for items pertaining to the plan sheets (i.e. roadway obliteration, roadway excavation, guardrail, fence, etc.) either on the first plan sheet or on a separate tabulation sheet before the plan sheets. These tables aid the bidders in precisely locating the work areas and determining the effort required to perform the work.

Tabulation of quantities sheets consist of detailed summaries of work items presented in a tabular format. It provides bidders with more detailed information on the location and extent of the work required than can be shown on the summary of quantities sheet. Tabulations should show how a quantity is developed, not just repeat the quantity shown in the Summary of Quantities. Arrange the tables by increasing pay item number. Tables may either be drawn using CADD software or created in a spreadsheet made to look like a normal plan sheet. The WFLHD cell library (work_dd.cel) includes a table cell called "table3" which may be used or referred to as a guide. Sample spreadsheets are also available as guides.

Plan and Profile. Prepare plan and profile sheets at a scale that is adequate to show the necessary details as governed by the topography and the complexity of the work. Plans usually have a horizontal scale of 1:2000 [1" = 200 ft] when prepared on a standard size sheet. Larger or smaller scales may be used depending on the amount of detail to be shown. Profiles have the same horizontal scale as the plan, but the vertical scale should have an exaggeration of 5 or 10 times the horizontal scale.

When laying out plan and profile sheets, avoid dividing major structures, highway intersections, interchanges, or grade separations between sheets. Use supplemental sheets as necessary to make these drawings as clear as possible. Leave approximately a third of the first plan-profile sheet blank. Leave a similar blank space after the end of project on the final plan-profile sheet. Use the blank space on the first plan-profile sheet for project specific legends, utility information (name, type, contact and phone number) and other miscellaneous information beneficial to the contractor. Except for the first and last sheet attempt to place 700 meters [3000 feet] on a sheet, at 1:2000 scale [1"=200 ft], and break sheets at even 100 meter station [10 stations] numbers. Increasing stationing runs from left to right.

Plan View. Show the following information on the plan view:

- A prominent North arrow for orientation on each sheet.

- All boundary lines, State, county, city, township, and section lines. Where ties are shown to section corners that fall off the sheet, break the line and show the corner with tie distance. Describe found corners and show their coordinates. Also show streams, lakes, swamps, estuaries, etc.
- Include contours on complex projects on an as-needed basis. Fade or fade and color contours when plotted.
- When available show control point (CP) coordinates in a Control Point Table. Use a CP symbol and symbol number on the plan view.
- Station coordinates and elevation of the beginning of the project and the end of the project on the first and final plan-profile sheets, as appropriate.
- Include clear and concise labels and notes in the plan view. Ensure they are short and to the point. Utilize special details and special contract requirements to clearly define the work to be performed.
- On all sheets show the construction limits, access control lines, easements, and right-of-way lines. Within the right-of-way, show all cultural features requiring relocation, such as utilities and fences (when not on the right-of-way line). Identify all ownerships for right-of-way purposes. Show all drainage structures. Show any cultural features adjacent to the right-of-way that may be affected by the project.
- Curve data consisting of delta angle, radius of curve, tangent length, length of curve, and super-elevation should be shown. Curve widening may also be shown at this location. For spiral transitions, the spiral angle and length of spiral should be shown. Identify the station (0+000 or 0+00) at least 5 times per sheet along the centerline. Show bearings of all tangents.
- Show the location of borings, test pits, or other sites where subsurface investigations have been made on the plan portion of the plan-profile sheet. Do not show actual log or test results on the plan-profile. Use separate plan sheets for this data.
- Graphically show the proposed locations of culvert pipe (drawn to approximate skew), guardrail, wall, and other proposed work items. Where these items are called out in the profile view, no note is necessary in the plan view. Call out proposed work items either in the plan or profile view. Show exact station limits of proposed features in tables where applicable.
- Call out removal items and roadway obliterations with a note and show in a table as applicable.
- Include contours on complex projects on an as-needed basis. Fade or fade and color contours when plotted.
- Include companion site's (turnouts, parking areas, etc.) mainline stationing, centerline, outline, and cut/fill limits. Include approach road symbols.

Profile View. On the profile portion of the plan-profile sheets show the profile grade and existing ground lines. Show vertical curve information including station, elevation, length, and curvature ("k" value). Place a note indicating the profile grade and existing ground lines. Show gradients on the profile to four decimal places, grade elevations to two decimal places, and natural ground points (if any) to two decimal places. Show vertical and horizontal clearances for railroads, highways, and streambeds under proposed and existing structures.

Also show the following information on the profile view:

- Identify locations for items such as underdrain, subexcavation, and special ditches within the profile view with a bar graph (preferred) or plan view (acceptable). Show exact stations, lengths, elevations, and other information in a summary.
- Place a note at the approximate locations of pipe culverts listing the size of the pipe culvert. It is not necessary to show pipe culvert symbols. Note exact station and lengths in drainage summary. Include Q25 and HW/D ratio for 1200 mm [48 inch] culverts and larger.
- Show bridges and major structures to be constructed on the plan and profile in outline only, with a note to see the appropriate drawings.
- Show the approximate location of guardrail on profile by using a bar graph. Use circles at end of bars with notation stating terminal end section type. Exact stationing is not required on the profile, but should be placed in a summary.
- Include a quantity bar showing unadjusted excavation and embankment quantities. Break the earthwork bars at the end of runs (i.e. If no earthwork is generated or required over a portion of the project, don't show the quantity bar in that location).
- Show proposed work items that have not been called out in the plan view.

9.6.5.3.6 Associated Roadways

Plans, profiles, and details for approach roads, parking areas, turnouts, and other associated roadways may be placed in a single section or in multiple sections as appropriate. It may be appropriate to include approach road plans with the mainline plan and profile sheets. The designer should make the plans clear to the intended audience.

Use unique stationing for designed approach roads and secondary roads. Ensure that the stationing is different than stationing found on the mainline (e.g. the first approach road begins with 1+000, the second approach road begins with 2+000, etc...). Label matching stations where the designed approach road or secondary road intersects the mainline (e.g. M.L. 23+59 = Appr. 1+00). Either use the abbreviations "M.L." and "Appr." defined on the Standard Symbols and Abbreviation sheet, or use the roadway names.

Provide elevations and coordinates for critical points within parking areas, if centerline and staking notes are not provided. Include note stating, "Elevations shown are to finished grade unless otherwise noted."

9.6.5.3.7 Soil Erosion and Sediment Control

This section consists of plans, detail drawings and standard drawings that detail the measures required to protect resources and to comply with permit stipulations. The plan sheet details should reflect Best Management Practices (BMP); comply with Erosion and Sediment Control on Highway Construction Projects, FHWA, 23 CFR Part 650, Subpart B.; and be in agreement with the stipulations in the National Pollutant Discharge Elimination System (NPDES) permit. Include erosion and sediment control plans for all applicable projects, not just large or complex projects. It is not satisfactory to leave the development of erosion and sediment control plans to the contractor or project personnel after project award.

As a minimum, erosion and sediment control plans should identify erosion and sediment sensitive areas and provide a mechanism for minimizing any adverse effects. The plan sheets should show the contours and proposed erosion control features. For complex and/or environmentally sensitive projects also include topsoil, permanent seeding, and mulching locations in the erosion control section rather than the plan profile section.

9.6.5.3.8 Materials Sources

When a material source is included, show the following:

- Baseline (Survey Data)
- Contours
- Disturbance limits
- Boundaries of the materials source
- Boundaries of main extraction area
- Maximum final slope ratio
- Rehabilitation Plan
- Geotechnical information
- Stripping notes
- Seeding plan
- Borehole locations
- Typical section for source development including benching requirements

See [Section 9.6.5.3.14](#) of the PDDM for more information regarding Reclamation Plans.

9.6.5.3.9 Drainage

This section consists of the Tabulation of Drainage Quantities, details of large culvert installations, headwalls, inlet and outlet treatments, fish passage requirements, energy dissipators, catch basins, manholes, and other drainage installations. Drainage standard drawings should also be included in this section.

The Tabulation of Drainage Quantities sheet lists all permanent culverts and related drainage data. Show the location of the drainage installation under the station heading.

Show related data in the row across the sheet under an appropriate column heading. Total the figures in the various columns to obtain the quantities to show on the summary of quantities sheet for the appropriate culvert item.

Provide drainage cross-sections for all culverts greater than 1200 mm [48 inches]. Show skew angle measured from a line perpendicular to centerline.

9.6.5.3.10 Other Sections

Provide separate sections for safety features (Items 617, 618, etc.), fences and related items (Items 619), walls, utilities and other items of work not described in other parts of the plans. These sections should contain the standard plans and other details pertaining to the work. Individual detail sheets that do not fit well into other sections may be placed in a Miscellaneous Details section.

9.6.5.3.11 Environmental Mitigation

Commitments for environmental mitigation features that are contained in the environmental documentation should be detailed as necessary and included in the project plans as Special Details and/or shown at the appropriate location in the plans.

Plan sheets for wetland replacement or mitigation are special drawings that detail all work required to ensure successful mitigation. These may range from simple sketches to elaborate contour grading and planting plans that conform to the commitments in the environmental document.

9.6.5.3.12 Landscaping and Revegetation Plans

When applicable, show special grading details, slope treatments, landscaping, salvage of vegetation, planting layout, plant installation details, irrigation, and other permanent landscaping features on separate plan sheet details for clarity and ease of use.

9.6.5.3.13 Temporary Traffic Control

Provide details to assure safe passage of traffic through a specific project construction zone. Use a table format to list the required traffic control devices and signs. For most low volume roads provide standard traffic control layouts that conform to the MUTCD. For areas with complex traffic control, graphically portray the striping and traffic control device locations. For projects with complex schedules, provide a complete work schedule summary showing work restrictions such as road closures and environmental restrictions either in the specifications or the plan sheets.

9.6.5.3.14 Permanent Traffic Control

Provide tables and details showing the permanent pavement marking, sign, object marker, and delineator locations. For complex areas provide a graphical plan showing the proposed striping and sign locations in addition to the tables. Also show details for unique signs.

9.6.5.3.15 Bridges

The Structural Design unit designs most bridges and other large structures. The designer will usually receive a complete set of bridge plans and accompanying draft Special Contract Requirements for insertion into the PS&E assembly. The bridge plans and roadway plan-profile sheets, and other plan sheets, must be crosschecked for compatibility and to ensure that stationing, gradients, elevations and other geometric details are identical. The notes on the bridge plans and the draft Special Contract Requirements must be reviewed and checked to eliminate any potential conflict with other provisions of the contract. Transfer quantities on the bridge plans to the summary sheet and assign item numbers as appropriate. Resolve any differences found during the review and number the bridge plans for insertion into the final package.

Structure sheets may be inserted into the plan package anywhere following the plan-profile sheets. They are often placed last in the plan package.

9.6.5.3.16 Contiguous Projects

A general plan or layout of contiguous construction projects may be beneficial to potential bidders in determining the cost of work on FLH projects. This is particularly true where another agency is constructing a project that will affect FLH contractors. It is essential that the relationship between the projects be well detailed on the plans.

There are instances where as-constructed plans should be included in the contract plan package. If a bridge or other structure is scheduled for salvage, a set of the as-constructed plans will greatly assist a contractor in determining the most effective method to disassemble the structure.

On occasion, right-of-way plans or utility plans may be too complicated to incorporate on the plan and profile sheets. They could be inserted into the plans under this subject area.

9.6.5.4 FLH Standard Drawings, Standard WFLHD Details and Special Details

Arrange the FLH Standard Drawings, Division Details and project-specific Special Details in the subject section to which the drawing applies.

9.6.5.4.1 FLH Standard Drawings

Refer to [PDDM Section 9.6.5.4.1](#) for information regarding [FLH Standard Drawings](#).

9.6.5.4.2 Standard WFLHD Details

In addition to the standard drawings issued by the Federal Lands Highway Office, the WFLHD has developed approved details for use on all projects as applicable. [WFLHD Details](#) are intended for details that are used on a repetitive basis. Details from other FLH Divisions may also be used as applicable.

Details are organized in a similar fashion to the FLH Standard Drawings. The detail number consists of the corresponding three digit section number from the *Standard Specifications for Construction of Roads and Bridges on Federal Projects (FP)*, prefixed with a "W". WFLHD Details will be created for both US Customary (W000-0) and Metric (MW000-0) units. For example, the "Gabion Basket" details are W253-1 (US Customary) and MW253-1 (Metric).

Special Details that are used on many projects should be nominated to become a WFLHD Detail. Coordinate review and approval of new WFLHD Details with the appropriate technical specialists, the Specifications Engineer, the Construction Branch, and the Highway Standards Engineer.

9.6.5.4.3 Special Details

Special Details are project specific details necessary to properly describe the work. Special Details include plan sheets detailing grade crossings, turnouts, retaining walls, dikes and ponds, waste or borrow areas, stage construction plans, permanent striping and signing plans, road approaches, material source locations and other work.

When a modification is made to Standard Drawings or Standard WFLHD Details for specific projects, they become special details. Remove the typical standard or detail drawing title blocks to prevent confusion. Use the normal sheet title blocks for these drawings.

Standard plans prepared by State DOT's or other outside agencies that are incorporated into the contract should be treated as Special Details for insertion into the plans package. Ensure that all references to specifications or other drawings align with the remainder of the project package.

A [FLH Special Details Database](#) is maintained, which may be helpful for development and sharing of project-specific special plan details and the associated specifications and unit costs.